Dec. 4, 1934. H. E. SCHANK ET AL 1,982,931

RADIATOR CORE

Filed June 17, 1933

Fig. 1.

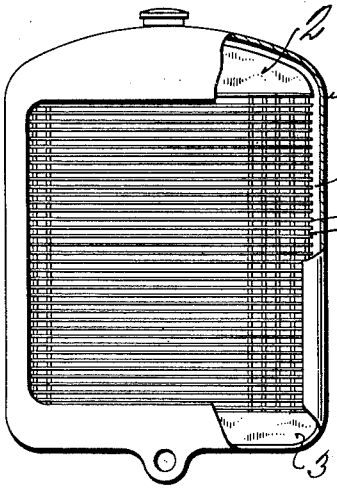


Fig. 2.

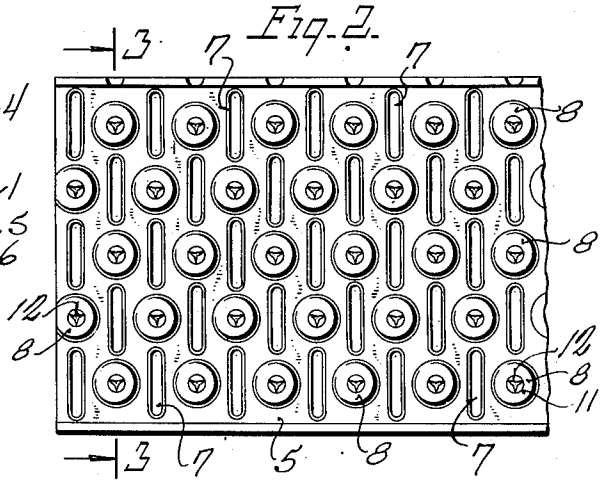


Fig. 3.

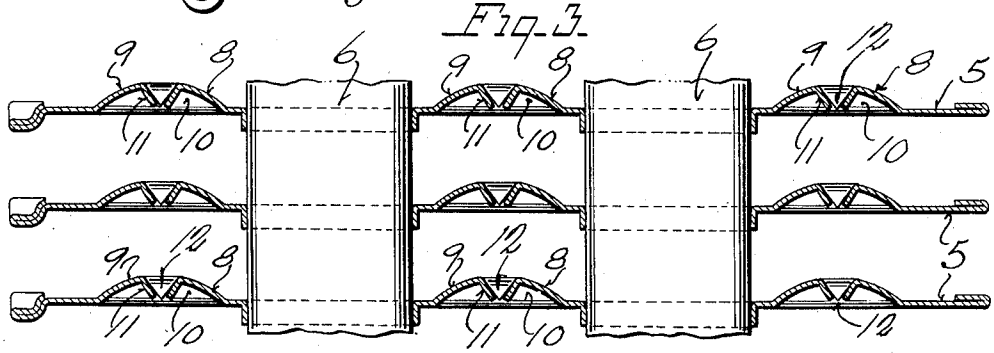


Fig. 5.

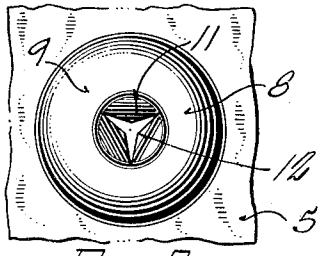


Fig. 4.

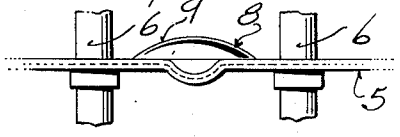


Fig. 6.

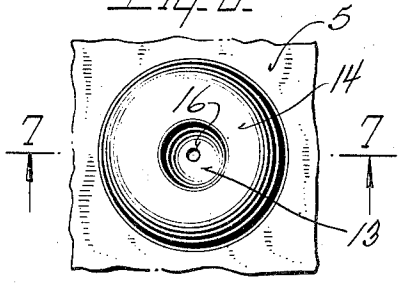
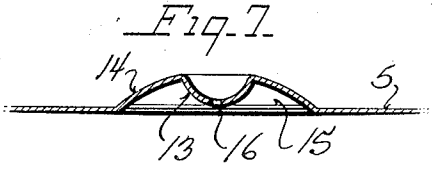


Fig. 7.



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UNITED STATES PATENT OFFICE

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RADIATOR CORE

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5 Claims. (Cl. 257—130)

This invention relates to radiator cores for motor vehicles.

The invention is particularly applicable to cores having cup-like protuberances forming air deflectors in the air passages of the core to turbulate the air in its movement through the core. We have found in cores of this construction that at air speeds above sixty-five miles per hour, there is a sharp, shrill whistle caused by the movement of the air through the core.

This whistling is objectionable in cores used on motor vehicles, and it is the general purpose and object of our invention to eliminate this noise up to and beyond the air speeds noted.

To accomplish the object of our invention, we so form the deflectors that whistling is eliminated up to air speeds of eighty-five miles per hour and higher.

Specifically, a portion of each deflector is forced into the cavity provided by the deflector from its convex side to provide a projection having an aperture at its outer end to perforate the deflector to eliminate whistling of the core up to air speeds of eighty-five miles per hour and higher.

In the accompanying drawing illustrating a radiator core embodying our invention—

Fig. 1 is a front view of the core, the outer casing or shell of which is broken away to show the upper and lower tanks to which the core is connected;

Fig. 2 is a top plan view of a portion of one of the fin plates of the core provided with the deflectors of our invention, tubes extending through the plates being shown in double outline;

Fig. 3 is an enlarged transverse sectional view taken on line 3—3 of Fig. 2;

Fig. 4 is a front view of a portion of one of the fin plates and associated tubes to show one of the deflectors in elevation;

Fig. 5 is an enlarged top plan view of one of the deflectors showing the perforated projection therein;

Fig. 6 is a similar view showing another form of projection; and

Fig. 7 is a sectional view taken on line 7—7 of Fig. 6.

