

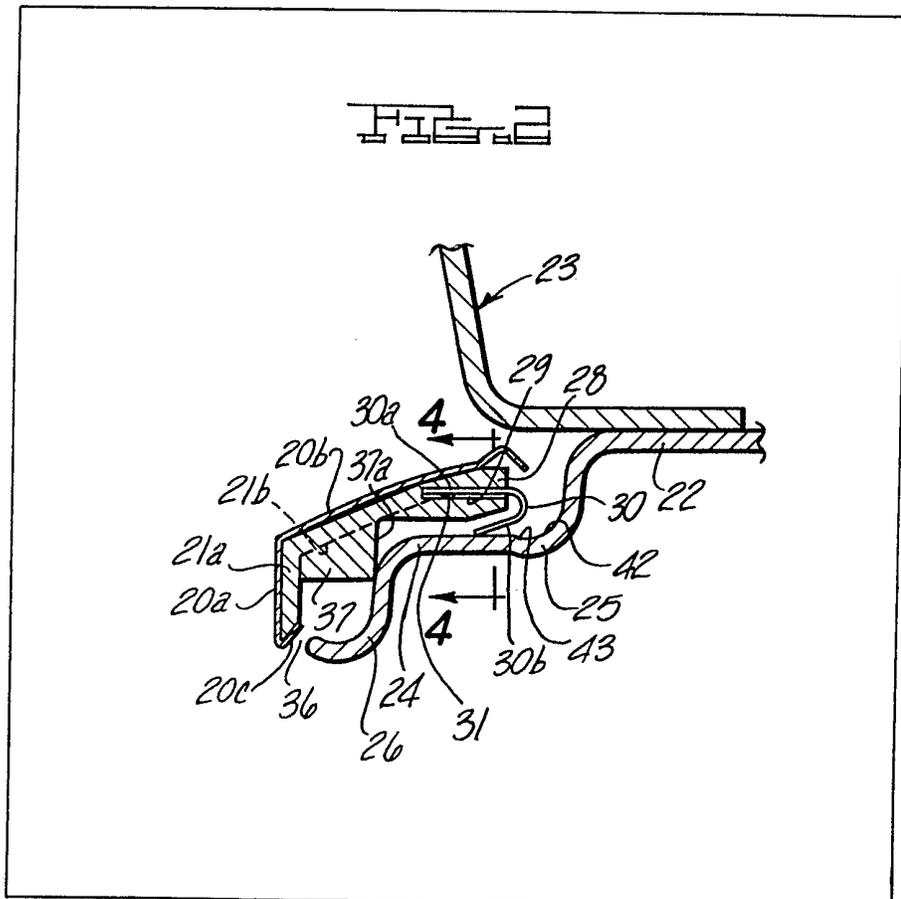
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(54) **Vehicle wheel trim**

(57) A vehicle wheel trim comprises a molded plastics member (21a) backing an outer ornamental layer (20a) and having a substantially axial flange portion (21b) which carries a plurality of resilient clips (30) adapted to engage the wheel rim for securing the trim to the wheel. Each clip has a leg (30a) secured within an axial

recess (29) located in the flange portion (21b) and of smaller radial dimension than the latter. A plurality of circumferentially spaced bosses are formed integrally with the flange portion (21b) to define the outer wall of each recess (29), each boss being of substantially the same thickness as the flange portion 21b and merging axially outwardly therewith at an angle as shown.



