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(54) WATER DRAIN SPOUT FOR VEHICLES

(71) We, DAIMLER-BENZ AKTIENGESELLSCHAFT, a company organised under the laws of the Federal Republic of Germany, of Stuttgart-Unterturkheim, Federal Republic of Germany, do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a water drain spout for a cavity in a motor vehicle body the spout being adapted to be so disposed in the vehicle that, in use, water present in the cavity flows out through the force of gravity when the vehicle is stationary or moving and the region which serves to discharge the water being surrounded on its side facing the atmosphere by an apron extending around it.

A water drain spout of this kind is already known from DT-OS 24,60,428. This known spout has a central water drain outlet and the dimensions of the apron surrounding it are so selected that during travel the pressure conditions then prevailing prevent splashes of water from penetrating into the drain aperture from outside.

The present invention seeks to improve a known water drain spout of this kind so that it can also be used if in addition a hose or the like, which is used for the forced draining of water from another component, has to be passed out into the open.

According to the present invention there is provided a water drain spout, for a cavity in a motor vehicle body, the spout being adapted to be so disposed in the vehicle that, in use, water present in the cavity flows out of the spout through the action of the force of gravity, and the region of the spout that serves to discharge water being surrounded on its side facing the atmosphere by an apron extending downwardly beyond said region, said region being funnel-shaped and closed by a pierceable bottom wall, water outlet apertures, being provided in the wall of the funnel, distributed round its periphery, and extending downwards as far as the bottom.

According to a further embodiment of the invention the penetration of dust or the like can be prevented by providing flaps in the region of the apertures, each flap being fastened to the upper edge of the aperture.

The dimensions of the apron are preferably so selected that the ratio of the inside diameter of the apron to the diameter of the bottom wall is of the order of 6:1 and that the ratio of the height of the apron to the diameter of the bottom wall is of the order of 4:1.

Embodiments of the invention will now be described by way of example with reference to the accompanying drawing, in which:—

Figure 1 shows diagrammatically the arrangement of a water drain spout according to the invention on a trough in the bottom of the boot of a private motor car,

Figure 2 is a section on the line II-II in Figure 1, on a larger scale, and

Figure 3 is a section through a further embodiment similar to Figure 2 but with the addition of flaps in the region of the water outlet apertures.

At the lowest point of a trough (not shown in greater detail) a water spout or outlet 2 is fastened by means of an annular groove 3 extending around it which engages the rim of an opening in a body panel 1 of the vehicle.

The water drain spout 2 has a downwardly tapering funnel-shaped portion 4, which is closed at the bottom by a bottom 5 which is necessary can be pierced. A number of water outlet apertures 6 are provided in the wall of the funnel-shaped portion 4, distributed over the periphery of the latter, these apertures ending adjacent the bot-

tom 5. These water outlet apertures 6, (which may additionally be provided with resilient flaps 7 biassed to a closed position to provide protection against the entry of dust of the like — as shown in Figure 3), serve for the draining of the trough (not shown in greater detail). If in addition it is necessary to effect the forced draining of another component, such as for example an aerial trough or fuel filler trough by means of a hose or the like, the bottom 5 of the water drain spout 2 can be pierced and the hose taken out into the open through the resulting opening.

On its side facing the atmosphere the portion of the water drain spout serving to discharge water is surrounded by an apron 8 of cylindrical shape which extends around it and whose dimensions are of particular importance.

Water will in fact normally flow off during travel only as long as there is a pressure drop from inside to outside, which is the case in a closed vehicle in which the ventilation system is open, because the outside pressure is slightly negative; an outlet speed that is dependent on the speed of travel but it relatively low then occurs at the apertures 6.

If the inside pressure then becomes very much lower than the outside pressure because of the opening of a sliding roof or a side window, this reversed pressure drop brings about a relatively high suction speed at the aperture 6, which however is to a large extent destroyed by the increase in cross-section in the region of the larger aperture 9 surrounded by the apron 8. While the apertures 6 are designed in accordance with the accumulation of water which is to be expected, and which is determined by experiment, the other dimensions of the water drain spout 2 are determined by wind tunnel experiments.

