THE JOINT EXAMINATION BOARD

PAPER P4

AMENDMENT OF SPECIFICATIONS FOR UNITED KINGDOM PATENTS IN REVOCATION PROCEEDINGS

11 November 1999

10.00 a.m. - 01.00 p.m

Please read the following instructions carefully. ***Time Allowed - THREE hours***

1. Where a question permits, reasons should be given for the conclusions reached.

2. Start each question **(but not necessarily each part of each question)** on a fresh sheet of paper. In the appropriate boxes at the top of each sheet please enter the designation of the paper, the question number, and your Examination number. Write on **one** side of the paper only using **BLACK** ink. You must **NOT** staple pages together. u must **NOT** state your name anywhere in the answers.

3. **Unless specifically requested answers are NOT required in letter form.**

4. **NO** printed matter or other written material may be taken into the examination room.

5. Answers MUST be legible. If the examiners cannot read a candidate's answer no marks will be awarded.

6. NO writing whatsoever, including number of papers, is allowed prior to the commencement of the examination or after it has finished.

9. **At the end of the examination please double check that you have fully complied with instruction 4 and assemble your answer sheets in question number order to hand in.**

This paper consists of **twenty one** pages including this page

INSTRUCTIONS TO CANDIDATES

In this paper, you should assume that a United Kingdom patent application comprising the attached specification (identified as GB 9700007.7) has been filed and that the UK Patent Office has issued the attached Official Letter. You have reported the Official Letter to your client and have received instructions for response in the form of the attached letter.

Your task is to prepare the following:

1. A letter to the UK Patent Office in response to the Official Letter, accompanied by a set of amended claims if appropriate. (Please note that for the purposes of this examination you are **not** required to propose any amendments to the description of the patent application).

2. A memorandum consisting of notes to provide the basis of advice and comment to your client explaining the actions you have taken and the reasons for those actions. These notes should be restricted to patent matters; you are **not** required to consider any other matters such as copyright, design or confidential information.

You should accept the facts given in the paper and base your answer on those facts. In particular, you should **not** make use of any special knowledge that you may have of the subject matter concerned, and you must assume that the prior art referred to is in fact exhaustive. Where only extracts of documents are presented, you should assume that those extracts contain all relevant material.

If your advice to your client includes a suggestion that one or more divisional applications should be filed, you should draft independent claim(s) for the or each divisional and your memorandum should indicate your grounds for believing the filing of such a divisional application to be advisable. You should **not**, repeat **not**, draft a description for a divisional application, nor any dependent claims.

LETTER FROM CLIENT

Thank you for your reminder about the imminent deadline on this case. I am struggling to catch up with matters here since the departure of our previous Managing Director six months ago.

As you may know, our company has been fairly successful over the past twenty years supplying wheel arch liners to manufacturers of lorries and buses. There were no competing products on the market, perhaps because we had a UK patent for the basic idea, but I now learn that this has recently expired.

Two years ago our MD designed the improved liner for which you made the present patent application. It is definitely a better product because of the reduced spray levels, and should have good commercial prospects. But, we have had delays in starting manufacture because of some internal disagreements leading to the MD's recent departure to join a large competitor, who is now going to be selling liners of this kind.

The future of this arm of our business depends on selling the new design using the spray-diverting lip feature in one form or another (we are still testing various lip configurations), so getting this patent granted is crucial for us. I must say I am puzzled at the Patent Office's negative reaction, since to my eye neither of the two old documents looks closely relevant at all. I must leave it to you to sort this out, however, because I am going to be travelling abroad for three weeks and unfortunately unavailable. If you feel there is a reasonable chance of success please take this letter as authorisation immediately to proceed with whatever action you feel is appropriate to protect or improve our position.

The above-mentioned large competitor has recently exhibited their new wheel arch liner, which to our disgust is an obvious copy of our design made with information from our ex-MD. They have left out the special slot lips on the inner corrugated liner presumably because she warned them of the pending patent's existence. Their liner is just as shown in our old patent, but, the backing cover and other components are absolutely identical to those of our new design, i.e. just as shown in our patent application drawings, and they are using the new materials. Their anti-spray performance will be less improved than ours, because of the absence of slot lips. However their marketing of such a similar product, more up-to-date than our existing metal shields, is going to be a serious problem for us. Is there some way we can hold them off while we convince the customers of our better anti-spray performance?

I look forward to hearing from you on my return.