The radiator shown in Fig. 1, comprises a core 1, upper and lower tanks 2, 3 to which the core is connected and an outer casing or shell 4 as in radiator constructions.

The core 1 is of the fin and tube type being composed of the requisite number of horizontal fin plates 5 and vertical tubes 6. The fin plates 5 are of relatively thin sheet metal, such as copper, and extend the depth and the width of the core. The plates are common to all of the tubes and have openings 7 through which the tubes extend. The plates are soldered to the tubes at the openings, there being flanges or ferrules on the plates about the openings for this purpose.

The tubes extend through the full complement of plates and are connected with and open into the upper and lower tanks 2, 3. The plates are arranged in closely spaced relation along the tubes and are provided with air deflectors 8 in the spaces between the tubes as shown in Figs. 2 and 3. These deflectors extend into the air passages provided between the plates and turbulate the air in its flow through the core. The deflectors are cup-like in form, being pressed from the metal of the plates to one side thereof, as shown. Thus, each deflector provides a protuberance 9 on one side of the plate and a cavity 10 on the opposite side of the plate. When the deflectors are hemi-spherical in shape, as shown in the drawing, the protuberances are convex and the cavities which they form are concave.

The deflectors are relatively large, there being a single deflector between each pair of tubes 6 when the latter are arranged in rows lengthwise of the plates as shown in Figs. 2 and 3. As illustrated, the tubes of one longitudinal row are offset with respect to the tubes of an adjacent row. This positions a deflector in one row in line with a tube of an adjacent row. With the deflectors large, a deflector extends laterally on opposite sides of the tube with which it is alined. The tubes are preferably of the elongated type, arranged with their flat walls opposed and with the associated deflector in the space between them.

To eliminate whistling of the core up to the relatively high air speeds noted, we provide the deflectors, that is, the protuberances, with suitably shaped and arranged projections 11. There is a projection 11 for each protuberance, the projection being formed by pressing a portion of the convex wall of the protuberance, preferably at the crown thereof, into the cavity provided by the protuberance. This may be performed by a punch, the latter being shaped to provide the character of projection desired. In Figs. 2, 3 and 5, the projection is pyramidal in shape, a punch having a three sided operating point being used for the purpose. The projection is punched through providing an opening or aperture 12 at its apex or outer end, whereby air may pass from one side of the plate to the other through the projection. Except for this air passage, the pro-

tuberance or deflector is otherwise closed. The opening in the projection may continue along its sides as shown in Fig. 5.

The projections 11 may be given any desired geometrical form. In Figs. 6 and 7, we have shown a projection 13 circular-like in form. This projection is hemi-spherical in shape, like its protuberance 14. Projection 13 may be formed by a punch, deflecting the portion of the convex wall of the protuberance providing the projection into its cavity 15 as before. Projection 13 is also punched through to provide an opening or aperture 16.

Regardless of the particular shape of the projections, they serve in conjunction with protuberances or deflectors shown, to eliminate air whistling of the core up to air speeds of eighty-five miles per hour and higher.

Whistling is caused by the vibrations set up in the core structure by the air passing therethrough at high air speeds. It is probable that there is some vibration with a high note set up in the structure which causes the noise or it may be a combination of vibrations. The perforations in the fin plates at the deflectors provided by the projections 11 and 13, apparently set up a vibration of a different note or tone which breaks up that caused by the movement of the air through the core. We have found by tests, that with deflectors of the kind herein shown, perforated as described, whistling of the core up to the high air speeds mentioned is eliminated.

The use of our invention is not limited to cores of the fin and tube type. We have shown that type for purposes of illustration. The invention is applicable to any type of core embodying as air deflectors protuberances of the closed cup-like type.

Moreover, the details of construction and arrangement of parts shown and described, may be variously changed and modified without departing from the spirit and scope of our invention, except as pointed out in the appended claims.

We claim as our invention:

1. In a radiator core, cup-like air deflectors, supports therefor, said deflectors being pressed out of the supports and serving to turbulate the air passing through the core, said deflectors providing protuberances and cavities on opposite sides of their supports, and projections pressed into the cavities from the walls of the protuberances to eliminate air whistling of the core up to relatively high air speeds.

2. In a radiator core, cup-like air deflectors, supports therefor, said deflectors being pressed out of the supports and serving to turbulate the air passing through the core, said deflectors providing protuberances and cavities on opposite sides of their supports, and projections pressed into the cavities from the walls of the protuberances and being apertured to eliminate air whistling of the core up to relatively high air speeds.

3. In a radiator core, fin plates and tubes extending through the plates, cup-like protuberances pressed out of the plates in the spaces between the tubes to turbulate the air passing through the core, said protuberances having means to eliminate air whistling of the core up to relatively high air speeds.

4. In a radiator core, air deflectors, supports therefor, said deflectors serving to turbulate the air passing through the core and pressed out of the supports to provide protuberances and cavities on opposite sides of the same, and means associated with the cavities of the deflectors to eliminate air whistling of the core up to relatively high speeds.

5. In a radiator core, air deflectors, supports therefor, said deflectors serving to turbulate the air passing through the core and pressed out of the supports to provide protuberances and cavities on opposite sides of the same, and projections on the walls of the cavities to eliminate air whistling of the core up to relatively high air speeds.

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