GB 2 098 554 A

1/2

FIG. 1

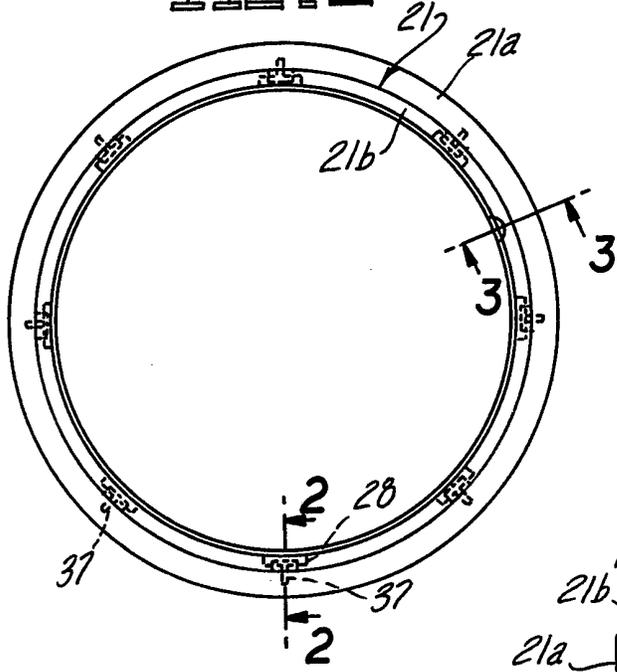


FIG. 2

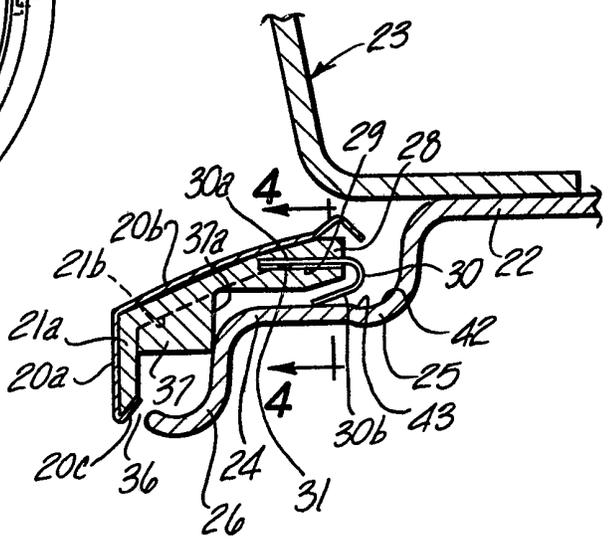


FIG. 3

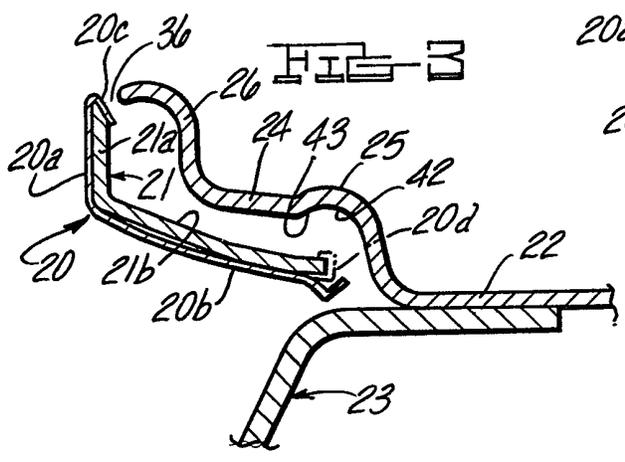
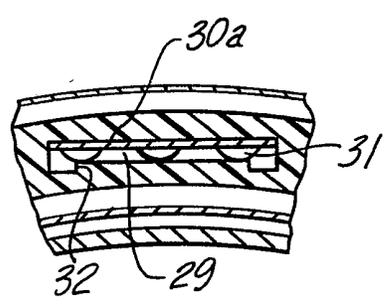
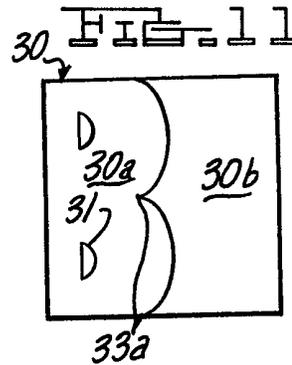
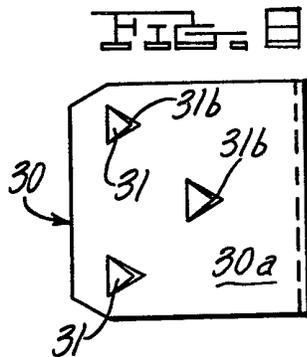
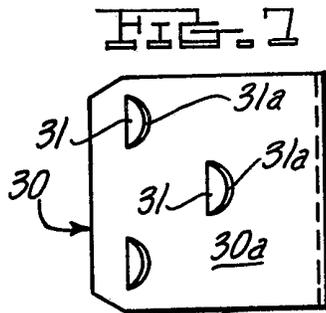
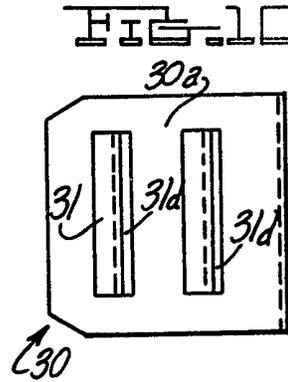
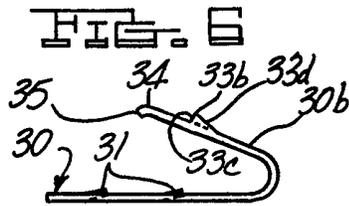
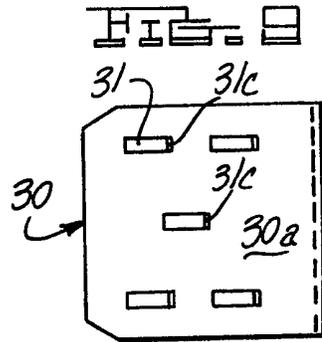
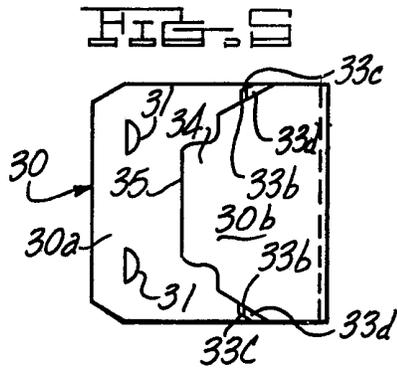


