May 24, 1938. J. B. BRENNAN 2,118,484

TEMPERATURE CONTROL FOR INTERNAL COMBUSTION ENGINES

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Fig. 1.

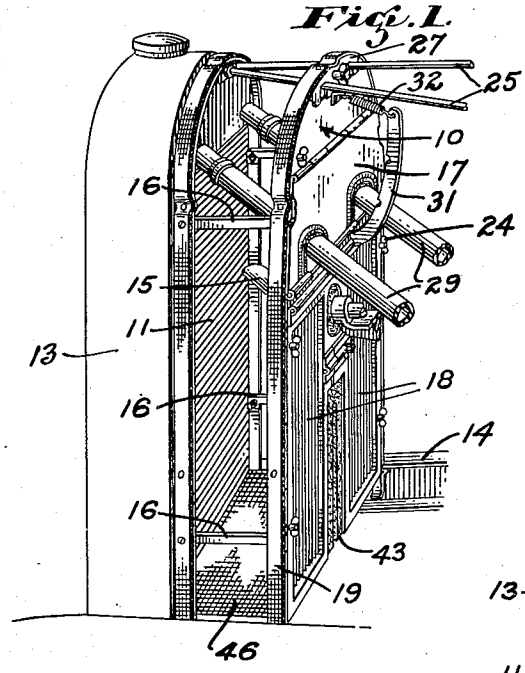


Fig. 2.

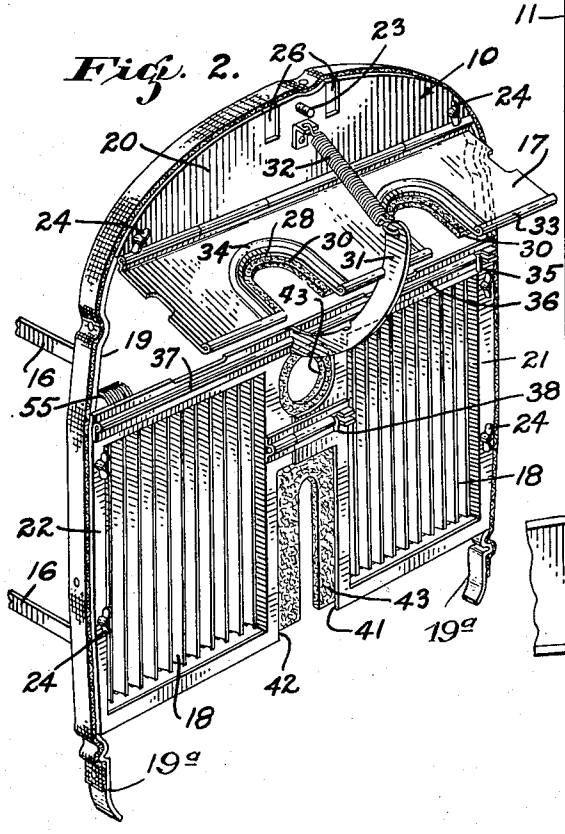
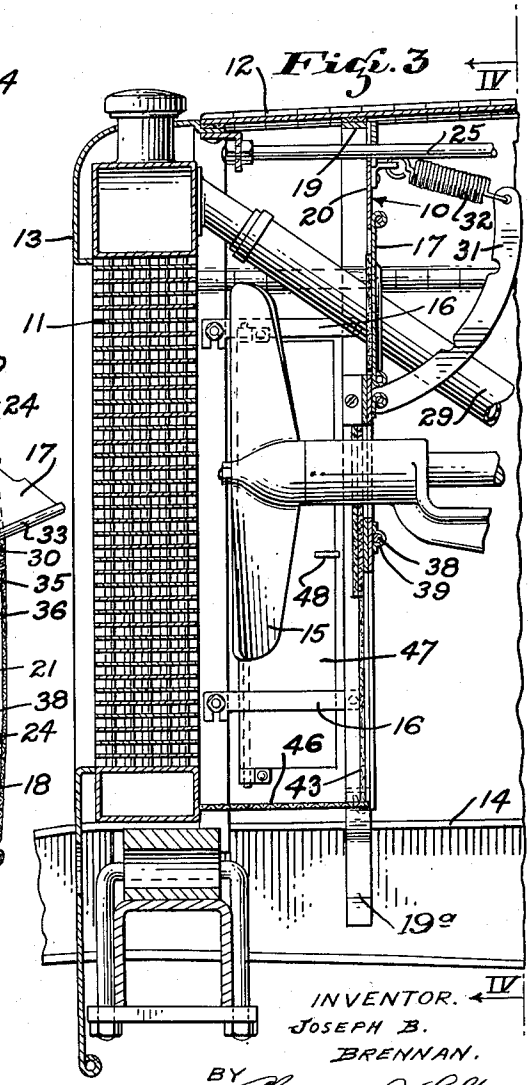


Fig. 3



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Fig. 4.

