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WINTER FRONT FOR AUTOMOTIVE RADIATORS

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Fig. 3

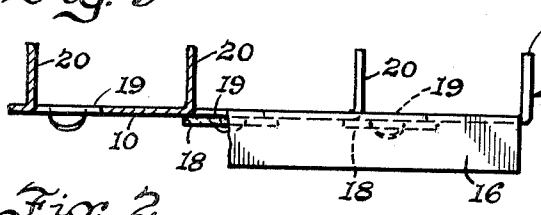


Fig. 1

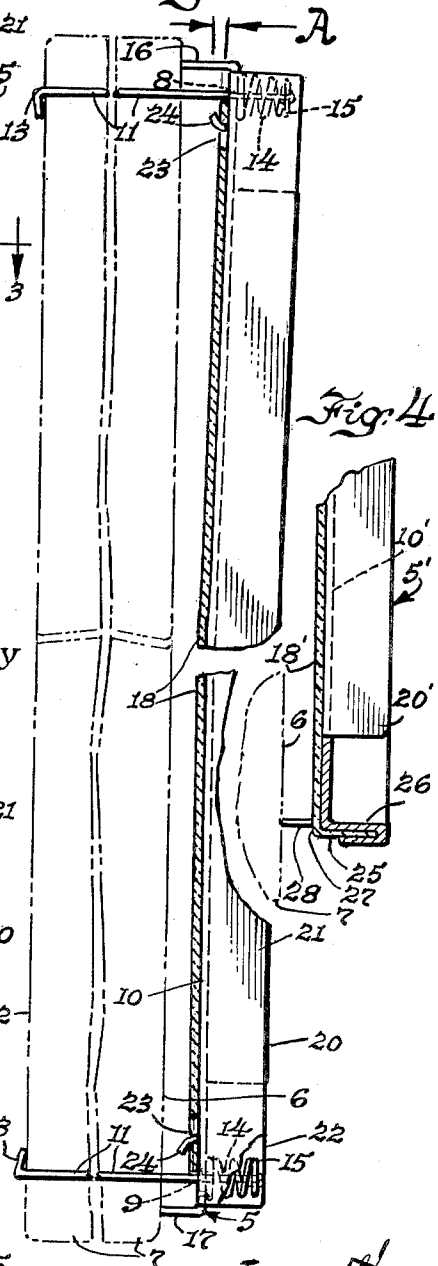


Fig. 2

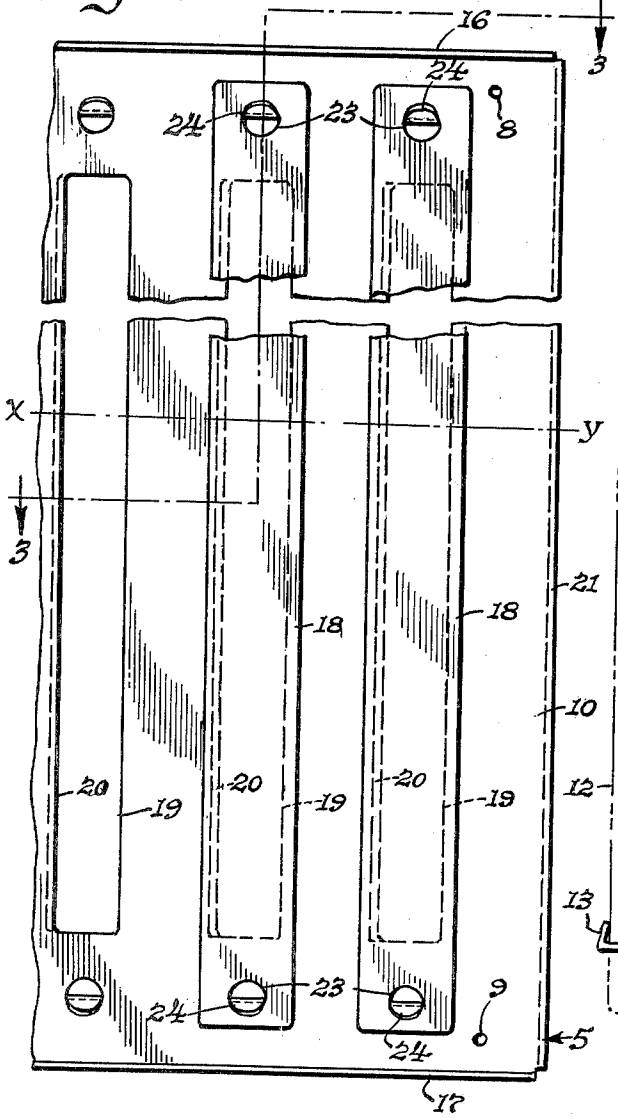


Fig. 4

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WINTER FRONT FOR AUTOMOTIVE RADIATORS

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This invention relates to a new and improved winter front for the radiators of automotive vehicles, comparable in its purpose to the Pines winter fronts commonly used many years ago, but constructed along entirely different lines and much simpler and far less expensive, besides being applicable practically universally to all makes of cars over the front of the radiator core, behind the grill, to retain the heat in the core and control the amount of cold air allowed to pass through the core, thus making for much more efficiency of operation in cold weather and insuring a better supply of hot engine coolant liquid for circulation through the car heater.

According to my invention, a frame of stamped, sheet metal construction is adapted to be suitably clamped detachably onto the front of the radiator core, behind the grill, and has a plurality of spaced, parallel slots defined therein where the metal sheet has been sheared and flanges bent outwardly to give strength and rigidity to the frame, and narrow strips of semi-elastic plastic material, having a temperature coefficient of expansion about ten times that of the steel of the frame, are laid over the slots and fastened to the frame in stretched condition to serve as closures for the slots, preventing air flow through the core only so long as the parts remain cold, but uncovering the slots, more or less, when the parts become heated sufficiently, when the strips expand much more than the metal of the frame and the strips, therefore, become loose and allow more or less air flow through the core for cooling purposes.

The invention is illustrated in the accompanying drawing, in which—