CLIENT'S PATENT APPLICATION

GB 9700007.7

VEHICLE WHEEL SPRAY COLLECTOR

This invention relates to apparatus for restricting spray from vehicle wheels.

Road vehicles travelling on a wet surface create a considerable amount of spray which issues from the wheels in two ways. A small proportion is thrown out sideways at a low level. **A** larger proportion flies tangentially up and around the wheel as spray.

A conventional wheel arch or mudguard restricts much of this spray. However when the water flung tangentially from the wheel strikes the wheel arch, it then drops back down onto the rotating wheel. This cycle is repeated so that water finally escaping from between the wheel and arch is very finely divided and creates a mist or cloud which can seriously affect the vision of people driving other vehicles.

Our own GB 1400000 describes a wheel arch liner specially adapted to trap and control spray, as shown in Figs **1** and 2. A curved steel liner or shield 40 is mounted inside the conventional wheel arch 60 and has a corrugated form the inner face of which provides a set of downwardly-opening V-shaped channels facing onto the wheel. Elongate slots 50 are formed in the crests 30 of these channels. Water flung from the wheel periphery 100 passes through the slots, strikes the wheel arch and falls back into troughs 70 which are on the

outer surface of the arched shield, between the slotted crests. This water flows along the troughs to collecting gutters 80 at the ends of the arched shield which are sloped to guide it outwardly onto the road beyond the wheel in an orderly stream rather than as a spray.

It would be desirable to improve on such prior art constructions by increasing the effectiveness with which spray can be collected and be prevented from scattering.

Accordingly, this invention provides a vehicle wheel spray collector comprising an arched shield adapted to be mounted over a vehicle wheel and having spray collecting channels on the concave side of the arch, the channels having slots in their crests for the passage of water flung from the vehicle wheel and diverging inwardly from their crests to their mouths, and spray-diverting means being provided to divert water flung out through the slots and thereby inhibit its return back through the slots.

In particular, we have found that by forming at least a portion of the shield at the margin of each slot with a flange or inwardly turned lip which is angled to the channel wall and extends generally transversely relative to the radial direction of the arched shield, we can substantially reduce the amount of flung water which subsequently returns onto the wheel back through the slot. So as to maximise the diverting effect a lip is preferably provided on each wall of a channel so that each slot is defined by a pair of opposed lips. The spray-diverting effect of a lip is best if the lip is

substantially perpendicular to the radial direction in which spray is flung from a wheel so that the outward face of each lip, i.e. on the convex side of the arched shield, is preferably substantially parallel to the slot. Diversion is also improved if the edge of the lip is perpendicular to the width of the slot.

To minimise direct reflection of spray back onto the wheel, it is preferred that the width of a lip be comparable to the width of a slot.

It appears that the lip edge acts to divert spray passing through the slot back around out of vertical alignment with the respective slot; it then tends to fall onto the outer surface of the shield, e.g. into one of plural escape troughs which are preferably provided around the shield's outer surface, rather than falling or rebounding back through the slot onto the wheel.

A runoff gutter is provided at or adjacent one or both ends of the arched shield to collect water flowing down the outside of the shield in the escape channels 9 and guide the water as a stream to the side of the wheel. We prefer to incline the runoff gutter down towards the inboard side of the arrangement. It has been found that contrary to expectation the spray-forming effect of turbulence on the runoff water stream is then less than when the stream is diverted to the outboard side of the wheel, as has been done in the past.

Usually a backing cover extends around the outside of the arched shield. This backing cover may be the wheel arch or mudguard itself, or a supplementary backing cover installed with the slotted shield. Spray passing through the slots can rebound from the backing cover onto the outer surface of the arched shield. The backing cover is preferably spaced only a short distance from the shield to provide a compact construction.

An embodiment of the invention is now described in detail with reference to the accompanying drawings, in which:

Fig 1 and Fig 2 are respectively a vertical transverse section and an enlarged vertical transverse section of the spray collector shown in GB 1400000;

Fig 3 is a side elevation of a spray collector shield embodying the present invention;

Fig 4 shows a fragment of the collector shield on an enlarged scale;and

Fig 5 is a transverse section through the enlarged fragment taken on line V-V and

.

The embodiment of the invention is described with reference to Figs 3 to 6. An arcuate shield 5, in extent about 160°, is installed beneath the front wheel arch or mudguard 4 of a vehicle. Front and rear runoff gutters 15,16 are mounted across the ends of the shield.

The shield's principal components are an inner corrugated arch liner 6 and an outer backing cover 13, located at a close

spacing from the convex outer side of the corrugated arch liner 6. Marginal flanges 7 are used to rivet the lining within the existing wheel cover 4 by screw brackets 19.