FIG. 4





SPECIFICATION
Vehicle wheel trim

This invention relates to improvements in a vehicle which trim assembly comprising means for securing the assembly to a vehicle wheel. Ornamental wheel trims or covers of stainless steel and the like and numerous devices for securing the trim to the wheel have long been in use. Such covers have been characterized by heavy, complex and costly constructions.

Primary objects of the present invention are to provide a comparatively simple and inexpensive wheel trim assembly of improved construction having the ornamental appearance of a conventional wheel trim and a particularly simple and effective retention means whereby the assembly may be readily secured to a vehicle wheel or removed therefrom as desired.

Another object is to provide such a wheel trim assembly comprising a thin outer ornamental layer of bright or decorative appearance and also comprising a molded backing and reinforcement of hard, lightweight plastics material for the ornamental layer.

Another object is to provide a wheel trim assembly comprising a flange member molded from said plastic materials to provide an integral annular axial flange portion adapted to fit freely and coaxially within a conventional annular flange of a vehicle wheel. The axial flange portion is formed with a plurality of radially shallow circumferentially spaced recesses associated with a corresponding plurality of J-shaped spring steel retention clips. Each recess opens axially inwardly to receive a flat, barbed leg of the associated retention clip. A plurality of sharp edged barbs or tabs are lanced from the plane of the flat leg to extend radially and axially inwardly to their sharp edges from resilient connections with the flat leg. The barbs or tabs are dimensioned to effect an interference fit with the adjacent wall of the shallow recess and to embed therein to resist their removal, but are resiliently yieldable to enable the initial insertion of the flat leg of the clip into the associated shallow recess.

When the flat barbed leg of the clip is secured within its associated shallow recess, the bight of the J-shaped clip extends closely around the axially inner edge of the molded axial flange portion to comprise a resilient connection between the flat barbed leg and a shorter retaining leg that extends radially and axially outwardly to a sharp pronged end for yieldingly engaging and embedding into the axial wheel flange at an interference fit.

In accordance with the structure of the J-shaped clip, including the flat barbed leg fixed within the shallow recess, and the shorter retaining leg engageable with the wheel flange, an efficient retention means of minimum radial dimension is achieved which is thus suitable for use with a wide range of vehicle wheel types wherein the radial clearance within the axial wheel flange is too small for conventional retainers. Also

the structure described materially simplifies the structure of the molded axial flange portion of the trim assembly as well as the molding operation and the mold required.

In regard to the clearance required for the retention means, mass-produced wheels of even the same kind vary appreciably in size as a result of the customary stack-up of allowable dimensional tolerances. Accordingly it is difficult to predetermine the precise position of the trim assembly relative to the wheel when secured thereto.

