May 29, 1934. L. B. GREEN 1,960,629

GRILLE FOR RADIATOR SHELL FRONTS

Filed Feb. 24, 1933 2 Sheets-Sheet 1

Fig. 1

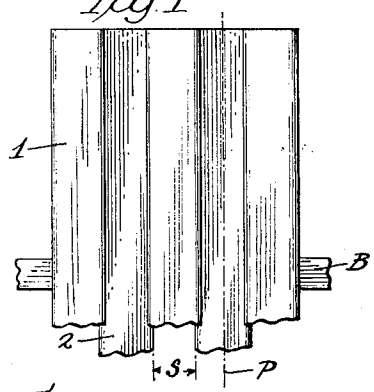


Fig. 2

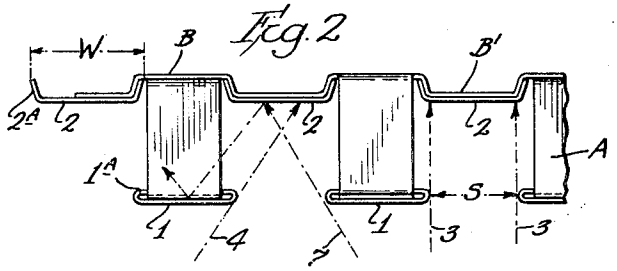


Fig. 3

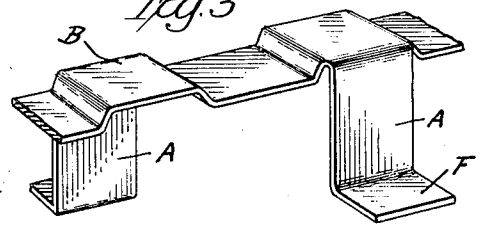


Fig. 6

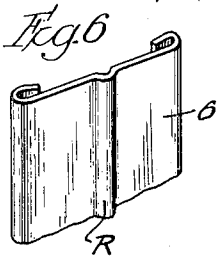


Fig. 4

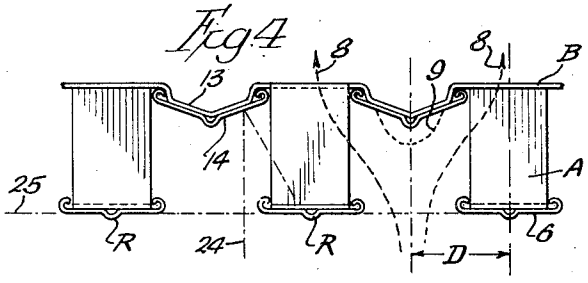


Fig. 5

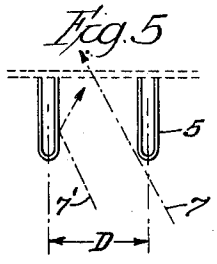


Fig. 7

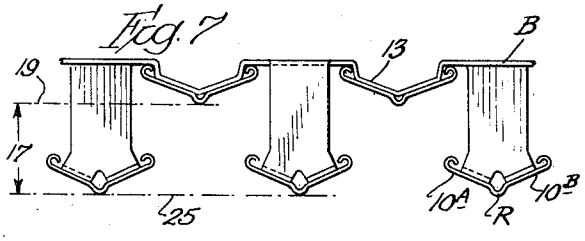


Fig. 8

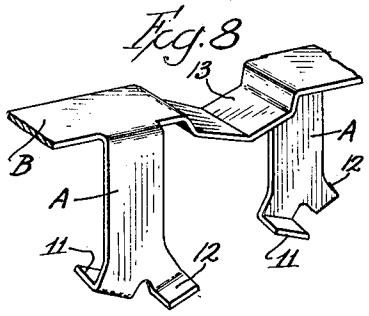
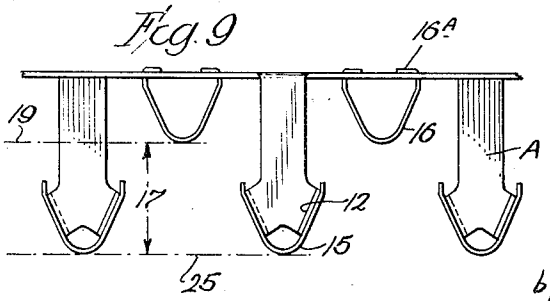