The inner side of the corrugated liner 6 presents a series of side-by-side downwardly opening circumferential channels 8 which flare downwardly from their flattened crests. The convex outer side of the corrugated liner 6 has upwardly flaring escape troughs 9 which extend between the downwardly opening channels 8. Apertures 10 in the form of elongated slots are provided through the flattened crests of the channels 8. Neighbouring slots 10 are longitudinally separated by web portions 11 to maintain the liner's structural integrity.

To trap the maximum-spray, it is important that the spray can pass readily through the slots. The important feature herein is to avoid obstruction of the slots by spray that has already passed through and which is falling back.

A flange or lip 12 is formed on either side of each slot 10 transversely to the flow of spray through the slots. Thus the lips **12** form parallel opposite margins of the slot 10. The divergence angle of each channel 8 is preferably about 30". The edge of each lip 12 is generally perpendicular to the width of the slot and the outer face of each lip is generally parallel to the width of the slot.

We find that the effect of these lips 12 is to deflect spray passing through the slots as indicated in Fig 5. The deflected spray strikes the backing cover 13 at an angle for

reflection down into an escape trough 9, Undeflected the spray -passing through a slot would tend to rebound back through the slot and obstruct incoming spray.

The slots 10 and the lips which define them are of comparable width for the most effective spray deflection. The lips 12 are preferably less than 3 mm wide to minimise back-reflection of spray onto the wheel.

The deflecting action of the lips is weakest in the centre of each slot. To improve the deflection of spray at the outer side of the slot, we provide supplementary splitter ribs 14 on the backing cover **13,** aligned along the centres of the slots. With the backing layer 13 sufficiently close to the corrugated arch 6, these effectively divide the central portion of spray and guide it away from above the slot.

Water collecting in the troughs 9 runs forward and backwards into the front and rear runoff gutters 15,16 at the shield ends. See Fig 6. Each gutter is sloped inboard and opens only at the inboard end, to dump the consolidated runoff water beneath the vehicle. We have discovered that, contrary to previous perceptions, dumping the water beneath the vehicle actually reduces the overall spray problem. The turbulence beneath the vehicle is surprisingly found to be less than at the outboard side, and interference with other vehicles - potentially causing flying spray - is avoided.

The corrugated liner 6 and its backing cover 13 are made of tough engineering plastics materials, which are easy and

economical to shape, light in weight and not vulnerable to corrosion.

CLAIMS:

1. **A** vehicle wheel spray collector comprising an arched shield adapted to be mounted over a vehicle wheel and having spray collecting channels on the concave side of the arch, the channels having slots in their crests for the passage of water flung from the vehicle wheel and diverging inwardly from their crests to their mouths, and spray-diverting means being provided to divert water flung out through the slots and thereby inhibit its return back through the slots

2. **A** vehicle wheel spray collector according to claim **1** in which the convex side of the arched shield provides escape troughs running between the spray collecting channels.

3. **A** vehicle wheel spray collector according to claim 1 or claim **2** having a runoff gutter adjacent the end of the arched shield to collect water from the escape troughs and guide it to the side of the arch.

4. **A** vehicle wheel spray collector according to any one of the preceding claims in which each slot is bordered by a pair of opposed lips, angled in from the respective side walls of the channel to divert flung water passing through the slot.

5. **A** vehicle wheel spray collector according to claim **4** in which the lips of each pair are substantially parallel.

6. A vehicle wheel spray collector according to any one of the preceding claims having a backing cover overlying the convex side of the arched shield.

Fig.2. (PRIOR ART)