Another object is to provide an improved molded flange member for the trim assembly having a radial flange portion extending radially from an axially outer portion of the aforesaid axial flange portion. A plurality of circumferentially spaced reinforcing webs of said molded material are molded integrally with the radial and axial flange portions to maintain the angular relationship therebetween. Each web is formed with a radial shoulder adapted to engage an annular flange of the wheel and limit the axial inward movement of the trim assembly when the latter is attached to the wheel, thereby to predetermine the relative position of the trim assembly on the vehicle. In consequence, the trim assembly will be secured to the wheel at a predetermined location selected to assure the desired ornamental appearance and also to assure effective retention and to enable removal of the assembly when desired without undue difficulty.

Another object is to assure an effective engagement between the tabs of the flat leg of the retention clip and the adjacent wall of the associated recess by providing an enlargement of the recess at a location confronting a portion of the sharp edge of at least one of the tabs such that the surface area of the hard molded material engaged by the tab is reduced with the result that the sharp edge of the tab will engage a small localized area of the hard molded material and effectively embed thereinto.

Another object is to provide an improved resilient clip that interengages the wheel flange when the trim assembly is secured to the wheel and which provides one cam for springing the clip to facilitate its attachment to the wheel and a second cam for springing the clip to enable its removal from the wheel, wherein the clip is shaped and dimensioned to cooperate with the cams so that greater force is required for removal of the clip from the wheel than is required for attachment of the clip to the wheel.

Other objects are to provide an improved retention device for the plastic flange member comprising a plurality of circumferentially spaced resilient arms of said plastic material molded integrally with the flange member, the arms having integral resiliently yieldable end portions for supporting a plurality of small metallic nails or spikes that resiliently engage and embed radially into the wheel flange when the trim assembly is secured to the wheel. Spring steel retention clips are avoided and the entire flange member, except

for the small spikes, comprises the hard, lightweight molded plastic material. The inherent resiliency of the latter material is utilized to effect the attachment with the wheel.

5 The end of each plastic spring arm may comprise a separate integral spike support when the resiliency of the plastic material is adequate to effect the desired embedding of the nails into the wheel flange. In a preferred embodiment of the invention, the spike supporting ends of the spring arms are formed to comprise a unitary annular spike support coaxial with the wheel flange when the trim assembly is secured thereto. The annular support is dimensioned in its unstressed condition
10 prior to attachment of the trim assembly to the wheel so that the spring force of the plastic spring arms urging the spikes radially into engagement with the wheel flange is augmented by the resiliently distorted annular support when the trim assembly is secured to the wheel.

15 Other objects of this invention will appear in the following description and appended claims, reference being had to the accompanying drawings forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

25 The following United States patents are representative of the state of the art and are concerned generally with the problems confronted by applicant:—

30 3,771,834, 3,794,385, 3,873,161, 3,970,346 (Kretschmer) and 4,003,604 (Connell). These show steel clips interlocked with a plastic ring. In relation thereto, however, the present invention
35 seeks (a) to reduce the force required to depress clip portions so as to facilitate attachment of the trim assembly to the vehicle wheel, and (b) to increase that force during removal of the trim assembly to resist the removal.

40 The present invention will now be described, by way of example, with reference to the accompanying drawings, in which:—

45 Fig. 1 is an elevational view of an annular wheel trim assembly embodying the present invention, looking at the inner face being that which confronts the vehicle wheel.

50 Fig. 2 is an enlarged fragmentary sectional view taken in the direction of the arrows along the line 2—2 of Fig. 1, showing the trim assembly secured to a vehicle wheel.

55 Fig. 3 is a view similar to Fig. 2, but taken in the direction of the arrows along the line 3—3 of Fig. 1.

60 Fig. 4 is a sectional view showing details of one of the spring steel retention clips secured within a recess in the plastic support for the metallic trim member.

65 Fig. 5 is a plan view of a spring steel retention clip embodying the present invention and suitable for use in the assemblies illustrated in Fig. 2.

Fig. 6 is a side elevation of the clip shown in Fig. 5.

Fig. 7 is a view of the clip shown in Fig. 5, taken from the underside of Fig. 6.

65 Figs. 8, 9 and 10 are views similar to Fig. 7,

showing modifications.

Fig. 11 is a plan view similar to Fig. 5, showing a modification.

70 It is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practised or carried out in various ways. Also, it is
75 to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

80 Referring to the drawings and to Figures 1 to 4 in particular, an annular metallic trim ring or member 20, which may be formed from thin lightweight sheet metal, is backed and reinforced by an annular flange member 21 of comparatively hard lightweight form-sustaining molded plastics material shaped to conform generally to the
85 contour of member 20. The trim member 20 may have a bright ornamental exterior face and may comprise stainless steel, anodized aluminium alloy or chrome plated steel, or it may comprise a metallic plating directly on the plastic backing 21.