FIG. 1 is an assembly view, taken from one side, showing a winter front made in accordance with my invention, applied to the front of a radiator core, intermediate portions of height and thickness of which have been broken away to save space and permit showing the details of the construction on a larger scale;

FIG. 2 is a rear view of one end portion of the winter front with an intermediate portion of the height dimension thereof broken away to conserve space and enable showing the parts approximately full size, the same as in FIG. 1, only two of the plastic strips being shown, the strip for the third slot having been removed for purposes of better illustration;

FIG. 3 is a view partly in horizontal section and partly in top plan on the line 3—3 of FIG. 2; and

FIG. 4 is a fragmentary, vertical section of another winter front, showing a modified or alternative construction insofar as the method of fastening the plastic material is concerned.

Similar reference numerals are applied to corresponding parts in these views.

Referring first to FIGS. 1, 2, and 3, the reference numeral 5 designates the winter front of my invention generally which is of planar form and in FIG. 1 is shown applied to at least one side of a radiator, namely the flat front 6 of a radiator core 7 behind the usual grill (not shown). Any suitable fastening means may be employed for this quickly detachable mounting, as for example, the well-known spring pressed hooks similar to what are commonly used in the application of bug screens on radiator cores, for which purpose holes 8 and 9 illustrated in FIG. 2 at the top and bottom of the stamped sheet metal frame 10 are provided for extension therethrough of wire hooks 11 that bear against the back 12 of the core 7, as indicated at 13, the other ends of the hooks 11 having coiled compression springs 14 mounted thereon behind washers 15 so as to hold the rearwardly extending horizontal flanges 16 and 17 at the top and bottom of the frame 10 of the winter front pressed tightly against the front 6 of the core 7, leaving ample space between the frame 10 and core 7 for operating clearance for the flat, elongated plastic strips 18, the expansion and contraction of which in response to temperature change gives the thermostatic control of air flow through the core 7 in accordance with my invention.