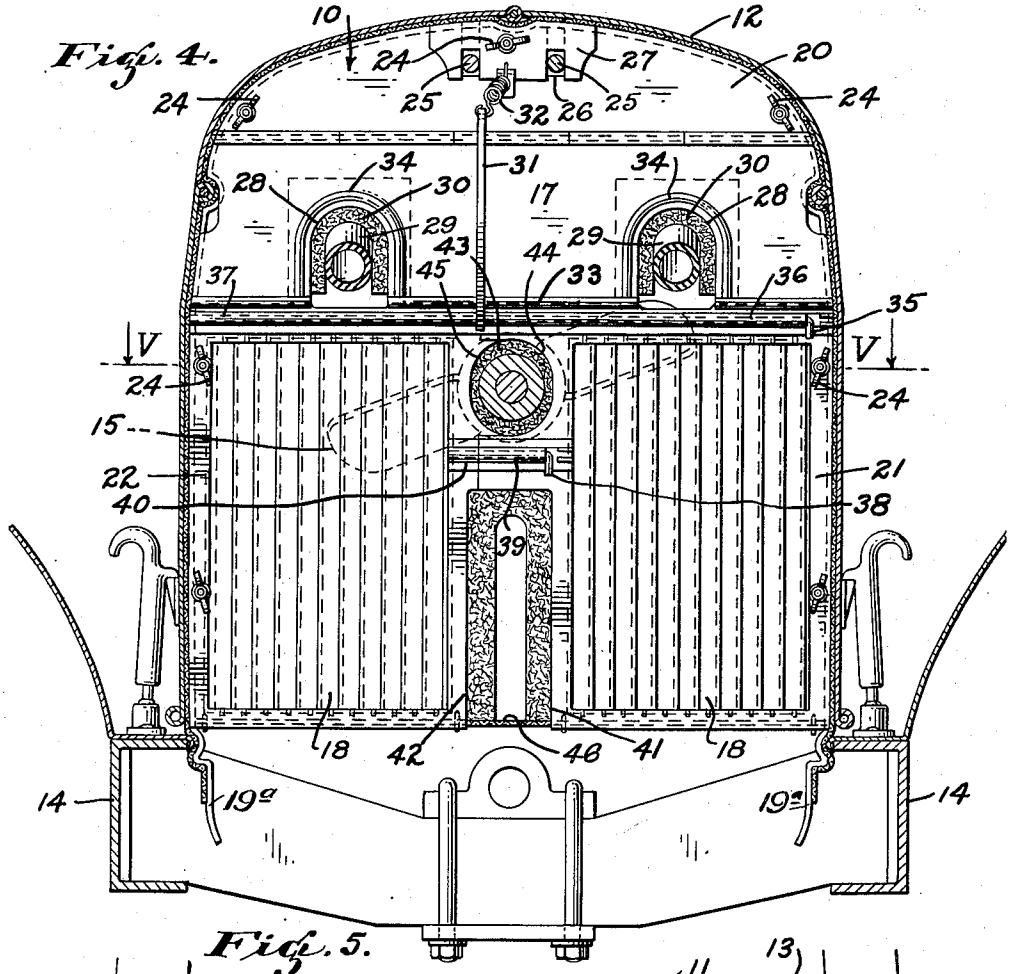
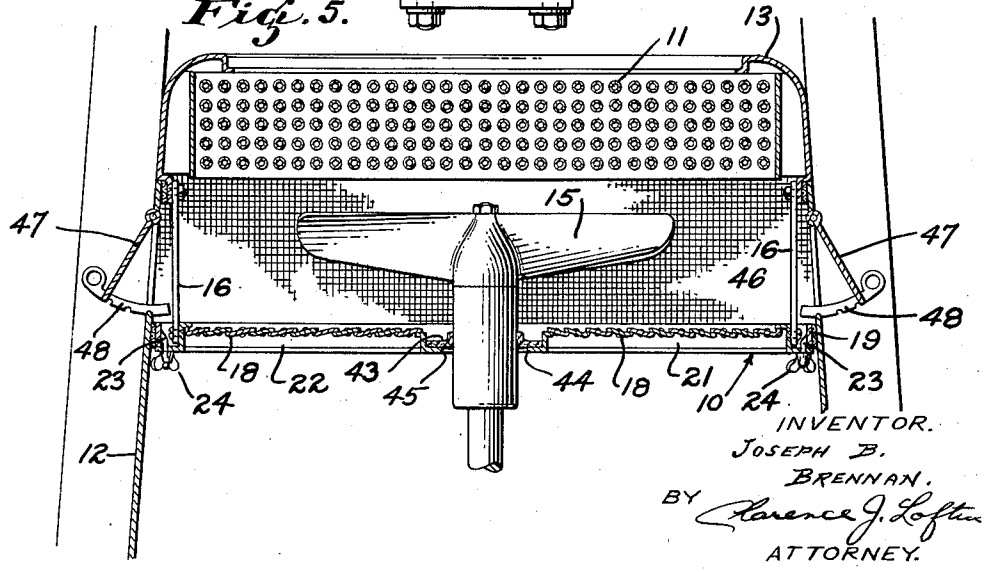