The cross-section of the aperture 9 is so designed that with the highest possible negative pressure in the passenger compartment, which occurs when for example a sliding roof is open and the ventilation system closed, so low a speed in the bottom region of the aperture 9 will be obtained up to speeds of travel of 150 kilometers per hour that no splashes of water pass up through the aperture 9. This results in ratios of the cross-sections of the aperture 9 and bottom 5 of about 6:1.

Taking into account the entire length of the spout, which is also partly determined by the angle of slope of a vehicle, this distance between the outlet regions of the apertures 6 and 9 is likewise determined by wind tunnel experiments. It must be so great that the high suction speed at 6 leads to a more or less uniform speed profile in the lower region of the aperture 9. For this purpose a ratio of about 4:1 is necessary.

The wall thickness and the material of the spout, which may be of rubber or plastics material, are dictated by the requirement that the spout should not be deformed by ram air and impinging splashes of water.

WHAT WE CLAIM IS:—

1. A water drain spout, for a cavity in a motor vehicle body, the spout being adapted to be so disposed in the vehicle, that, in use, water present in the cavity flows out of the spout through the action of the force of gravity, the region of the spout that serves to discharge water being surrounded on its side facing the atmosphere by an apron extending downwardly beyond said region, said region being funnel-shaped and closed by a pierceable bottom wall, water outlet apertures, being provided in the wall of the funnel, distributed round its periphery and extending downwards as far as the bottom.

2. A water drain spout according to Claim 1, wherein flaps are provided in the region of the apertures, each of them being fastened to the top edge of the aperture and being biassed to close the aperture.

3. A water drain spout according to Claim 1 or 2 wherein the apron and bottom wall are circular in a horizontal plane and the ration of the inside diameter of the apron to the diameter of the bottom wall is of the order of 6:1.

4. A water drain spout according to Claim 1, 2 or 3, wherein the ratio of the height of the apron to the diameter of the bottom wall is of the order of 4:1.

5. A water drain spout substantially as described herein with reference to and as illustrated in Figures 1 and 2 or Figures 1 and 2 as modified by Figure 3 of the accompanying drawings.

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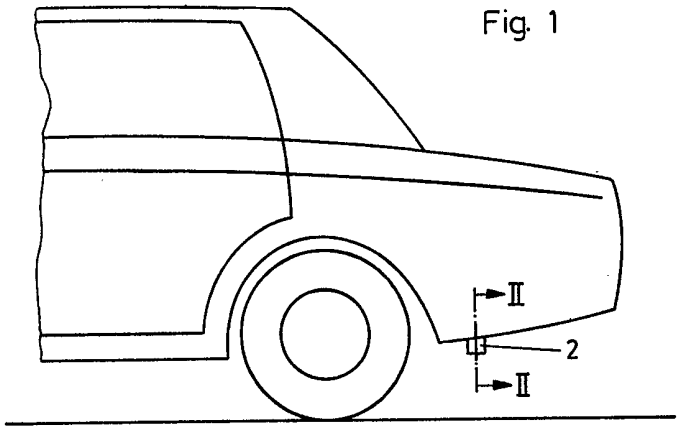
1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

Fig. 1



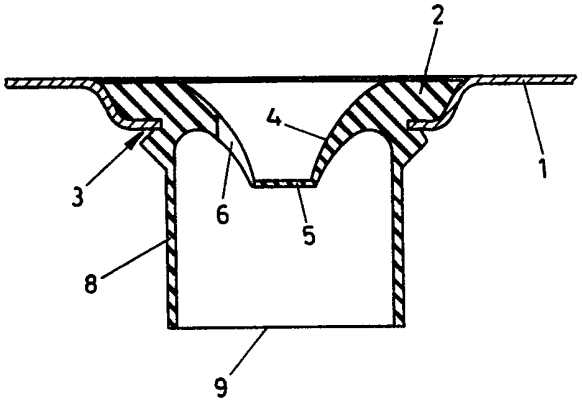


Fig. 2

Fig. 3