The strips 18 are of polyethylene plastic sheet material, like Marlex for example, which has a temperature coefficient of expansion approximately ten times that of sheet steel like that used in frame 10, so that starting from a cold condition with the strips 18 bearing flatly against the back of the frame 10 and stretched lengthwise relative to the slots 19, provided in spaced, parallel relation in the frame 10, to serve as closures for these slots preventing air flow through the core 7, there will be no air flow through the core for cooling purposes until the car's engine has warmed up and its liquid coolant circulating through the core 7 heats the core and the winter front 5 as a whole sufficiently to cause expansion of the winter front frame 10 and strips 18 thereon, whereupon the strips 18 expand to a much greater degree than the frame 10 and become loose enough to allow more or less air flow through the slots 19, depending, of course, upon the extent of heating of the winter front 5. The air flow through the winter front 5 and radiator core 7 cools the engine coolant liquid and also the winter front frame 10 and strips 18, and there is, consequently, a good thermostatic control of the air flow through the radiator core, and the car engine is kept operating fairly uniformly at a higher and much more efficient operating temperature than would be possible by merely thermostatically regulating coolant flow htrough the radiator in conventional way and dispensing with the winter front 5. Fuel consumption is accordingly reduced and engine life increased and repair bills reduced. The location of the strips 18 behind the frame 10, is of advantage not only in subjecting the back of the strips to the direct action of the radiant heat from the radiator but also in having the air currents acting against the front of the strips to unseat the same, so that enough air will surely pass through the slots 19 to cool the radiator sufficiently. Due to the mounting of this winter front directly on the front of the radiator, it is concealed behind the grill and there is therefore no problem concerning the appearance of the unit or its fastening means; it will not detract from the appearance of the car.

The sheet metal frame 10 is sheared to define three sides of the rectangular slots 19 and the metal from each of the slots is bent forwardly to form flanges 20 which define the fourth side of the slots. These flanges lend stiffness and strength to the frame, as do also the top and bottom flanges 16 and 17 and the opposite end flanges 21 and 22. There is, therefore, little or no likelihood of any appreciable deformation of the frame 10 in service. The strips 18 are shown as having D-shaped holes 23 punched in the opposite ends thereof for extension therethrough of lugs 24 punched rearwardly from the frame 10 above and below the slots 19, each of the strips being attached at one end to one of these lugs 24 and stretched enough to permit attachment at its other end to the other lug adjacent the other end of the slot 19 for which the strip serves as a closure. This method of assembly makes for the greatest possible economy in the use of the plastic sheet material and also makes for very simple and economical assembling operations, as well as ease and simplicity of replacement of any strips that may, in time, require replacing, as where they have been damaged in some

way. Usually, the winter front will outlive the car, and, since it can be so easily removed and applied, an owner, upon purchase of a new car, may remove the winter front unit from one car to apply it to another.

In FIG. 4, I have illustrated another winter front 5' in which the strips 18' are of the same semi-elastic plastic material as strips 18 but a little longer, the opposite end portions 25 thereof being clamped on the top and bottom portions of the frame 10', where J-shaped lugs 26 are provided on the frame above and below the slots 19 for clamping purposes. The right angle bends at 27 at the top and bottom of the frame 10' enable stretching the strips 18' to the necessary extent without the danger of the strips pulling out from the clamps 26. Lugs 28 bent inwardly from the frame 10' between the J-shaped lugs 26, serve by abutment with the front 6 of the radiator core 7 to space the winter front 5' from the radiator core for operating clearance for the strips 18'. Flanges 20' in this construction define one side of the rectangular slots 19', similarly as in the other construction, and lend stiffness and strength to the frame 10' and minimize the danger of deformation of the winter front in service. This construction is also adapted to be fastened detachably to the front of the radiator core similarly as the other construction.

In both forms, due to the flexibility of the sheet metal of frames 10 and 10', especially when these are of light gauge sheet metal, for economy, it may be desirable to give the frame a slight amount of convexity or bulge toward the front of the radiator core to offset the tendency toward buckling in that direction under the pull of the multiplicity of longitudinally stretched semi-elastic strips 18 or 18'. It is a simple matter to bend the frame along a horizontal line *xy* at the middle of the slots 19 and 19' to the extent of the dimension indicated at A in FIG. 1, say about 1/16" in a dimension of about 18". The strain imposed then by the strips 18 or 18' in longitudinally stretched condition will tend only to straighten the oppositely buckled frame, instead of buckling a straight frame.