Fig. 5.



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Fig. 6

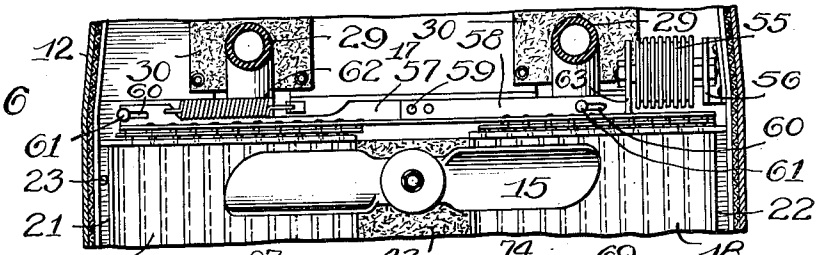


Fig. 7

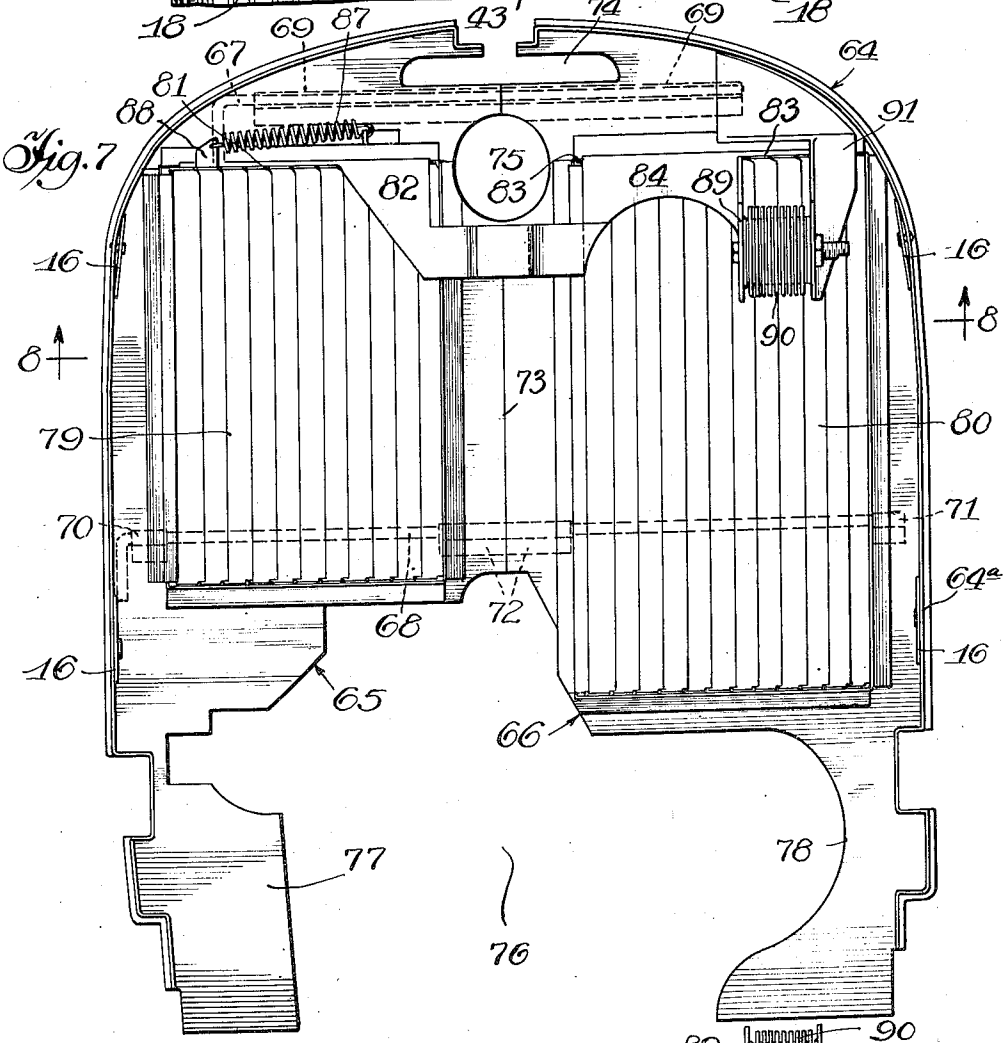
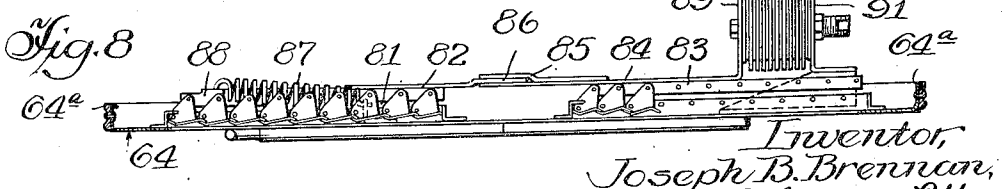