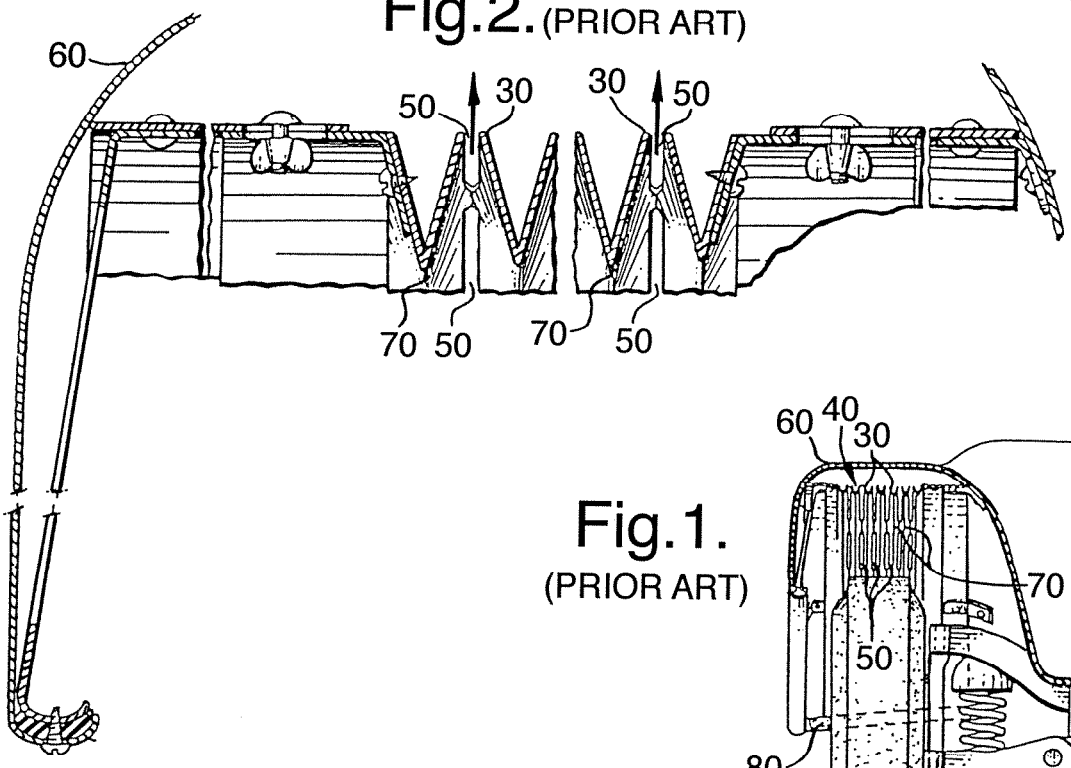


Fig.1. (PRIOR ART)

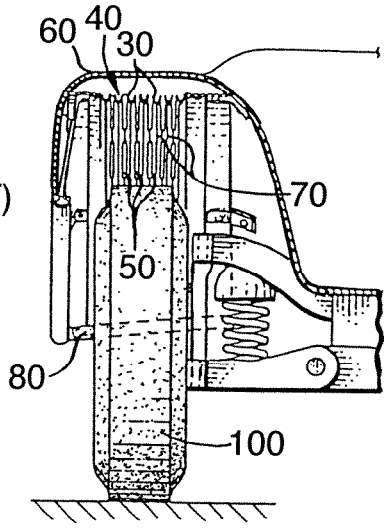


Fig.3.