Fig. 9



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GRILLE FOR RADIATOR SHELL FRONTS

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Fig. 10

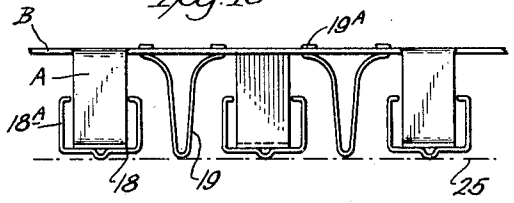


Fig. 11

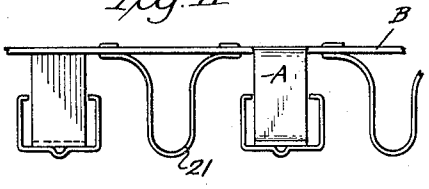


Fig. 12

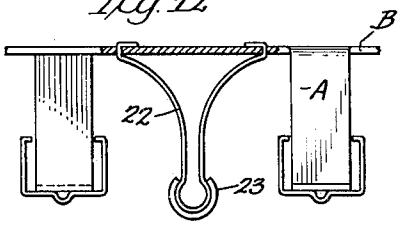


Fig. 13

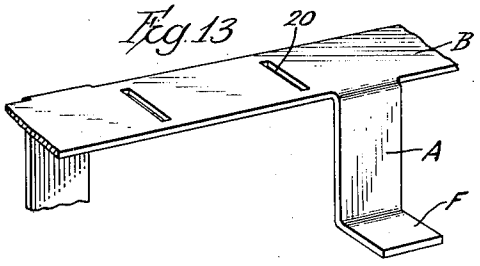


Fig. 14

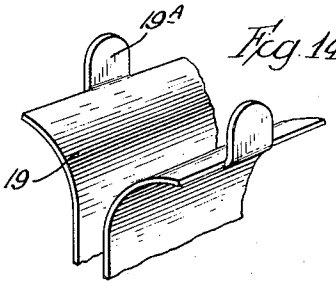


Fig. 15

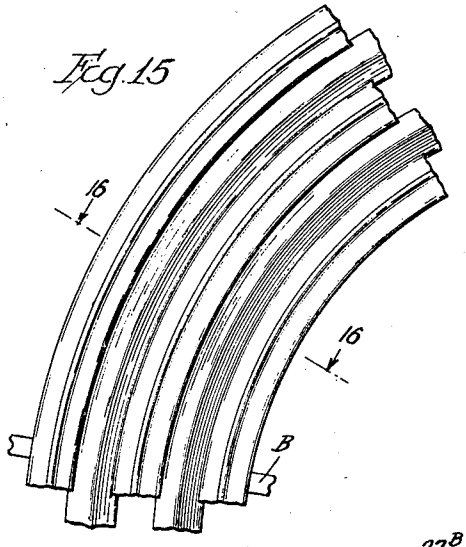


Fig. 16

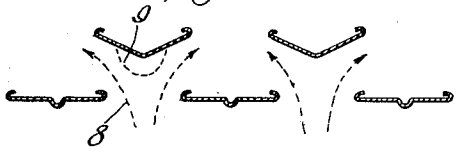
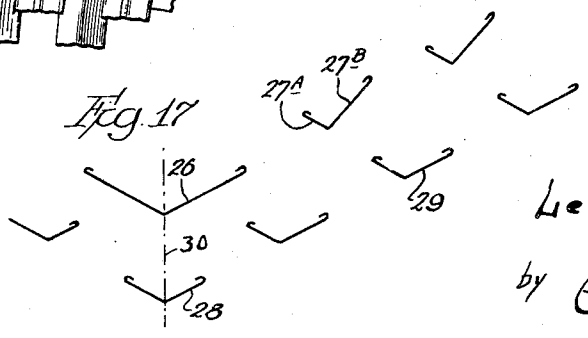