Fig. 8



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UNITED STATES PATENT OFFICE

2,118,484

TEMPERATURE CONTROL FOR INTERNAL COMBUSTION ENGINES

Joseph B. Brennan, Fort Wayne, Ind., assignor to The Magnavox Company, Fort Wayne, Ind., a corporation of Arizona

Application March 21, 1934, Serial No. 716,672

5 Claims. (Cl. 123—174)

The present invention relates to a temperature control means for an internal combustion engine and more particularly to an improved arrangement wherein the temperature of the engine is maintained by controlling the circulation of air through a water cooling radiator associated with the engine.

It is well known that the efficiency of an internal combustion engine depends to a large degree upon the temperature at which it operates. It is also well known that the cylinder walls and other parts of the engine must be held below a certain predetermined temperature in order to prevent a scorching of the cylinder walls. This latter condition is usually controlled by means of circulating water and/or air that will maintain the engine at a temperature which will permit the most efficient operation. It is practically impossible to provide a water cooling radiator for an internal combustion engine which will produce the optimum temperature under all conditions of operation, as for instance, during different seasons of the year and therefore it has been the practice to provide baffles or louvered panels positioned forwardly or in front of the radiator and responsive to the temperature of the water circulating through the radiator, and which baffles or panels will interrupt and control the amount of air passing through the radiator cooling system.

It is an object of the present invention to provide a device forming a louvered partition or panel behind the radiator and fan and in front of the motor and adapted in combination with the hood, to form a chamber or compartment for banking the heated air until such time as the temperature within said compartment rises to a point sufficient to actuate a thermostat which in turn opens the louvers and permits a flow of air through the radiator and to the motor.

A further object of the invention is to provide a temperature controlling partition or panel for an automobile engine which can be readily mounted in spaced relation with the radiator and behind the air circulating fan after the automobile has been assembled without dismantling any of the parts thereof, and forming a chamber or compartment with the radiator and hood when the latter is in closed position.

Another object of the invention is to provide a temperature controlling mechanism for the water cooling radiator of an automobile which can be mounted in spaced relation with the radiator at a point where it will give the most efficient control.

Another object of the invention is to provide a temperature controlling means for an automobile radiator which will cooperate with the automobile hood in a novel manner to control the circulation of air through the radiator.

Another object of the invention is to provide a temperature controlling partition or panel which has means for effecting both a gross and a fine control of the cooling air circulating through the radiator.

With these and other objects in view, the invention consists in the construction and novel combination and arrangement of parts hereinafter fully described and illustrated in the accompanying drawings, it being understood that various changes in the form, proportion and details of construction may be resorted to without departing from the spirit of the invention or sacrificing any of the advantages thereof.

In the drawings wherein like numerals designate like parts throughout the several views;

Fig. 1 is a fragmentary perspective view showing an automobile radiator with a temperature controlling panel or partition mounted in operative relation therewith;

Fig. 2 is a perspective view showing the improved panel or partition removed from the automobile and in its assembled condition;

Fig. 3 is a vertical sectional view taken along the center of Fig. 1;

Fig. 4 is a vertical sectional view taken along line IV—IV of Fig. 3;

Fig. 5 is a sectional view taken along line V—V of Fig. 4.