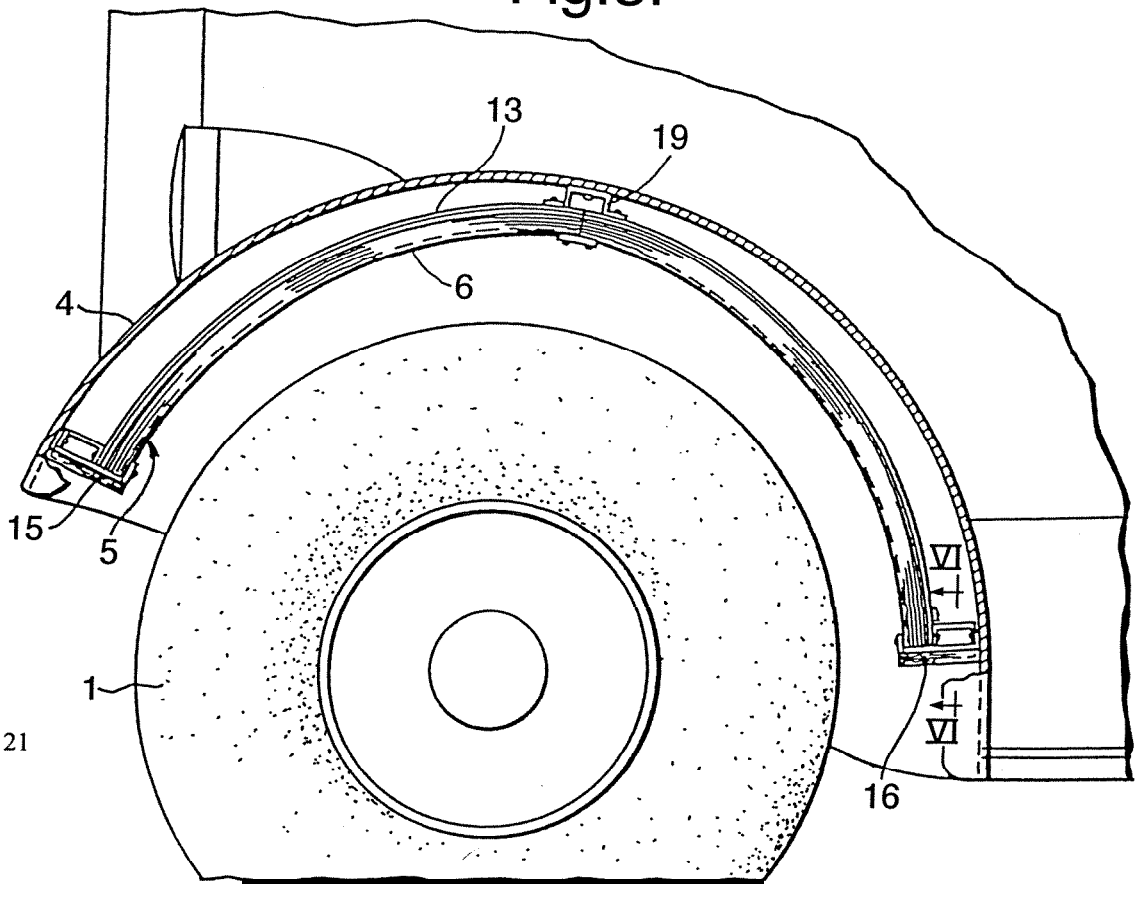


Fig.4.

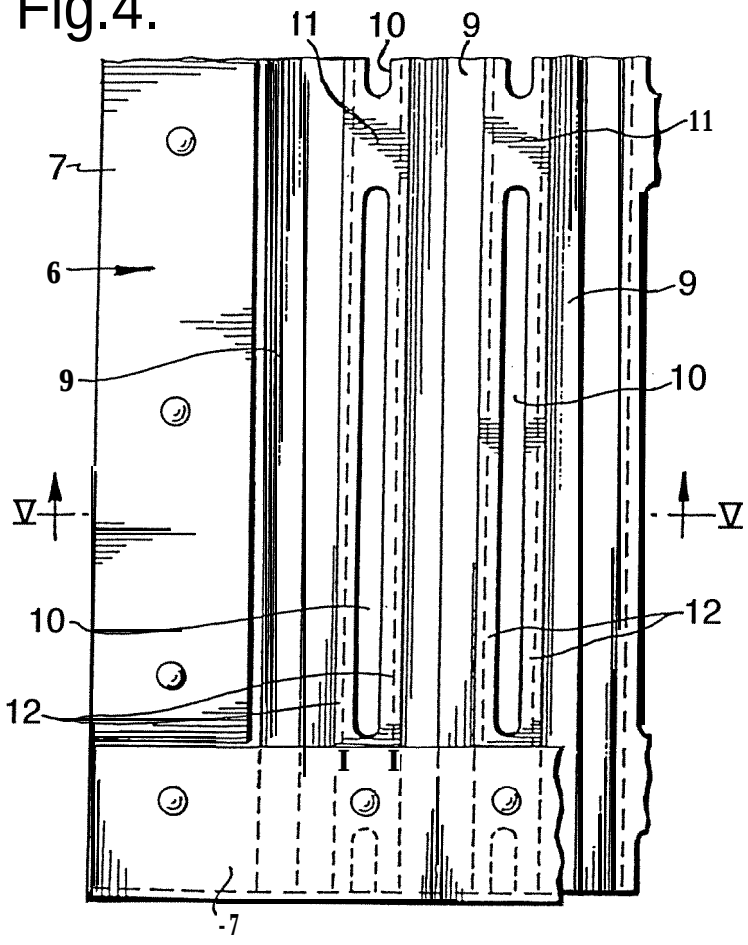
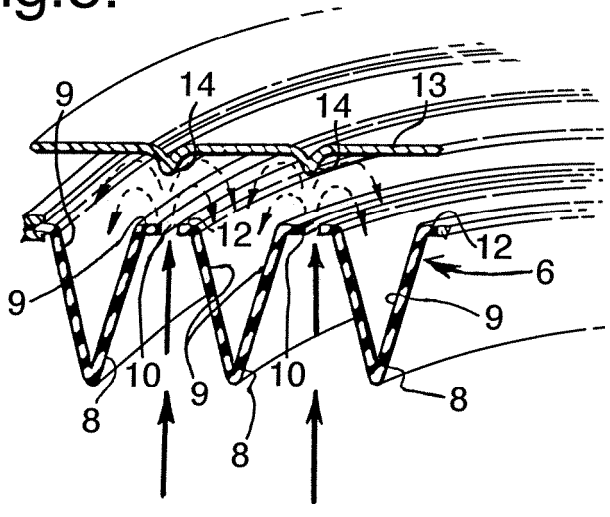


Fig.5.