90 The trim ring 20 illustrated in Figs. 1 to 3 is designed to provide a decorative trim for an annular rim or tyre supporting flange 22 of a typical vehicle wheel 23, Fig. 3, and comprises an annular radial flange 20*a* extending outwardly
95 from the axially outer edge of an integral co-axial annular axial flange 20*b*. Due to the need for economy and to minimize weight, the material of the trim ring 20 is too thin and flexible to permit its attachment directly to the wheel flange 22.
100 Accordingly, the ring 20 is secured to the plastic backing and reinforcing member 21, as for example by integral annular flanges 20*c* and 20*d* of ring 20 formed closely around outer and inner peripheral portions respectively of the backing
105 member 21. The latter comprises an annular radial flange 21*a*, which conforms to the adjacent axially inner surface of the flange 20*a* in form-sustaining relationship and extends radially outwardly from the axially outer edge of an integral coaxial
110 annular axial flange 21*b*. The flange 21*b* conforms closely to the proximate inner surface of trim flange 20*b* in supporting relationship and comprises, with flange 21*a*, a unitary annular flange member 21.

115 The wheel 23 comprises a central spider forced into and welded to the annular rim flange 22 for supporting a conventional pneumatic tire, not shown. The flange 22 usually comprises a heavy gauge sheet metal stamping of steel or aluminium alloy having an annular axial flange portion 24
120 spacing an annular axially inner safety hump 25 from an outer annular radially outward extension 26, which terminates in an annular axially outwardly rounded flange adapted for attachment of wheel balancing weights (not shown). The
125 radially outer surface of the axial flange portion 24 comprises the base of a groove for receiving the outer rim bead of a pneumatic tire.

130 The axial flange 21*b* is reinforced at a plurality of circumferentially spaced locations, eight in the

present instance, by radially thickened bosses 28 (Fig. 2) of the molded material of the flange member 21. Each boss 28 has an axially inwardly opening recess 29 molded therein which, as

5 illustrated in Fig. 4, has parallel radially spaced walls dimensioned to receive the long flat fixed leg 30a of a generally J-shaped stainless spring steel retention clip 30 snugly therein.

A plurality of sharp edged barbs or tabs 31 are lanced from the fixed leg 30a to extend therefrom radially outwardly and axially inwardly, Figs. 5, 6 and 7. By virtue of the inherent resiliency of the material of each clip 30 and its attachment with the radially inner ends of its tabs 31, the sharp

10 outer edges of the tabs 31 resiliently engage and embed into the radially outer wall of the recess 29 and also urge the flat leg 30a radially inwardly against the opposite parallel radially inner wall of the recess 29.

Prior to assembly of each clip 30 within its associated recess 29, the tabs 31 extend radially in their unstressed condition sufficiently to effect an interference fit within the recess 29 and to yield resiliently radially inwardly to enable the

25 initial insertion of the legs 30a into their associated recesses 29. Thereafter any attempt to remove a clip 30 from its recess 29 causes the sharp edges of the tabs 31 to dig even deeper into the adjacent recess wall.

As illustrated in Fig. 4, each recess 29 is enlarged radially outwardly along the circumferentially spaced edges of the associated leg 30a to provide a pair of radial shoulders 32 aligned with the mid-regions of the sharp edges of

35 a corresponding pair of tabs 31. The corner edge of each shoulder 32 enhances the ability of the tab to dig into the hard material of the backing flange member 21 by increasing the tab pressure per unit area.

As illustrated in Fig. 7, three tabs 31 having sharp semi-circular edges 31a are adequate to retain the fixed leg 30a within its recess 29. Two tabs 31 are spaced circumferentially to engage the shoulders 32 and a central tab 31 engages the

45 radially outer wall of the recess 29 at an intermediate location. Alternatively to being rounded as in Fig. 7 the sharp edges of a tab 31 may comprise a point 31b as in Fig. 8 a short circumferentially extending edge 31c as in Fig. 9 or a longer circumferentially extending knife edge

50 31d as in Fig. 10.