Fig. 17



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1,960,629

UNITED STATES PATENT OFFICE

1,960,629

GRILLE FOR RADIATOR SHELL FRONTS

Lee B. Green, Lakewood, Ohio, assignor to The Globe Machine & Stamping Company, Cleveland, Ohio, a corporation of Ohio

Application February 24, 1933, Serial No. 658,283

10 Claims. (Cl. 293—54)

My invention relates to louver-type grilles adapted to extend effectively across an air-admitting opening, such as the usual frontal opening of the housing for the radiator core of an automobile. In its general objects, my invention aims to provide grilles of this type which will conceal the radiator core behind the grille to a much greater extent than the parallel-bar louver-type grilles now commonly employed and which will prevent a considerable portion of the dust in the admitted air from reaching the core cells of the radiator core. Furthermore, my invention aims to provide an inexpensive construction for rigid grilles of this class, which will permit the louver elements to be valid in their frontal appearance so as to afford many different ornamental effects.

In the now customary louver-type radiator grilles, the louver members are so called blades extending substantially parallel to each other across the air-admitting opening, with the presenting flat blade faces substantially at right angles to the general plane of the said opening and to front face of tht radiator core, the consecutive blades being spaced by distances considerably greater than the width of the frontal face portion of each blade. When thus disposed, these louver blades (when viewed squarely from in front) conceal only the relatively small fraction of the front face of the radiator core corresponding to the ratio of the total front edge width of all of the louver blades to the width of the air-admitting opening across which the grille extends. For example, if the spacing between consecutive louver blades is four times the effective thickness or frontal width of each blade, a full front view of the grille will leave these blades concealing only one-fifth of the front face of the radiator core.

The extent of this fractional concealing of the radiator core increases when the observer moves toward either side of the longitudinal axis of the car, but the radiator core usually remains partly visible until the line of observation reaches an angle of approximately 45 degrees with respect to the said general plane of the frontal opening in the radiator shell. Consequently, a grille of this conventional type is sadly deficient in effecting the radiator-core concealment for which the grille is largely intended. Moreover, such louver blades of rearwardly open U-sections usually present a severe "prison bar" effect when viewed from the front, so as to detract from the ornamental appearance for which the radiator shell and parts adjacent to the latter are designed.

In one of its important aspects, my invention aims to overcome the just recited objections by providing simple and easily manufactured louver-type grilles which will entirely conceal the radiator core when the grille is viewed squarely from the front, which will never permit an observer to see more than a minor fraction of the face of the radiator core, and which will readily allow the frontal appearance of the louver blades to be varied so as to enhance the general appearance of the front of the car.

A further objection to both louver-type and woven wire type automobile radiator grilles is due to the fact that the air admitted through the passages between adjacent blades or other elements of such grilles flows directly and unimpeded to the cells or air-passages of the radiator core, thereby readily enabling dust in the air (or mud which has been splashed up into the air by a more forward car) to clog these core cells.

My present invention aims to reduce such a reducing of the efficiency of the radiator core by disposing part of the louver blades (or other louver elements) so that they will modify the directions in which air flows after being admitted between other louver blades, and so that this change in the direction of the admitted air will be sufficiently abrupt to prevent a considerable portion of the dust (or the like) in the air from being carried by the air to the cells of the radiator core.

Illustrative of the manner in which I accomplish the above recited objects,

Fig. 1 is a front elevation of an upper end portion of a staggered-blade grille embodying my invention.

Fig. 2 is an enlarged plan view of portions of the same grille.

Fig. 3 is a slightly enlarged and fragmentary perspective view of the blade-connecting bar shown in Fig. 2, drawn on the same scale as Fig. 2 and looking downward.

Fig. 4 is a plan view allied to Fig. 2, showing centrally ribbed louver blades, and showing the rearward blades of a V-section.

Fig. 5 is a plan view of a portion of a conventional grille with U-sectioned blades in a single row, and with both the mid-plane spacing of the blades and the amount of metal in the blades corresponding to that shown in Fig. 4, for comparison with the latter figure.