OFFICIAL LETTER

Application No:	GB9700007.7	Examiner:	**W Runnacles**
Applicant:	Noslosh **UK Limited**	Date of Report:	15 May 1999

Latest date for reply:

15 November 1999

Patents **Act 1977**
Examination Report under Section 18(3)

Basis of the examination

This examination report is based on the application as filed.

Novelty

It appears, as a result of the search under Section 17, that your application does not meet the requirements of Sections 1 (l)(a) and 1 (l)(b) in that the invention as claimed is not new and/or does not involve an inventive step having regard to the matter contained in the patent specifications or other documents cited below:

GB2 111 111
GB 2 333 333

GB 2111111 (Published 30 April 1985)

(Description and drawings only)

This invention relates to improvements in wheel arches and mud flaps for vehicle wheels.

In the invention, there is provided a vehicle wheel arch comprising an arched cover member having on its underside a series of spaced side-by-side open-ended channel members whose channels open towards the cover member and are spaced therefrom, the channel members being arranged so that in use spray from a vehicle wheel may pass radially outwards between the channel members, strike the cover member and rebound therefrom into the channel members to form streams which pass along the channel members and are deposited from an open end thereof.

The channels may be provided as an interconnected set with means for fixing them to an existing vehicle wheel arch cover member as a spray restricter unit.

Preferably the channel members have converging side walls so that spray passing between them from the wheel is somewhat concentrated before striking the cover. Means may be provided for depositing water collected in the channel members laterally of the vehicle wheel.

A particularly preferred embodiment has two sets of side-by-side channel members differently radially spaced from the cover member, the members of one set being staggered relative to the members of the other set. Spray is then deflected laterally as it passes between the channel members of each set, and the double staggered sets form a more effective catchment for drops falling back from the cover.

In the drawings:

Fig 1 is a side elevation of a wheel arch;
Fig 2 is a perspective view of part of the wheel arch;
Fig 3 is a part section of the wheel arch, and
Fig 4 is a schematic section showing the arch in use.

As shown, the wheel arch cover member 12 arches over a wheel 18 and generally has an inverted U lateral cross-section.

First and second retaining tracks 22,24 are fixed along an inner surface of the cover member side walls 20 by rivets 26. These support first and second arrays 28,30 of side-by-side channel members 32 of V cross-section. Channel members in the first array 28 are laterally staggered or offset relative to those in the second array 30. Bracing ribs 34 connect the members 32 of the respective sets.

The channel members 32 and cover member 12 may be of rubber, tough plastics or PVC. Or, channel members 32 of such material may be fitted to an existing metal cover 12.

A mud flap 36 is fixed to the rear end of the cover member 12, and the arrays 28, 30 of channel members 32 extend down the front face of the mud flap. The free ends of the channel members 32 open into a laterally-directed channel 40 which is open at the outboard side, to keep the flowing water out of the wheel path.

In use on a wet road, spray flung outwards from the wheel 18 passes between the channel members 32 of the first and second arrays 28,30, being deflected laterally and slowed down during its passage. Striking the inside of the cover member 12, the spray rebounds into the V-shaped channels of the members 32 having lost most of its momentum. The collected water runs down the V-channels to the lateral channel 40 and is deposited on the road surface, substantially without spray.