The shorter retaining leg 30b of each clip 30 extends radially and axially outwardly from the bight of the clip to a sharp end dimensioned to effect an interference fit within the annular flange portion 24 and to resiliently engage and embed

55 thereinto by reason of the resilient connection with the leg 30a at said bight. The sharp end of the spring steel leg 30b that digs into the wall of the recess 29 may comprise a knife edge but is preferably pointed, as for example by being scalloped as illustrated in Fig. 11 to provide a few sharp prongs 33a, or by having its corner edges bent radially outwardly at right angles to the plane

65 of the leg 30b to form the sharp barbs 33b, as

illustrated in Figs. 5 and 6.

Prior to formation of the prongs or barbs 33b, excess corner material at the outer end of leg 30b is cut away so that the axially outer edges 33c of the resulting prongs 33b (after the corner portions of the leg 30b are bent outwardly) will intersect the plane of the leg 30b at approximately an 80° angle to assure effective embedding of the prongs 33b into the adjacent wheel flange, yet enable the trim assembly 20, 21 to be pried loose from the vehicle wheel 23. The axially inner edge 33d of each prong or barb 33b preferably slopes toward the surface of the retaining leg 30b at a much shallower angle and thus serves as a cam to facilitate attachment of the trim assembly 20, 21 to the vehicle wheel 23 by camming the resiliently yieldable leg 30b radially inwardly to prevent the barbs 33b from biting appreciably into the wheel flange 24 when the trim assembly 20, 21 is moved axially inwardly during the attachment, as explained below.

A similar one-way cam action is accomplished by the pronged retaining leg 30b of Fig. 11, wherein the latter leg meets the surface of flange 24, 26 at a sufficiently shallow angle during attachment to the wheel to enable axial inward movement, yet sufficiently steep to prevent accidental removal. Thus the spring force urging the Fig. 11 retaining leg 30b radially outwardly causes the prongs or barbs 33a to embed into the adjacent wheel flange 24 and effectively resist axial outward movement as a result of normal operating forces.

Between the barbs 33b, the leg 30b in Figs. 5 and 6 extends axially and radially outwardly at 34 beyond the barbs 33b and terminates in a rounded cam edge 35 adapted to make initial engagement with the wheel flange 24, 26 and cam the leg 30b and barbs 33b radially inwardly to facilitate attachment of the trim assembly 20, 21 to the vehicle wheel. Shortly after the initial engagement of the cam edge 35 with the wheel flange, the cam edges 33d engage the wheel flange as the trim assembly is progressively forced axially inwardly to the final position attached to the vehicle wheel.

In the structure shown and described, the plastics flange member 21 with its bosses 28 and recesses 29 are molded as a unit. Thereafter the retention spring clips 30 and trim member 20 are secured to the member 21. If the resulting trim assembly 20, 21 is annular as shown, the trim member 20 may be secured to the backing member 21 by an additional flange 20d formed around the annular axially inner edge of the flange 21b, as indicated for instance in Fig. 3.

It is apparent that axially extending annular flange portion 21b is dimensioned to extend freely coaxially into the axially extending annular wheel flange portion 24, and the resiliently yieldable retaining legs 30b will effect the above-described interference fit within the flange 24 and will yield resiliently radially inwardly to enable the trim assembly to be forced axially inwardly to the final secured position whereat the retaining barbs of

the spring clip legs 30*b* embed into the wheel flange to resist removal.

At the final secured position, it is desirable that an annular clearance 36 exists between the flange 20*c* (reinforced by the backing flange 21*a*) and the axially outer periphery of the wheel rim flange 26 to enable insertion of a heavy screwdriver or similar tool for prising the trim assembly loose from its attachment with the vehicle wheel. The stack-up of dimensional tolerances in the usual mass-produced automobile wheel results in large dimensional variations. Without some provision to the contrary it is not possible to predetermine the desired clearance 36. Also, in order to assure the desired rigidity for the backing and reinforcing flange member 21 and to preserve the angle between the annular flange portions 21*a* and 21*b*, a plurality of circumferentially spaced reinforcing webs 37 of the material of the flange member 21 are molded integrally with the flanges 21*a* and 21*b* at their internal juncture.

