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(54) **ROAD GUTTER HAVING DUST COLLECTION FUNCTION**

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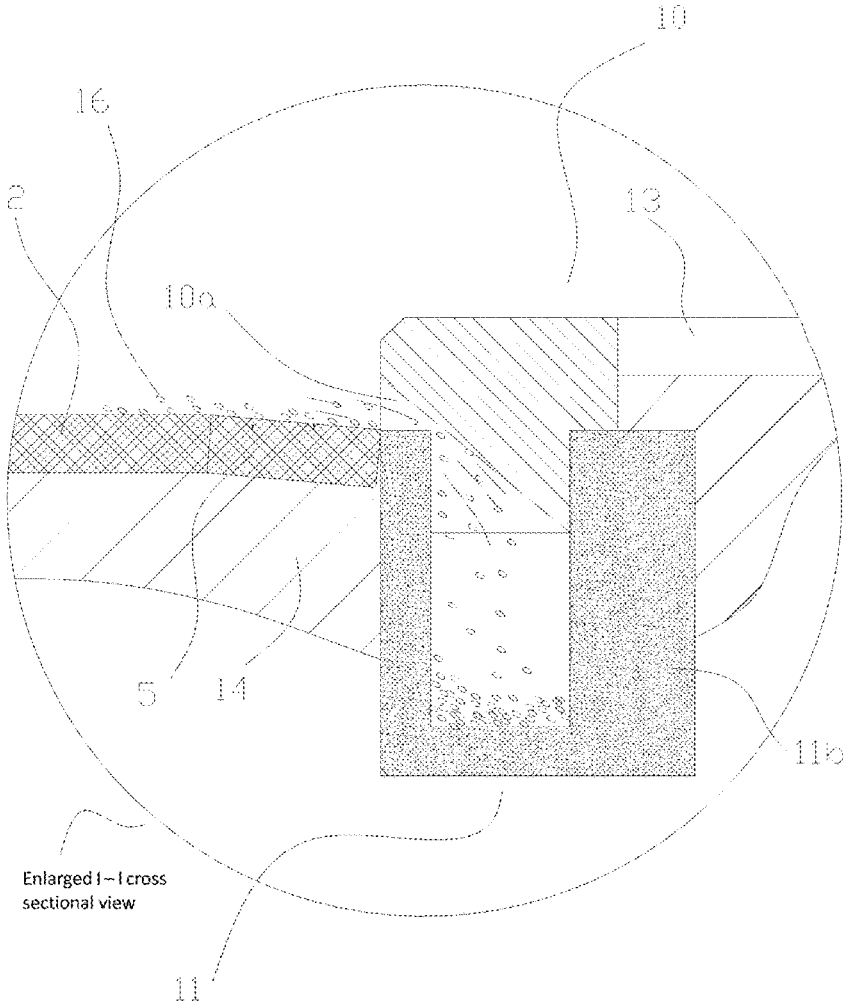
(57) **ABSTRACT**

A road gutter having a dust collection function, consisting of a gutter groove (**11**) and a cover stopper (**10**) that covers the gutter groove (**11**). The side surface of the cover stopper (**10**) is "T"-shaped. Plugs (**10***b*) of the cover stopper (**10**) are embedded in the gutter groove (**11**), and a shoulder (**10***c*) of the cover stopper (**10**) is supported on platforms (**11***c*) formed by the left and right walls of the gutter groove (**11**) to bear the weight of the whole cover stopper (**10**). The front surface of the cover stopper (**10**) is inverted "U"-shaped, and forms a dust absorption channel (**10***a*) with a solid part of the gutter groove (**11**). The dust absorption channel (**10***a*) communicates the gutter groove (**11**) with an external space. Road dust and mess enter the gutter groove (**11**) from the external space by means of the dust absorption channel (**10***a*) under the drive of an external force, and fall to the bottom of the gutter groove (**11**).