Fig. 6 is an enlarged perspective view of a portion of one of the forward louver blades in Fig. 4.

Fig. 7 is a plan view of a portion of a staggered-blade grille allied to Fig. 4, but with both the forward and the rearward blades of a rearwardly open V-section.

Fig. 8 is an enlarged perspective view of a portion of the cross-bar shown in Fig. 9.

Fig. 9 is a plan view of a portion of a staggered-blade grille showing V-sectioned louver blades, with a smaller angular spread between the webs of each blade than in Fig. 7, and also showing a different forming of the lateral edge portions of the forward blades.

Figs. 10 and 11 are fragmentary plan views of staggered-blade grilles in which the rear ends of consecutive blades are relatively staggered, while the forward edges of the blades are in the same plane.

Fig. 12 is a fragmentary plan view allied to Fig. 11, showing louver blades presenting frontal portions of alternately different widths, and showing the frontal portion of the frontally narrower louver blade as ornamented by a slotted tube attached to it.

Fig. 13 is an enlarged and fragmentary view of the blade-connecting cross-bar in Figs. 10, 11 and 12.

Fig. 14 is an enlarged perspective view of a rearward portion of one of the generally V-sectioned blades in Fig. 12, showing the initial disposition of the fingers which clinch through the slots in the cross-bar of Fig. 13.

Fig. 15 is a fragmentary front elevation of a grille having staggered annular louver elements of rearwardly open and wide-angled V-sections, with the forward louver elements ornamented by medial ribs.

Fig. 16 is a section taken along the line 16—16 of Fig. 15, with dotted lines showing the direction of the air flow and the effect of a rearward louver element on admitted dust.

Fig. 17 is a fragmentary and diagramatic horizontal section through a V-front grille embodying my invention.

In the flat-fronted embodiment of which fragments are shown in Figs. 1 to 3, my grille includes two sets of relatively staggered and upright louver blades, each of which louver blades presents a flat front face; namely, forward blades 1 which are uniformly spaced from each other and have their front faces in a common plane, and rearward blades 2 each of which extends behind the opening between two of the forward blades. Each rearward blade 2 has its longitudinal medial line in a plane P (at right angles to the front faces of all of the grilles and parallel to the longitudinal edges of the blades), which plane extends midway between two adjacent forward blades 1.

Each louver blade of both sets desirably has both of its lateral edge portions recurved rearwardly so as to stiffen the blade, thereby permitting the use of light sheet metal for each blade. This recurving may be such as to present the initial free edge portion 1A of the metal strip from which the blade is formed behind the adjacent lateral edge of the frontal blade portion, as shown in Fig. 2, thereby also enhancing the appearance of the grille and preventing whistling in case the car is driven at high speed or facing a strong wind.

Each rearward blade 2 in Figs. 1 to 3 has each lateral edge portion 2A bent rearwardly, desirably at an angle of at least 45 degrees. Moreover, the total width W of each rearward blade desirably is at least equal to (and preferably greater than) the spread S of the air-passage between two adjacent forward louver blades, so that each rearward blade has its lateral edge portions extending squarely behind one of the two forward blades between which it is operatively interposed.

To connect all of the louver blades into a rigid assembly, I desirably employ cross-bars B (spaced vertically from each other after the manner long customary in louver-type grilles), each of which bars extends behind and is directly secured to the rearward blades 2 and has forwardly extending arms A secured to the forward blades 1. The arms A desirably are formed integral with the bar from which they extend, and to secure the needed rigidity of the louver-blade and cross-bar assembly while using a light gauge of metal, I preferably have the arms A extend alternately from opposite edges of the bar (as shown in Figs. 2 and 3) and bend the free end of each arm to form a foot F bearing against the rear face of the corresponding forward louver element 1. In addition, I desirably form the bar so that each portion B^1 which bears against the rear face of one of the rearward louvers 2 is offset forwardly from the main portion of the bar to clear the rearwardly turned edge portions 2A on the rear louvers.