Fig. 6 is a sectional view showing the front of the panel with a thermostatic operating means mounted at one side of the panel.

Fig. 7 is a view in front elevation of the novel device designed for an automobile having a six cylinder engine.

Fig. 8 is a view in horizontal cross section taken in a plane represented by the line 8—8 of Fig. 7.

Referring more particularly to the disclosure in Figs. 1 to 6 inclusive of the drawings, the present invention is shown as applied to an automobile of the type having an eight cylinder V-type engine, although it is to be understood that the invention is equally well adapted for engines of other types. As illustrated in Fig. 1, the invention contemplates the use of a circulating air controlling panel or partition 10 which is disposed to the rear of and spaced from an automobile radiator 11. The configuration of the panel or partition 10 is such that it will conform to the interior of an engine hood 12 at a point intermediate the radiator 11 and engine and form a

compartment with the radiator and hood when the latter is closed. The radiator 11 is shown as enclosed in a shell 13 that is preferably secured upon the forward end of the chassis 14 of the automobile. The air circulating fan 15 operates within this compartment or chamber. The panel or partition 10 is secured in position by means of a plurality of detachable brackets 16 which extend forwardly therefrom to the radiator shell 13. When the panel 10 has thus been mounted upon an automobile it will cooperate with the hood 12 to control the circulation of air through the radiator.

In order to prevent an overheating of the radiator 11, as during a long run or in warm weather, the partition or panel 10 is provided with suitable venting means that will permit the air circulated by the fan 15 to pass therethrough. In the drawings the panel 10 is illustrated as having a relatively large damper 17 and a plurality of adjustable louvers 18 arranged along each side of its center through which air may circulate. The adjustable louvers 18 can be controlled automatically by a thermostatic means which is sensitive to and controlled by the temperature of the air trapped or banked in the chamber or compartment formed rearwardly of the radiator. In the drawings the louvers 18 are shown as operated by an expansible bellows type of thermostatic means that is to be described in detail hereinafter.

In Figs. 2 and 4 of the drawings the partition or panel 10 is shown as comprising four major parts which can be readily dismantled and assembled in a simple and convenient manner without using any special apparatus or tools. These four major parts comprise an outer supporting frame 19, a top or upper member 20 that supports the damper 17, and right and left hand side members, designated respectively by the numerals 21 and 22, which carry the adjustable louvers 18. The supporting frame 19 can be formed of strap iron or it may be of light angle iron. If the frame 19 is formed of strap iron it will preferably be provided with suitable ears having threaded studs 23 (see Fig. 6 of the drawings) which will cooperate with wing nuts 24 to secure the members 20, 21 and 22 upon the frame. The brackets 16 which engage with the radiator shell 13 may be suitably attached to or pivoted upon the frame 19 when it is assembled or they may be later attached thereto by means of bolts and nuts, and the ends 19a of the frame 19 are shown as having a configuration which is adapted to cooperate with the automobile chassis 14 at the point where the ends engage therewith. This feature will of course be determined by conditions found in the particular automobile to which the invention is applied. In the present instance, these ends are shaped so as to be firmly held in engagement with the chassis when the side members 21 and 22 are finally secured in place by the frame 19.

The top or upper member 20 is secured at its ends upon the frame 19 by means of a pair of the aforementioned threaded studs 23 and wing nuts 24. The automobile on which the partition or panel 10 is illustrated has two tie rods 25 that extend from its cowl to the top of the radiator shell 13. In order to accommodate these tie rods 25 the upper member 20 has two notches 26 through which the tie rods may pass. At this point it should be stated that the notches 26 are preferred to round holes as such a construction permits the application of the partition or panel to the automobile without disturbing the tie rod adjustment made at the factory. When the panel or partition is in place a suitable cleat 27 is secured over the notches 26 to prevent the passage of air therethrough.

From the above general description it will be seen that the improved air circulation controlling panel or partition contemplated by the present invention comprises a small number of readily demountable elements which make it possible to install the panel upon an automobile in a simple, convenient and expeditious manner.

In applying the partition or panel to an automobile, the hood 12 is first raised at one or both sides and the supporting frame 19 is passed over the tie rods 25 and snapped into its vertical position upon the chassis 14. After the ends 19a of the frame have been thus snapped into engagement with the chassis 14, the brackets 16 are then secured to the radiator shell 13 so as to hold the panel in spaced relation with the radiator. For convenience the brackets 16 are made flat at their shell engaging ends so that they may be hooked over the radiator securing bolts carried by the radiator shell 13. After the frame 19 has been thus secured in position, the top member 20 and the side members 21 and 22 can be attached to the frame by means of the wing nuts 24, and finally the cleat 27 can be added to the assembly.