While I have described the strips 18 and 18' as being of polyethylene plastic sheet material, it should, of course, be obvious that other plastics having similar characteristics could, of course, be used, and, while plastic sheet material is believed to be most suitable, it is conceivable that other materials might be used to accomplish a similar purpose. Furthermore, the thermostat formed by the frame 10 or 10' and the strip or strips 18 or 18' could conceivably be used to advantage in other combinations for other purposes than as a winter front for an automotive vehicle radiator.

While I have shown here a single large full width winter front structure for a truck or car radiator, and that is the way the invention is used in most cases, it should be understood that, where supports and partitions interfere, the front structure will be provided in two or more sections combined into a winter front unit on the front of the radiator. Greater adaptability to fit different sizes of radiators is thereby also afforded, as these front structures can, for example, be made small enough so that one might be made of a size to fit the small width radiator of a "compact" car, two might be used side by side to fit the wider radiator of an intermediate size car, and three might be used side by side to fit the widest radiator of a large conventional size car. Separate means can be employed for the fastening of each section in place on the radiator, or means may be provided for securing sections together so that the same method of fastening to the radiator can be used as where the winter front is not of sectional construction.

It is believed the foregoing description conveys a good understanding of the objects and advantages of my invention. The appended claims have been drawn to cover all legitimate modifications and adaptations.

I claim:

1. In combination with a radiator for a liquid-cooled internal combustion engine which radiator is adapted to have a liquid coolant for said engine circulated therethrough for air-cooling of the liquid, a planar cover for at least one side of the radiator having openings provided therein through which air is adapted to flow in passing through the radiator to cool the liquid coolant, and elongated closure means for said openings of heat-sensitive material mounted on said cover on that side toward and in close heat exchange relationship to said radiator which are secured at their ends to said cover and normally close said openings but which when heated mainly by radiant heat from the radiator beyond a predetermined temperature expand relative to said cover due to a difference in thermal characteristics of the materials of said closure means and said cover and therefore uncover said openings to different degrees according to the extent of heating of said closure means, whereby to regulate air flow through said openings and thereby tend to maintain a predetermined coolant temperature.

2. A structure as set forth in claim 1 wherein the openings in the planar cover are elongated and the closure means of heat sensitive material are in the form of elongated flat strips of flexible resilient material wider than said openings and stretched lengthwise on said cover in surface to surface abutment with the cover on opposite sides of the openings to close the same against air flow therethrough until temperature rise of the cover and strips causes sufficient expansion of the strips to loosen them more or less.

3. A structure as set forth in claim 1 wherein the openings in the planar cover are elongated and the closure means of heat sensitive material are in the form of elongated flat strips of flexible resilient material wider than said openings and stretched lengthwise on said cover in surface to surface abutment with the cover on opposite sides of the openings to close the same against air flow therethrough until temperature rise of the cover and strips causes sufficient expansion of the strips to loosen them more or less, the openings in the cover being in spaced parallel relationship, and the cover being arched so that its convex side is toward the strips to offset the tendency to buckle under the load of a plurality of said strips in stretched condition.

4. A structure as set forth in claim 1 wherein the openings in the planar cover are elongated and the closure means of heat sensitive material are in the form of elongated flat strips of flexible resilient material wider than said openings and stretched lengthwise on said cover in surface to surface abtument with the cover on opposite sides of the openings to close the same against air flow therethrough until temperature rise causes sufficient expansion of the strips to loosen them more or less, the cover being made of metal having a certain temperature coefficient of expansion, and said flexible resilient strips of the closure means are of nonmetallic material having a greater temperature coefficient of expansion.

5. A structure as set forth in claim 1 wherein the openings in the planar cover are elongated and the closure means of heat sensitive material are in the form of elongated flat strips of flexible resilient material wider than said openings and stretched lengthwise on said cover in surface to surface abutment with the cover on opposite sides of the openings to close the same against air flow therethrough until temperature rise causes sufficient expansion of the strips to loosen them more or less, the cover being made of metal having a certain temperature coefficient of expansion, and said flexible resilient strips of the closure means are of nonmetallic material having a greater temperature coefficient of expansion, the openings in the cover being in spaced parallel relationship, and the cover being arched so that its convex side is toward the strips to offset the tendency to buckle under the load of a plurality of said strips in stretched condition.