With the forwardly offset bar portions B^1 formed to fit against the entire rearward faces of the rear louver blades, and with each foot F corresponding in width to the spacing between the recurved edge portions 1A on a louver blade, all blade-engaging portions of the bar and the arms of the bar are readily guided during the assembling, so that these portions can speedily be welded to the blades to complete the assembly. And, by having the said arms extend alternately from opposite edges of the bar carrying them, I prevent any tilting of the bar with respect to the blades.

In a thus constructed grille, it will be obvious from the dotted sight lines 3 in Fig. 2 that each rearward louver blade 2 entirely conceals a view through the passage between the two adjacent frontal louver blades 1 when the view is squarely from the front. It will also be seen from the dotted sight line 4 that with the view at a considerable lateral angle, each rearward louver blade would still partially conceal the radiator core behind such a grille. In addition, each rearward louver restricts the extent to which light can reach the front face of the radiator core, and the reflection of light from the front faces of all of the louver blades greatly diminishes the readiness with which portions of the radiator core could otherwise be seen.

Consequently, my staggered-louver grille, even when all blades have flat faces, is much more efficient for obscuring a view of what is behind it than might at first be assumed from the wide spacing of the blades shown in Fig. 1. This view-obscuring effect can easily be enhanced still further, by bowing the transversely medial portion of each frontal louver blade forwardly to form a medial rib R, as shown in Fig. 4, as the reflection of light from each such rib will be in directions different from that in which light is reflected from the other flat forwardly facing portions of the same louver blade.

Moreover, I can secure this enhanced concealing and obscuring effect without using more metal for the louver blades than that heretofore required for blades of the conventional U-section, as shown by a comparison of Figs. 4 and 5. In these two figures, each blade of Fig. 4 is formed from a strip of sheet metal of the same width as

that used for each U-sectioned blade 5 in Fig. 5, and the consecutive spacing D of the relatively staggered blades 6 in Fig. 4 is the same as the consecutive spacing of the blades in the grille of Fig. 5, which latter grille obviously will permit a large amount of light to reach a radiator core behind it, and will conceal that core to a much smaller extent.

In addition, my staggered-louver grille serves in the following important manner for reducing the amount of dust in the air which will reach the radiator core: When such dust enters passages between blades of a conventional louver-type grille squarely from the front, or even at such a lateral angle as shown by the dotted line 7 in Fig. 5, this dust will continue on to the core; and it will likewise be diverted toward the core by a single reflection if it enters along the dotted line 7^1 of Fig. 5.

However, dust admitted between adjacent frontal louvers in Fig. 2 squarely from the front will rebound, and the effect of the rebound in reducing its velocity will cause some of this dust to fall. When such dust enters along the line 7 in Fig. 2, this dust will be reflected by the forward face of a rearward louver against the rearward face of a frontal louver blade; and, since the latter blade has an air-pocket adjacent to its rear face, gravity will combine with the lack of air movement in this air pocket (and with the reduction in the momentum of the dust due to the double impact) to cause the dust to drop down behind the said frontal blade.

No similar reflection occurs for the air, because of the enormously lower specific gravity of the air, and also because the usual suction fan of the car cooperates with the forward movement of the car to admit the air between each two consecutive frontal louver blades mainly in a direction at right angles to the general plane of the grille. The admitted air is then divided by the suction of the fan into two streams passing opposite sides of the corresponding rearward louver blade, with the center lines of the streams approximately as shown by the lines 8 in Fig. 4. This leaves a pocket 9 of relatively stagnant air in front of the said rearward louver blade, through which stagnant air the momentum of the dust readily carries the latter. Consequently, my staggered louver grille effects a considerable separation of dust, gravel, and the like from the air.

This dust-separation is enhanced when each rearward louver blade comprises two webs diverging rearwardly away from each other at an angle of more than 90 degrees, and particularly so when the angle of divergence of these webs is not less than about 120 degrees, so that dust entering along the line 24 in Fig. 4 (at right angles to the common plane 25 of the front faces of the forward louver blades) will be reflected against the rear faces of forward blades.