While the drawings show the panel 10 as having three major partition forming members, one of which carries the damper 17, it should be understood that the member 20 and its damper 17 may be omitted if desired. In such event the louvered side members 21 and 22 will be extended upwardly into the area occupied by the damper 17 and the member 20. The louvers 18 will then function to control all of the air passing through the radiator 11.

The damper 17 is illustrated as hinged along its upper edge to the top member 20 and as having its lower edge cut away at two points, as at 28, to provide for water circulating hose connections 29 that extend from the engine to the upper part of the radiator 11. Two cut away portions 28 are shown in the damper 17 as the circulating water must flow through a hose connection 29 leading from each cylinder block of the V-type engine. Where a single hose connection is used only one cut away portion 28 will be necessary. No provision is made for the return water connections from the radiator 11 as these pass beneath the panel 10. The cut away portions 28 of the damper 17 are provided with flexible felt strips 30 which extend completely therearound so that in cooperation with the water circulating hose connections 29, they will substantially close the panel 10 when the damper is in its closed position. While the damper 17 is shown as hinged along its upper edge to the member 20, it is to be understood that this damper may be hinged along its lower edge. When a single hose connection 29 is used the damper 17 may be made in two parts with a hinge at either end or with a common hinge disposed vertically at its center so that the two ends may swing rearwardly.

The purpose of the damper 17 is to provide for a gross control of the air circulating through the radiator 11 and therefore it will not require frequent adjustment. It is shown as adapted to be set by hand in any position that will provide an approximately proper circulation of air for the radiator during any particular season of the year. In the warm months the damper 17 may be fully opened and in cold weather it may be

completely closed. As a means for holding the damper 17 in its closed or opened position, or in any intermediate position, there is provided a notched lever 31 that is biased into engagement with the edge of the damper by means of a tension spring 32 carried by the member 20.

The damper 17 is formed of comparatively light sheet iron and is adapted to engage the upper edges of the side members 21 and 22 when in its closed position. In order to impart rigidity to the damper it is provided with a beading 33 along its lower edge and also an embossing 34 which extends around the cut away portions 28.

The louvered right and left hand side members 21 and 22 are of substantially similar construction, except for certain details at their meeting edges which will be pointed out more specifically hereinafter. These members are secured at their outer edges to the supporting frame 19 by additional wing nuts 24 and at their meeting edges they are held in alignment by sliding bolts or other suitable means. In the drawings the side members are shown as held together by a relatively long rod or sliding bolt 35 that extends through tubular members 36 and 37 carried respectively by the side members 21 and 22.

A second and shorter sliding bolt 38, that cooperates with similar tubular guides 39 and 40 mounted respectively upon the side members 21 and 22, is also provided below the bolt 35.

As illustrated in the drawings the right and left hand side members 21 and 22 have overlapping and cut away portions at their inner edges which, in conjunction with the damper 17 and upper member 20, will form a complete partition beneath the automobile hood 12 that will prevent the circulation of any air beyond the panel 10. In the particular automobile to which the illustrated panel or partition 10 is adapted, the crank case of the engine extends forwardly and in order to accommodate this part of the engine the members 21 and 22 are cut away respectively as at 41 and 42. These cut away portions 41 and 42 are provided with felt strips 43 which will form a substantially air tight joint between the side members and the crank case. Oppositely disposed cut away portions 44 and 45 which will accommodate the fan shaft and bearing are also provided respectively in the members 21 and 22. These cut away portions 44 and 45 also have felt strips 43 which serve to seal the partition at this point.

The tubular members 36 and 39, previously referred to as mounted upon the right hand member 21, are extended beyond the vertical center line of the panel 10 and when the sliding bolts 35 and 38 are passed therethrough they will extend across the panel above and below the fan shaft to thus rigidly secure the meeting edges of the side members 21 and 22 in overlapping alignment and also maintain their upper edges in a plane transverse to the automobile hood 12. The upper sliding bolt 35 is preferably of a length sufficient to extend completely across the top of both side members and the lower bolt 38 is of such a length that it will not interfere with the louvers 18 at each side thereof. The right hand ends of the tubular members 36 and 39 are shown as having lugs or stops which serve to hold the bolts 35 and 38 in their respective tubular guide members.