GB 2 111 111

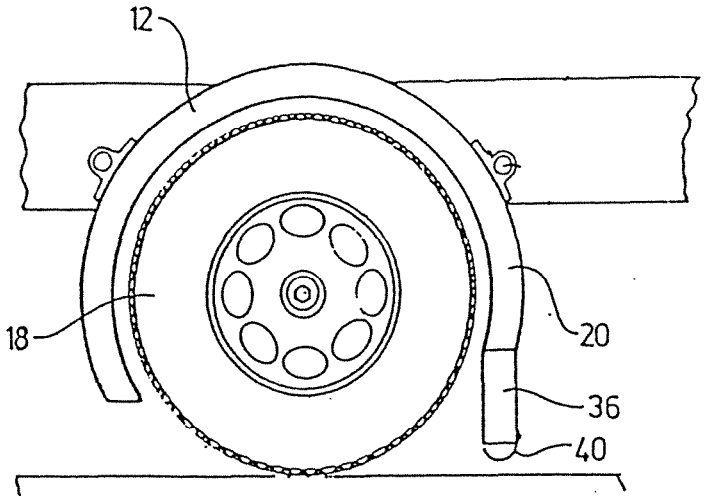


FIG 1

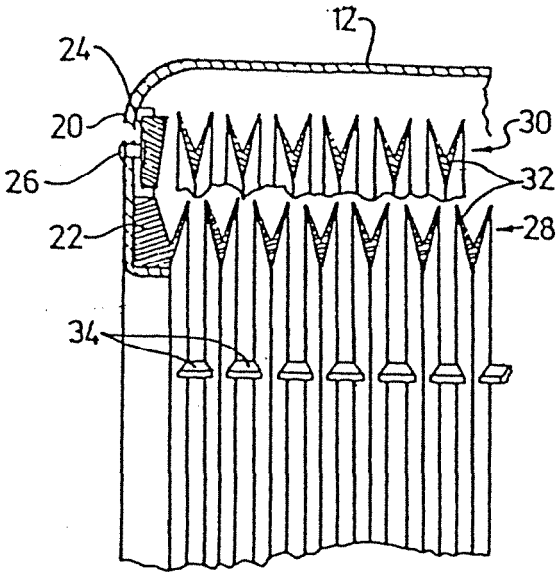


FIG 3

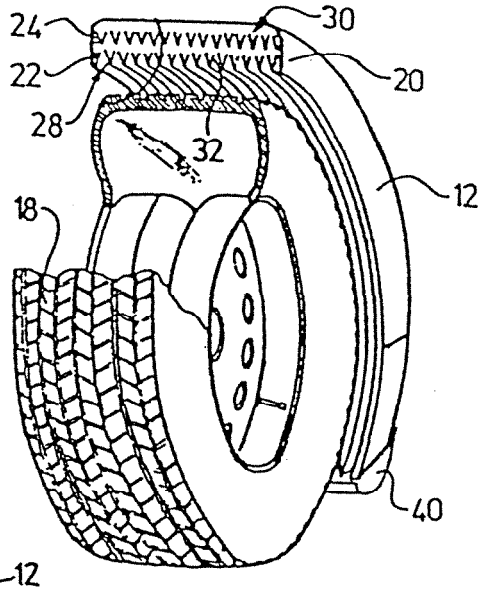


FIG 2

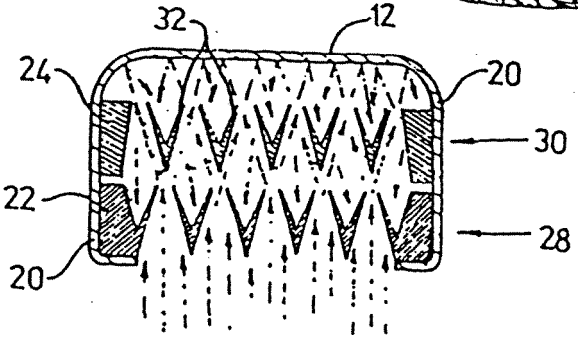


FIG 4

GB 2333333 (Published 6 August 1995)

(Description and Drawings only)

The object of the present invention is to provide a device for collecting and discharging splashed water thrown up by a vehicle wheel, with improved efficiency in collecting the splashed water.

The device has plural circumferentially-extending collection channels spaced apart side-by-side, with respective collection passages facing the tyre tread. To achieve the above mentioned object, rebound walls in the form of curved guide surfaces are associated with the collection channels. Then, most of the splashing water passing into the collection passage hits this surface at a shallow angle and is deflected with sliding along the surface and less splashing.

Preferably one side of the curved guide surface merges into a lateral boundary wall of the collection channel.

To help prevent water from splashing out of the collection channels, even at high speeds, the collection channels advantageously have a V-shaped cross-section while their freely projecting boundary wall is given a deflector edge by which water splashing up the boundary wall is deflected back into the collection channel. This deflector edge may be a hook-shaped formation on the boundary wall.

In the drawings,

Fig 1 is a side view of a device according with the invention, and
Fig 2 is a vertical cross section at II-II in Fig 1.

A vehicle wheel 3 rolls on a roadway 4 covered with accumulated rainwater 5. A wheel arch 1 extends over the wheel; rain water 5 picked up by the tyre tread is thrown up as indicated by the straight lines.