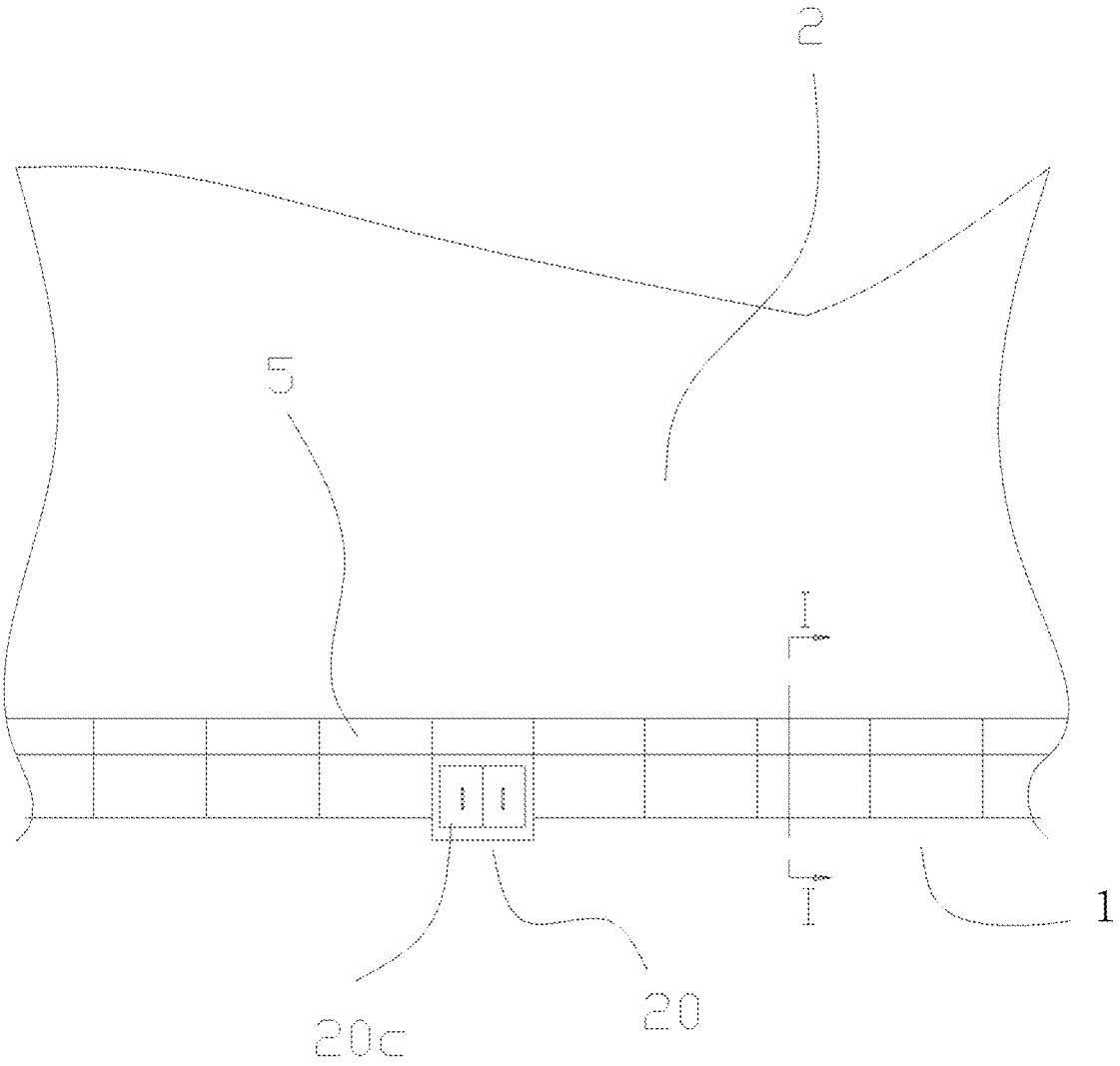


FIG. 1

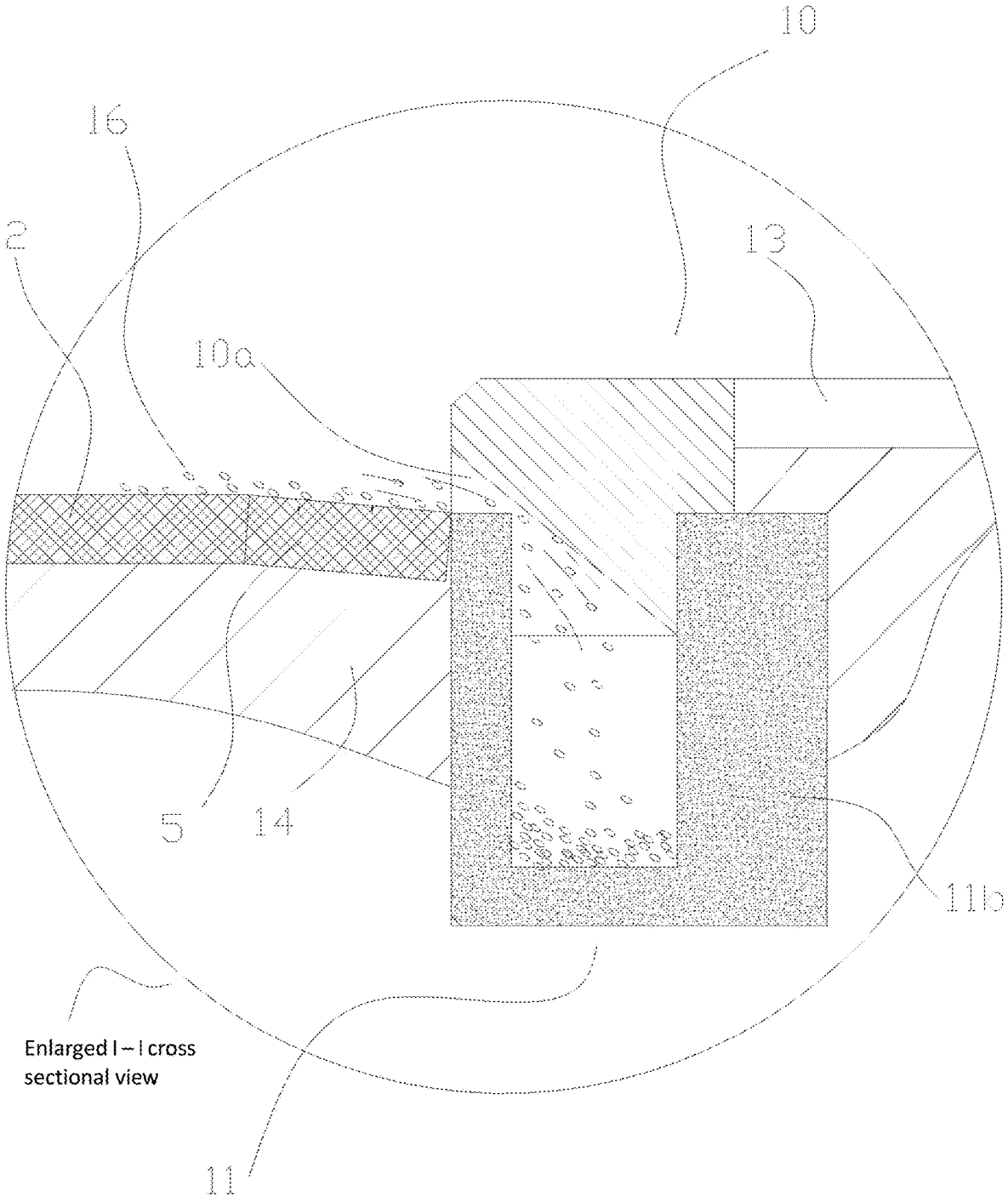


FIG. 2

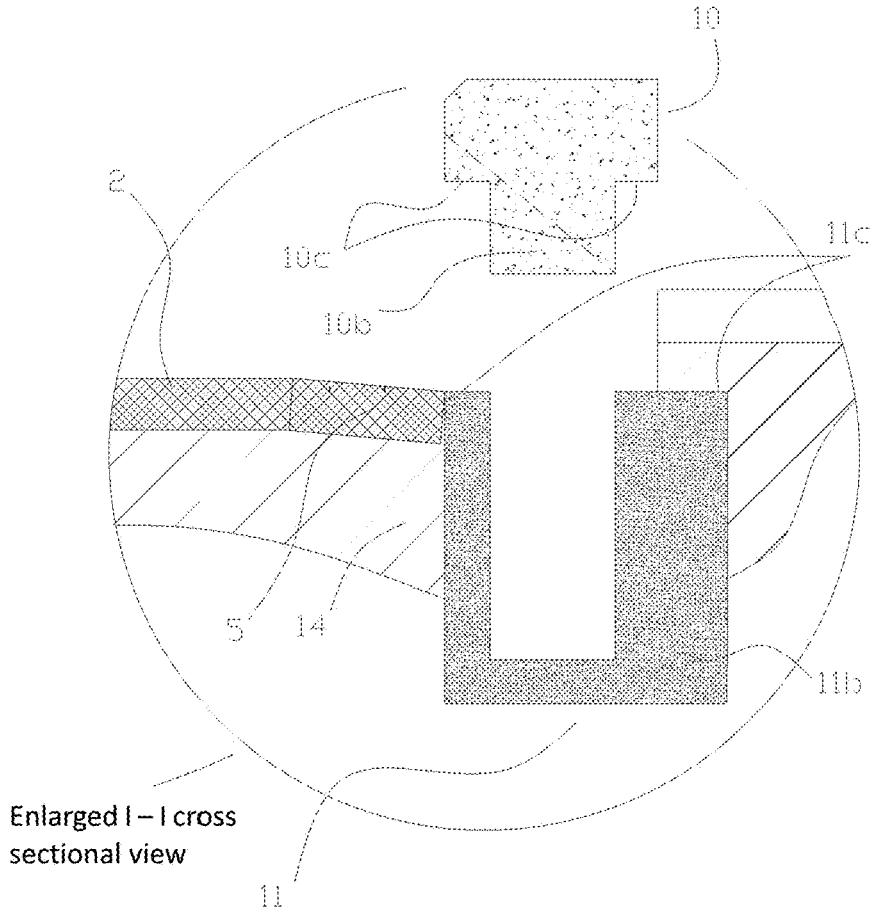

10
2
10c
11c
10b
5
14
11b
Enlarged I – I cross sectional view