If the automobile to which the present invention is to be applied does not have a closely fitting drip pan or is of a construction which will permit the passage of air below the radiator and/or panel, it will be found desirable to provide a closure between the bottom of the panel 10 and the radiator 11 which will prevent the escape of air downwardly and underneath the panel or partition. This difficulty can be conveniently and inexpensively overcome by securing a webbing 46 of canvas or the like between the lower edges of the panel 10 and the radiator 11. Such a webbing 46 of canvas or other material is illustrated in the drawings as extending horizontally from the sides of the chassis 14 and between the panel or partition 10 and the radiator 11. This webbing 46 can be secured in place at its ends by any suitable means.

Upon referring to Fig. 5 of the drawings it will be seen that the fan 15 is enclosed in the space or chamber between the panel 10 and the radiator 11. When the panel or partition is completely closed, as in extremely cold weather, the fan 15 will be ineffective to produce any circulation of air through the radiator 11. Under these conditions, however, the cold air striking the radiator as the automobile travels along will carry away enough of the heat radiated to prevent a boiling of the water in the radiator. The panel 10 will also serve to prevent the hot air given off by the radiator, and cold drafts through the radiator, flowing over the exterior surface of the engine. In this figure of the drawings there is also illustrated a ventilator 47 hinged at each side of the hood 12 which may be opened to permit a circulation of air through the radiator should it be desired to operate the engine without exposing it to hot or cold drafts of air entering through the radiator. These side ventilators 47 are located upon the hood 12 at a point in front of the panel 10 and adjacent the radiator. In extremely hot weather these ventilators 47 can be used instead of the damper 17 to effect what has been termed a gross control of the radiator and engine temperature. In the event that the panel or partition 10 is made up of only two vertically extending side members, as previously suggested, these side ventilators 47 may be operated to effect the gross control provided for by the damper 17 in the baffle illustrated. Each of the hinged ventilators 47 is shown as supported at its forward edge and as having a notched latching member 48 which will serve to hold the ventilator in a number of different open positions.

Although provision has been made for the proper circulation of air through the panel in the summer months to permit the engine to operate at its maximum efficiency and prevent its overheating, this panel because of its unique construction may be readily removed during the warm weather and again replaced after the summer months.

In Fig. 6 there is illustrated an embodiment of thermostatic means or mechanism 55 for operating the louvers 18. As here shown the thermostatic means 55 is mounted upon a bracket 56 which can be secured either to the frame member 19 or to the side member 22. Extending across the top of the louvers 18 there is a sliding link that is constructed of two separable parts, designated by the numerals 57 and 58, which are secured together at their meeting ends by bolts 59. When the parts 57 and 58 are thus secured together they will operate as a single long link. This link is made in two parts with a connection at their meeting ends to permit a separation of the side members 21 and 22, as contemplated by this invention, without disconnecting the link parts 57 and 58 from their respective sets of

louvers. Each of the parts 57 and 58 is provided with a slot 60 which engages with a stud 61 carried by each of the side members 21 and 22. The sliding link thus formed and supported is shown as biased to the right by means of a spring 62 connected between the link part 57 and a portion of the side member 21. An upwardly extending arm 63 that engages with the movable end of the thermostatic means 55 is provided upon the link part 58 to form a driving connection between the thermostatic means and the louvers.

As illustrated, the thermostatic means 55 is shown contracted and when in this position the louvers 18 are normally held in their closed position by the spring 62. When the thermostatic means 55 expands the sliding link formed by the parts 57 and 58 will be moved to the left and cause the louvers to be opened.

In Figs. 7 and 8, there is disclosed an embodiment of the invention constructed and arranged for application to an engine of the six cylinder type. In this form of the invention, the panel or partition 64 is made in two sections 65 and 66 which are split vertically and suitably connected together by means of locking bars 67 and 68 adapted to extend through tubular clips formed or provided on the panel sections. The locking bar 67 is shown as passing through abutting clips 69 on the sections 65 and 66, while the sliding bar 68 is passed through spaced clips 70 and 71, and abutting clips 72 on these sections. The panel sections 65 and 66 have abutting edges as at 73 and complementary cut-out portions as at 74, 75 and 76 for receiving parts of the automobile frame or chassis, cooling system and engine. Suitable insulating means may be provided around these parts. The ends 77 and 78 of the panel sections 65 and 66, respectively, are adapted to encompass and engage parts of the engine and/or chassis and be retained thereon and in spaced relation with the hood by means of brackets or clips 16. The sectional supporting frame or panel 64 is provided with an inturned flange 64a adapted to be engaged by the hood when the latter is in lowered or closed position.