The rearward blades also may be centrally ribbed, as shown in Fig. 4 and Fig. 7, so that their central ribs will also affect the reflection of light to enhance both the appearance of the grille and the obscuring of the radiator core. The forward blades may likewise be changed from a generally flat frontal effect, as shown by the forward blades in Fig. 7, each of which includes two rearwardly diverging webs 10A and 10B. To secure a rigid fastening of such V-fronted forward blades to the arms A of the blade-connecting cross-bars, I desirably provide each such arm A with two feet (11 and 12) extending in diverging planes; and I preferably also have the two feet on each arm extend in opposite directions with respect to a flat face of the arm, as shown in Fig. 8. This same figure also shows each forwardly offset cross-bar portion 13 midway between consecutive arms as bowed formed to fit against the rear face of a V-fronted rearward blade 14 in the manner shown in Fig. 4.

However, I do not wish to be limited to the use of blade-connecting members welded to the rear faces of the rearward blades, since other arrangements might be employed for fastening these blades to the connecting members. For example, Fig. 9 shows a portion of a grille in which fingered arms (allied to those of Fig. 8) support the forward blades 15, and in which the bar B carrying these arms has slots through which rearwardly projecting fingers 16A on the rearward blades are clinched after the manner shown in Fig. 12.

Fig. 9 also shows each blade as comprising two webs tangential to an arcuate medial portion, instead of showing the forwardly projecting medial rib R in Figs. 4, 6 or 7, thereby producing a different frontal appearance from the previously described figures. The spacing 17 (Fig. 7) of the common plane 19 of the most forward portions of the rearward blades from the common frontal plane 25 of the forward blades may also be varied, as shown by a comparison of Figs. 7 and 9; and the attractive appearances of my grilles may be further enhanced by also making the forward blades of a different color from the rearward ones.

Moreover, the relative staggering of the consecutive louver blades need not be as to all portions thereof, and the blades of the two sets need not be even of counterpart widths or shaping. For example, Fig. 10 shows a portion of a grille in which the two sets of louver elements are staggered only as to their rearward edges, while all of these elements presents their most forward portions in a common plate 25. In this case, each alternate louver element is of a rearwardly open channel section presenting parallel side webs 18A extending rearwardly from a generally flat front portion 18, to which the frontal portion an arm A of each blade-connecting bar B is fastened, this arm being longer than the width of each web 18A. The interposed louver blades 19 are of a rearwardly open approximately V-shaped section, with fingers 19A extending from the rear edges of their webs, each finger being clinched through a slot of the connecting bar B which is formed as shown in Fig. 13.

Fig. 11 shows part of a grille constructed similarly to that of Fig. 10, but in which relatively wider front portions are presented by the louver blades 21 which are directly clinched to the cross-bar.

Fig. 12 shows part of a grille also allied to that of Fig. 10, but in which each louver element 22 which is directly secured to the cross-bar projects forwardly beyond the frontal plane of the louver elements supported by arms on this bar, and in which the frontal portion of each such louver element is ornamented by a slotted tube 23 slipped over it, which tube might be of chrome-plated metal or of stainless steel.

Moreover, it should be obvious without separate picturing, that the surface 25 tangential to the frontal portions of all of the forward louver elements need not be a simple plane; as for example, that this surface might be a segment of a cylindrical surface to afford a rounded grille

front, or might consist of two rearwardly diverging planes to afford a V-front effect as shown in Fig. 17. Nor is it essential that the rearwardly diverging webs in a V-sectioned louver blade be of equal width, since departure in this respect may be advantageous in grilles of some frontal configurations. For example, Fig. 17 diagrammatically shows a horizontal section through a V-front grille with upright blades in which the central blade 26 of the rearward set has webs of equal width and is disposed squarely behind the central blade 28 of the forward set; and in which each other rearward blade has two webs 27A and 27B of relatively different widths.