Each flange 37 is dimensioned to provide a radial shoulder 37*a* located at a predetermined distance axially inwardly of flange 21*a* to comprise a locating stop adapted to engage the wheel flange 26 and thereby determine the desired clearance 36 when the trim assembly is attached to the vehicle wheel at the aforesaid final secured position. The reinforcing flanges 37 and their movement-limiting shoulders 37*a* may or may not correspond in number to the recesses 29. Accordingly, the shoulders 37*a* are not necessarily aligned with these retention devices and are not shown in the other sectional views.

The fixed legs 30*a* may be molded into the recesses 29 during the initial molding of the flange member 21. However, the clips 30 and the flange member 21 with its axially opening recesses 29 are preferably formed separately. The clips 30 are then secured to the flange member 21 by forcing the legs 30*a* into the axially open ends of the recesses 29 as described above. Thus the mold for the flange member 21 and the operation of molding the latter are simplified and the assembly of the clips 30 with the member 21 can be completed at a location remote from the molding operation.

CLAIMS

1. Means for decorating the axially outer face of a vehicle wheel having an annular wheel flange, comprising flange means of molded material having an annularly arranged outer radial flange and an annularly arranged axial flange adapted to extend coaxially within the wheel flange from a radially inner portion of the radial flange, the axial flange having a plurality of radially shallow and circumferentially spaced clip-securing recesses opening axially inwardly, a plurality of spring steel retention clips associated with the recesses respectively, each clip comprising an axial extension secured within the associated recess and extending axially inwardly from the axial opening of the recess, each clip also comprising a retaining extension spaced radially outwardly from

65 the axial flange for resiliently engaging the wheel flange and extending axially outwardly from a resilient connection with the axially inner end of the axial extension, the outer portion of the retaining having means arranged for resiliently engaging a radially inner surface of the wheel flange to secure the flange means against axial movement from the wheel; and a separate boss of said molded material associated with each recess, each boss being integral with the axial flange and extending radially outwardly from the radially outer surface of the axial flange at the region of the associated recess and comprising the radially outer wall of the associated recess, said annular axial flange comprising radially spaced inner and outer surfaces, the radial dimension of each clip-securing recess being less than the radial spacing between said inner and outer surfaces, each boss having a radial thickness substantially equal to the radial spacing between said inner and outer surfaces and merging axially outwardly at an angle with said axial flange.

2. A wheel decorating means according to claim 1 wherein said axial and retaining extensions comprise the arms of a generally U-shaped clip, the bight of the U-shape comprising a resilient connection between said axial and retaining extensions and the latter extending radially and axially outwardly from said bight around said radially outwardly extending boss.

3. A wheel decorating means according to claim 1 or 3 wherein each recess is delineated by substantially parallel wall portions of said molded material closely spaced radially, the axial extension within each recess comprising a substantially flat strip having a resilient tab extending angularly and axially inwardly therefrom and resiliently engaging one of said radially spaced walls to secure the axial extension within its recess.

4. A wheel decorating means according to claim 3, wherein said one of said radially spaced walls of each recess has an offset portion defining a shoulder of the molded material such as to align with said resilient tab so that a portion of an edge of the tab embeds into said material at said shoulder.

5. A wheel decorating means according to any of the preceding claims, wherein each boss comprises a radial enlargement of the material defining a portion of the axially inner edge of the axial flange portion, the recess associated with each enlargement opening axially inwardly through the last-named edge, and the retention clip associated with each recess comprises sheet spring steel extending axially inwardly from the last-named edge, then radially and axially outwardly in a reverse bend around the last-named edge in radially spaced relationship when unstressed prior to attachment with the vehicle wheel.

6. A wheel decorating means according to any of the preceding claims, wherein an ornamental trim layer is secured to the radially and axially outer surfaces of the flange means, the latter

conforming closely to the contour of a major portion of the trim layer in form sustaining relationship to comprise a backing and reinforcement for the trim layer.

- 5 7. A wheel decorating means according to any of the preceding claims, wherein a metallic trim member is secured to and conforms closely to the contour of the radially inner surface of said axial flange and the axially outer surface of said radial flange.

- 10 8. A wheel decorating means according to

claim 6 or 7, wherein the trim layer or member comprises a sheet member and means for securing the sheet member and flange means together comprising inturned annular edges of the trim layer or member formed around the radially outer edge of the annular radial flange and around the axially inner edge of the annular axial flange.

- 15 9. Means for decorating a vehicle wheel, substantially as hereinbefore described with reference to Figures 1 to 4 or to Figures 5 and 6 or to Figures 7, 8, 9, 10 or 11.

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