11

FIG. 3

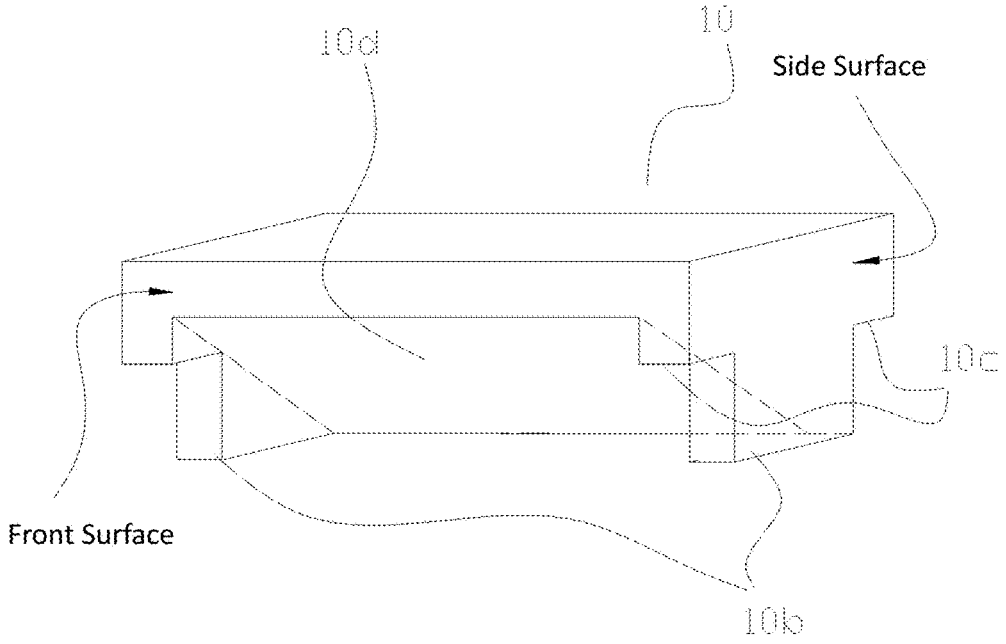

10d
10
Side Surface
10c
Front Surface
10b

FIG. 4

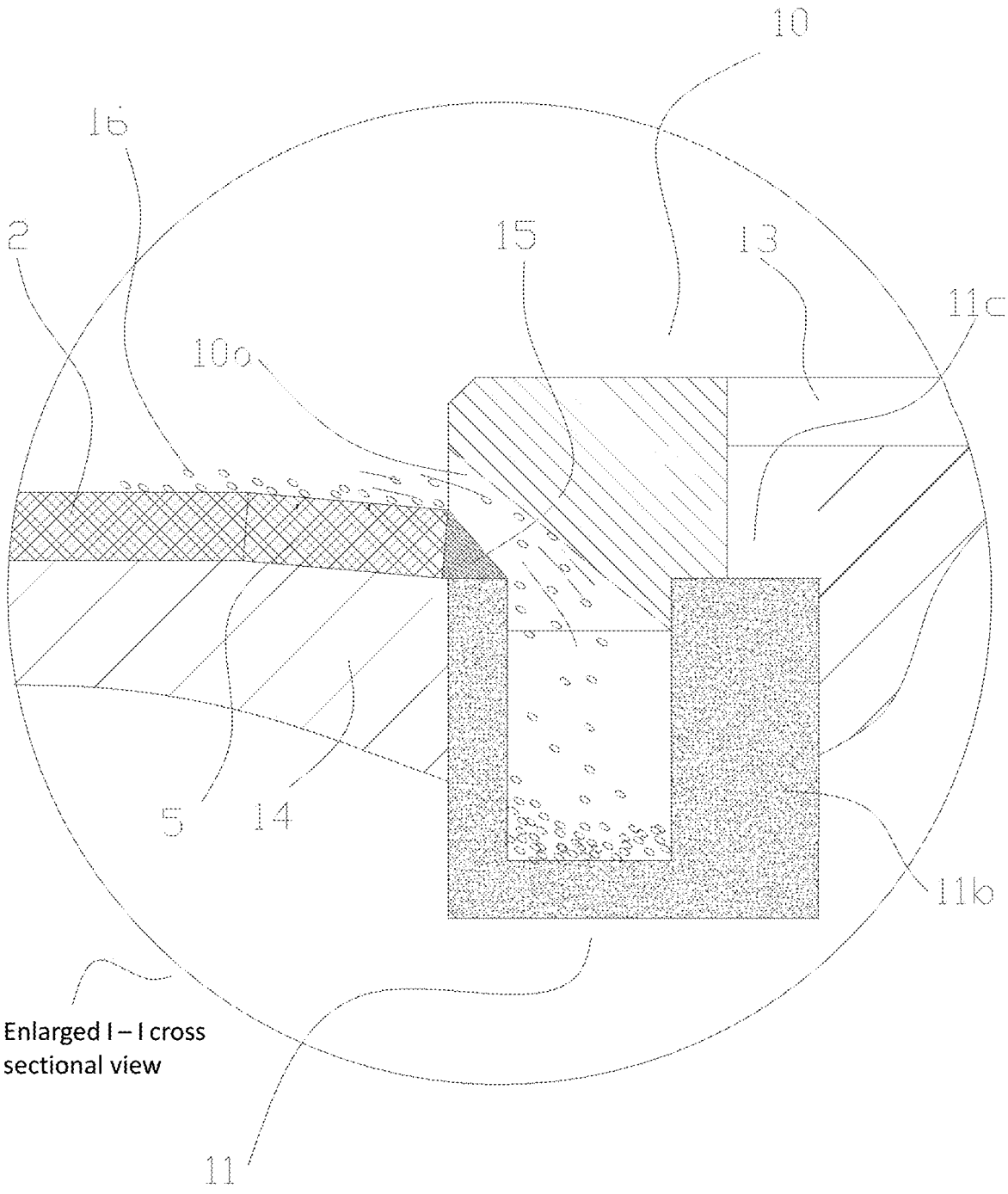

10
16
2
15
13
11c
10o
5
14
11b
Enlarged I – I cross sectional view