The panel section 65 is provided with the pivotally mounted louvers or shutters 79, while the section 66 is provided with louvers or shutters 80, which because of the contour of the engine, are of greater length than the louvers 79. Attached to the upper ends of the louvers 79 is a bar 81 to which is in turn connected a bar or plate 82. Similarly, a bar 83 is attached to the upper ends of the louvers or shutters 80, and this bar is in turn connected to a bar or plate 84. The bar or plate 84 has connected thereto another plate 85 having an end off-set for receiving an end 86 of the bar or plate 82. By thus connecting the plates 82 and 84, the shutters or louvers in both sections may be opened and closed as a unit. A spring 87, which is connected at one end to a lug 88 on the bar 81 and at its other end to the stationary part of the frame, normally retains the louvers in closed position. In order to open these louvers, the bar or plate 84 which forms the driving member, is connected by an arm or bracket 89 to an end of a thermostat 90, the other end of the thermostat being anchored on a bracket 91 mounted on the stationary part of the frame.

By thus making the panel or partition in two sections it may be readily assembled, removed or replaced. Also because of its simplicity, the device is cheap to manufacture and to install. The outer or exterior appearance of the automobile is in nowise altered and because of the construction of the thermostat and its location in the compartment formed by the radiator, hood and panel, the louvers will be quickly closed upon a decrease in the temperature of the air within this compartment.

From the above it will be seen that, in addition to a new arrangement for controlling the temperature of an automobile engine, the invention also provides a novel form of panel or partition which will make possible the application of the invention to an automobile after it has been completely assembled. This aspect of the invention is of equal importance to the purchaser and the manufacturer. The invention, as illustrated and described, is of such simple construction that a purchaser can easily install it upon an automobile without dismantling any of the parts or employing the services of a skilled mechanic. The manufacturer will also find it possible to install the invention upon an automobile without interfering with the established assembly routine at the factory. A further advantage to the manufacturer is that the panel can be mounted upon the automobile as a final assembly operation at the factory.

Having thus disclosed the invention, I claim:—

1. In a temperature control system for an automobile having an engine cooling system in which an air cooled radiator is employed, the combination of a hood extending rearwardly from the radiator and over the engine, a fan disposed behind said radiator for circulating cooling air therethrough, a panel disposed behind said fan and forming with the hood, an enclosing compartment for the fan at the rear of the radiator, thermostatic means in said compartment responsive to the temperature of the air therein, and adjustable louvers carried by said panel actuated by said thermostatic means for permitting the escape of air from said compartment to thereby control the operating temperature of the engine.

2. In a temperature control system, the combination of an internal combustion engine having a circulating fluid cooling system, a heat dissipating radiator through which the circulating fluid of the cooling system circulates, a fan behind said radiator for creating a flow of cooling air therethrough, a partition disposed to the rear of the fan and in spaced relation with said radiator whereby the fan will be enclosed in a compartment immediately behind said radiator, said partition having a large damper for effecting a gross control of the air circulating through said compartment, and thermostatically controlled louvers responsive to the temperature of the air within the compartment and operating independently of said damper for effecting a fine control of the air circulating through said compartment.

3. In a temperature control system for an automobile having an engine cooling system which includes a radiator open in front to the atmosphere, the combination of a hood extending rearwardly from the radiator and over the engine, a fan disposed behind said radiator for circulating cooling air therethrough, a member disposed behind said fan forming a compartment with the hood and radiator through which the heated air when circulated by said fan will pass, thermostatic means in said compartment responsive to the temperature of the air therein, and venting means controlled by said thermo-

static means for permitting the escape of air from said compartment to thereby control the operating temperature of the engine.

4. In a temperature controlling means for an automobile engine having a circulating fluid cooling radiator and an air circulating fan, the combination of a partition conforming to the interior of the hood and engaging the chassis behind the fan, said partition comprising a plurality of separable partition-forming members each having adjustable louvers mounted thereupon, a sliding link carried by each of said members connected to said louvers, means for connecting said links and thermostatic means connected to the sliding link of one of said members for opening and closing said louvers in response to temperature changes in the air adjacent said members.

5. In a temperature controlling means for an automobile engine having a circulating fluid cooling radiator and an air circulating fan, the combination of a panel adapted to engage the chassis of the automobile and conform to the interior of the hood behind the fan, said panel comprising a plurality of separable panel forming members having adjustable louvers mounted thereupon, connecting sliding links carried by said separable members for opening and closing the louvers carried thereby, thermostatic means responsive to the temperature of the air adjacent the panel formed by said separable members, and means connecting said thermostatic means to said sliding links whereby the links will be moved to open and close said louvers in response to temperature changes in the air passing through the radiator.

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