So also, it is not essential to my invention that the louver elements (which I have heretofore designated as louver blades) should have straight longitudinal edges after the manner of straight bars, so long as these longitudinal edges of the louver elements are co-parallel. Instead of being formed for presenting a parallel straight-bar effect, as pictured in Fig. 1, the co-parallel elements of my grille might be concentric annular elements, as shown in Fig. 15, thereby also presenting the advantages disclosed for annular louvers in my copending application #657,037, filed February 16, 1933.

Since a transverse section through the annular louver elements of Fig. 15, as shown in Fig. 16, will be a counterpart of what the section would be if the elements were straight-edged, it will be obvious that the heretofore described advantages of my staggered louver-blade arrangement would apply equally with such annular elements, and that any blade-connecting bar B extending transversely of such annular louver elements could be formed and secured to these elements in the heretofore described manner.

Moreover, it is not essential to my invention that all of the louver elements of the grille be in relatively staggered disposition, or that each rearward louver element should have its most forward portion equally spaced from the adjacent forward louver elements. For example, with a V-front grille, the central louver blade 26 of the rearward set may be centrally behind the central blade 28 of the forward set (as shown in Fig. 17) while the other rearward louver elements are in relatively staggered relation. For such a V-front type, each non-central rearward louver blade may be of a rearwardly open V-section presenting a short web 27A extending laterally inward of the grille and entirely behind one frontal blade 29, together with a relatively wider web 27B extending behind the space between the frontal blade 29 and the next laterally outward frontal blade.

Since the advantages obtained by the staggered arrangement of the louver blades of my here presented grilles do not depend on the means for holding these blades in their recited dispositions, I also do not wish to be limited to the employment of the illustrated cross-bars for connecting the louver blades. So also, while I have heretofore described my novel grille as associated with the air-admitting opening in the frontal shell of an automobile, I do not wish to be limited as to its uses.

I claim as my invention:

1. A grille comprising two sets of consecutively spaced and substantially parallel louver blades, one set of the blades being spaced rearwardly from the other set and comprising blades disposed in staggered relation to those of the said other set; and connecting means fastened to and connecting the two sets of blades into a rigid assembly, the said means comprising connecting members extending transversely of and secured directly to the louver blades of the rearward set, and arms extending forwardly from the said members and respectively fastened to the blades of the forward set.

2. A grille as per claim 1, in which each connecting member extends behind the louver blades of the rearward set, and in which each of the said arms extends entirely behind and is of less width than the forward louver member to which it is fastened, so that substantially all portions of the connecting means are concealed by the louver blades in a frontal view of the grille.

3. A grille as per claim 1, in which each connecting member bears flatwise against the rear faces of louver blades of the rearward set for the major portion of the width of the last named louver blades.

4. A grille as per claim 1, in which each connecting member bears flatwise against the rear faces of louver blades of the rearward set for the major portion of the width of the last named louver blades, and in which the said blades of the rearward set have rearwardly directed side flanges respectively engaging spaced portions of the connecting member.

5. A grille as per claim 1, in which each forwardly extending arm includes at least one finger extending transversely of the said arm and engaging a louver blade of the forward set.

6. A grille as per claim 1, in which each forwardly extending arm has a forward end portion thereof bent to form a finger extending transversely of the said arm and in flatwise engagement with the rear face of a louver blade of the forward set.

7. A grille as per claim 1, in which each forwardly extending arm includes two fingers respectively engaging laterally spaced portions of a louver blade of the forward set.

8. A grille as per claim 1, in which the said arms extend alternately from opposite longitudinal edges of the connecting member from which these arms extend.

9. A grille as per claim 1, in which each louver blade of the forward set is of a generally V-shaped cross-section presenting two rearwardly diverging webs, and in which each of the said forwardly extending arms includes two fingers respectively fastened to the two webs of a louver blade of the forward set.

10. A grille comprising co-parallel and consecutively spaced louver blades consecutively staggered in a direction at right angles to the front face of the grille, whereby the said blades constitute a forward and a rearward set of blades, a rigid structure connecting all blades of the rearward set, and auxiliary elements fastened to the said structure and respectively fastened to a louver blade of the forward set, each such auxiliary element extending between portions of the said structure fastened respectively to two consecutive blades of the rearward set.

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