11

FIG. 5

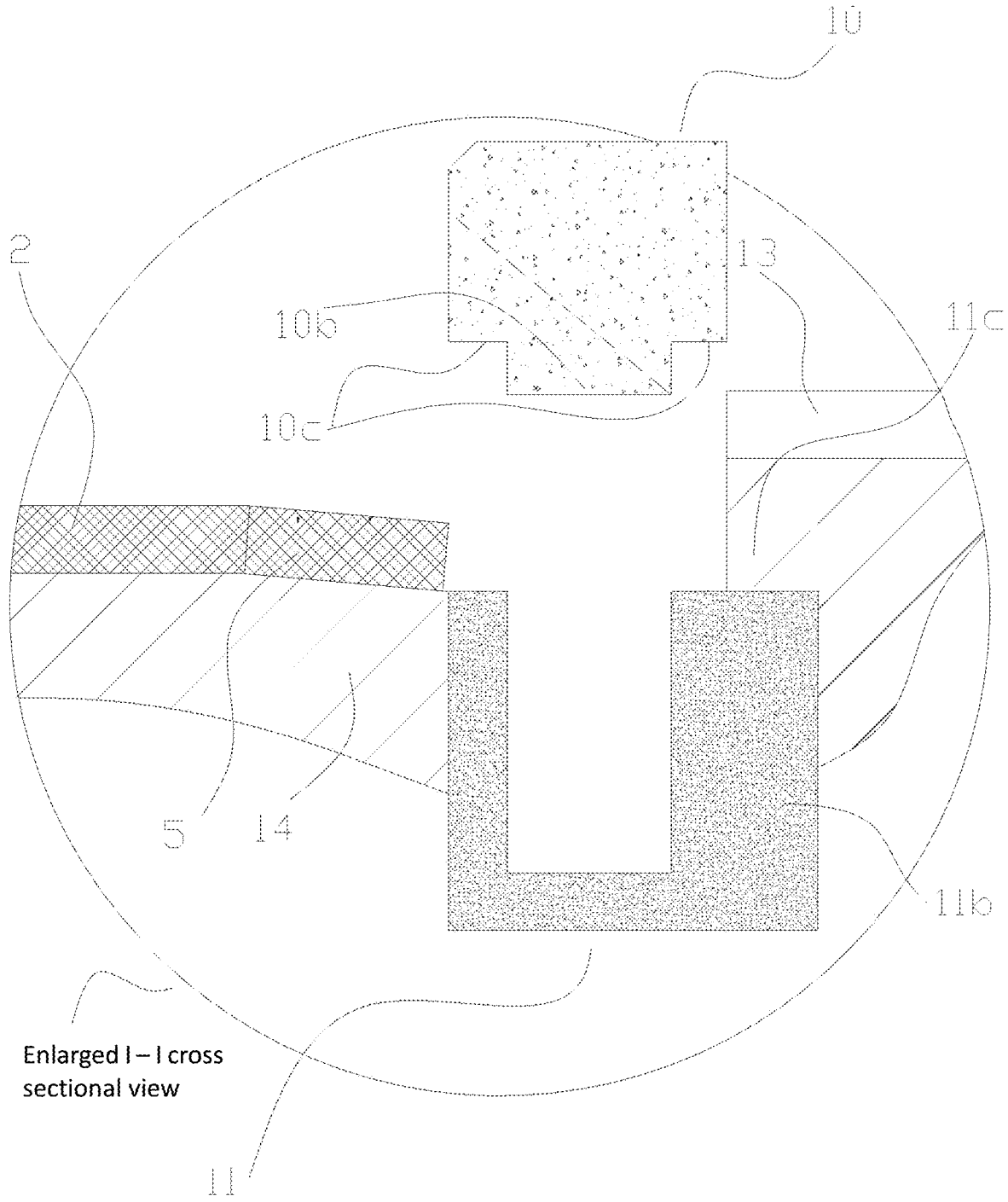

10
2
13
10b
11c
10c
5
14
11b
Enlarged I – I cross sectional view
11

FIG. 6

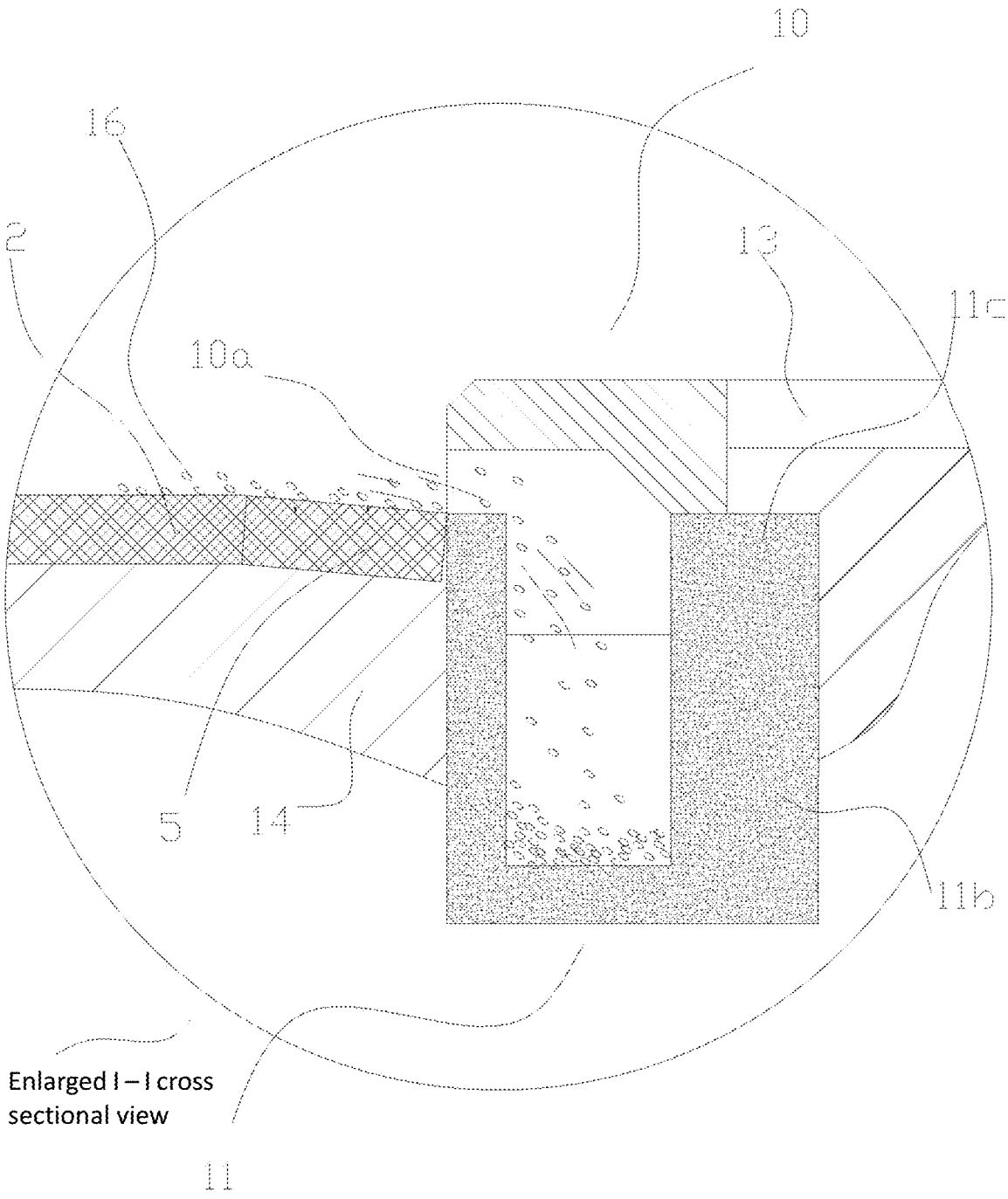


FIG. 7