6. A structure as set forth in claim 1 wherein the open-

ings in the planar cover are elongated and the closure means of heat sensitive material are in the form of elongated flat strips of flexible resilient material wider than said openings and stretched lengthwise on said cover in surface to surface abutment with the cover on opposite sides of the openings to close the same against air flow therethrough until temperature rise causes sufficient expansion of the strips to loosen them more or less, the cover having projections at opposite ends of each opening, each of the strips being longer than the openings to be covered thereby and having openings provided in the opposite end portions in which said projections are engaged when the strip is stretched lengthwise sufficiently in the initial assembling of the structure.

7. A structure as set forth in claim 1 wherein the openings in the planar cover are elongated and the closure means of heat sensitive material are in the form of elongated flat strips of flexible resilient material wider than said openings and stretched lengthwise on said cover in surface to surface abutment with the cover on opposite sides of the openings to close the same against air flow therethrough until temperature rise causes sufficient expansion of the strips to loosen them more or less, each of the strips being longer than the opening to be covered thereby and extending beyond the opposite ends of said opening and secured to the cover in longitudinally stretched condition in the initial assembling of the structure.

8. A structure as set forth in claim 1 wherein the openings in the planar cover are elongated and the closure means of heat sensitive material are in the form of elongated flat strips of flexible resilient material wider than said openings and stretched lengthwise on said cover in surface to surface abutment with the cover on opposite sides of the openings to close the same against air flow therethrough until temperature rise causes sufficient expansion of the strips to loosen them more or less, each of the strips being longer than the opening to be covered thereby and extending beyond the opposite ends of said opening and secured to the cover in longitudinally stretched condition in the initial assembling of the structure, at least one end of the strip being bent substantially at right angles around a right angle corner provided on the cover and having the extremity thereof secured to the cover beyond said right angle bend.

9. A structure as set forth in claim 1 wherein the openings in the planar cover are elongated and the closure means of heat sensitive material are in the form of elongated flat strips of flexible resilient material wider than said openings and stretched lengthwise on said cover in surface to surface abutment with the cover on opposite sides of the openings to close the same against air flow therethrough until temperature rise causes sufficient expansion of the strips to loosen them more or less, each of the strips being longer than the opening to be covered thereby and extending beyond the opposite ends of said

opening and secured to the cover in longitudinally stretched condition in the initial assembling of the structure, at least one end of the strip being bent substantially at right angles around a right angle corner provided on the cover and having the extremity thereof secured to the cover beyond said right angle bend, the cover being of sheet metal construction and having a foldable edge portion, the extremity of said strip being secured by clinching the same by folding said edge portion tightly thereon.

10. As an article of manufacture, a temperature control device for use with an air-cooled unit having an opening provided therein for flow therethrough of cooling air, said device comprising a cover for the opening having a plurality of smaller openings provided therein for air flow therethrough, and elongated closures for said smaller openings of heat sensitive material which extend over said openings and expand relative to said cover when heated and contract relative to said cover when cooled and which are secured to said cover at their ends so as normally to cover said openings against air flow therethrough but adapted when warmed beyond a predetermined temperature to expand and serve thereby to uncover said smaller openings and regulate air flow through said openings so as to maintain a predetermined temperature for said air-cooled unit.

11. As an article of manufacture, a temperature control device for use with a fluid-cooled unit having an opening provided therein for flow therethrough of cooling fluid, said device comprising a cover for the opening having a plurality of smaller openings provided therein for fluid flow therethrough, and elongated closures for said smaller openings of heat sensitive material which extend over said openings and expand relative to said cover when heated and contract relative to said cover when cooled and which are secured to said cover at their ends so as normally to cover said openings against fluid flow therethrough but adapted normally to cover said openings against fluid flow therethrough but adapted when warmed beyond a predetermined temperature to expand and serve thereby to uncover said smaller openings and regulate fluid flow through said openings so as to maintain a predetermined temperature for said fluid-cooled unit.

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