So that the drops thrown up do not burst into spray on striking the wheel arch undersurface, a collection device 6 is fastened there. This extends over the full width of the wheel arch, is rectangular in cross-section and arched concentrically relative to the wheel 3.

As seen in Fig 2, the device has eleven collection channels 7 positioned side-by-side and extending longitudinally. They are of uniform sectional shape and the pointed wedge base of each collection channel 7 faces the wheel periphery.

One wall of each collection channel 7 extends continuously out and around as a curved guide surface 8, curved semi-circularly in cross-section to leave an opening into the mouth of the collection channel 7. The guide surface 8 of one collection channel adjoins the wall of the adjacent collection channel so that together they form a continuous arched wall surface. The set of channels may be formed in one piece by extrusion of plastics material. This is enclosed on its outside by au inner wing casing 9 of impact-resistant plastics material. Or, the set of channels may be attached directly to the wheel arch interior.

In use, most drops of water flying out into the wedge-shaped collection passages 10 between the collection channels 7 impinge non-perpendicularly on the guide surface 8 and are flushed around into the collection channel 7, with minimal splashing because of the non-perpendicular impact.

Along the edge zone of the free boundary wall of each collection channel 7 is an in-turned lip or deflector edge 11 formed integrally by means of which agitated water splashing up out of the channel is deflected back in to minimise return onto the wheel surface.

At the ends of the collection channel 7, respective water chambers 12,13 are provided to receive the collected splash water and have exterior circular outlet openings 14 for the collected water to flow out onto the roadway.

FIG. 1

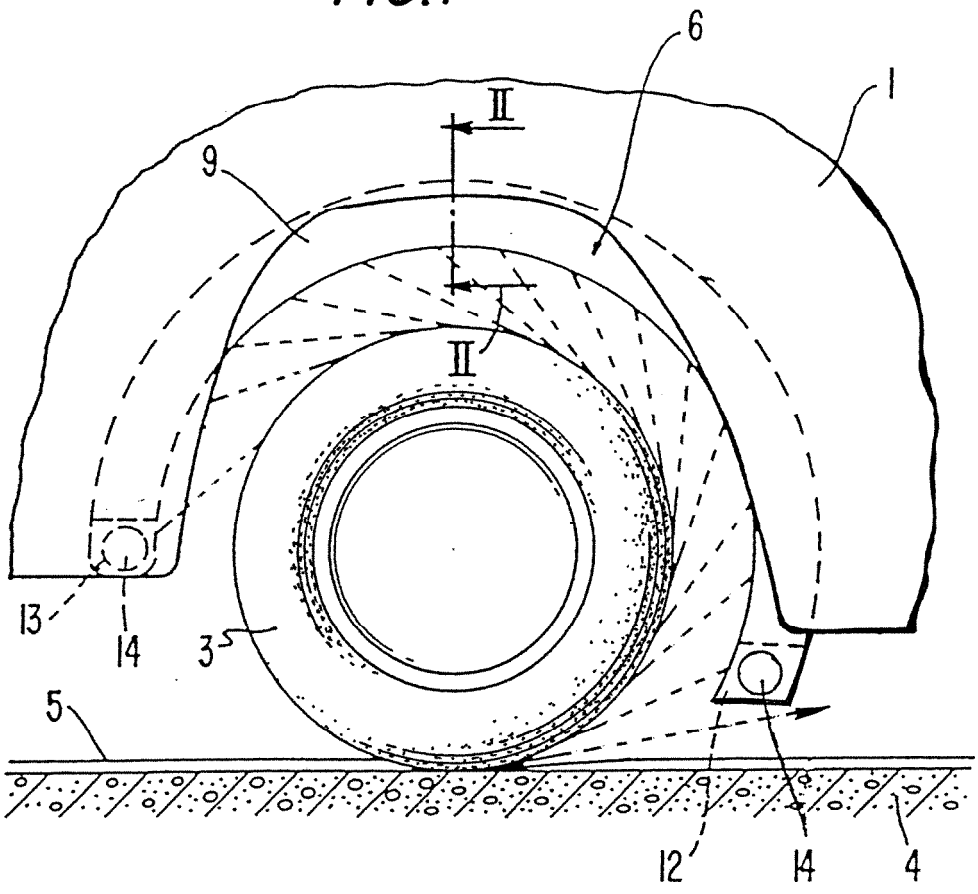


FIG. 2