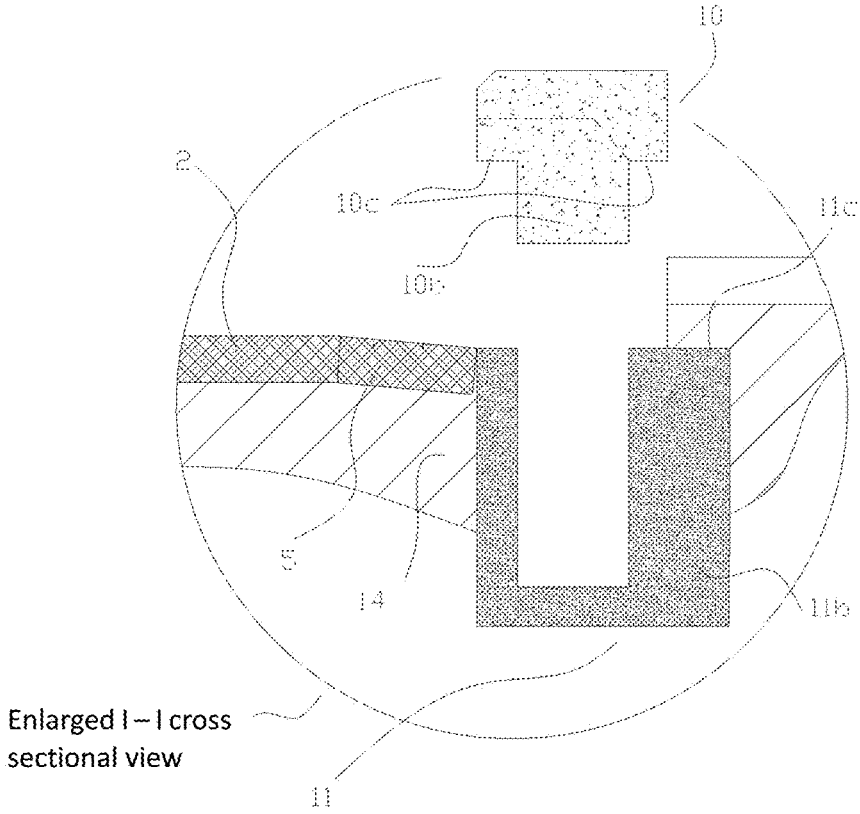

10
2
10c
11c
10b
5
14
11b
Enlarged I – I cross sectional view
11

FIG. 8

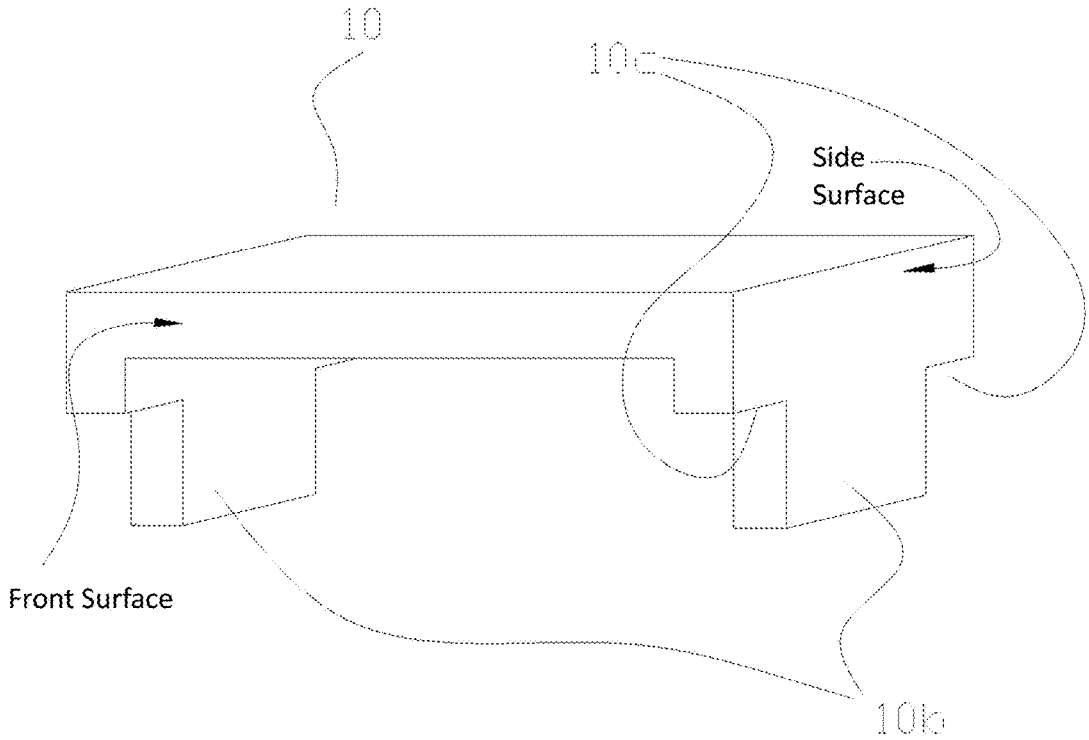

10
10c
Side Surface
Front Surface
10b

FIG. 9

ROAD GUTTER HAVING DUST COLLECTION FUNCTION

TECHNICAL FIELD

[0001] A road dust collection and drainage canal according to the present invention relates to an urban road drainage canal capable of automatically cleaning a road using natural wind, traffic stream whirlwind and rainwater to reduce dust and gathered water on the road, especially the drainage ditch with the function of the curbstone in the same time and belongs to the field of urban road construction.

BACKGROUND ART

[0002] In the prior art, the Chinese patent "Self-cleaning Road and Bag-type Dust Collection and Drainage Canal" with the patent application No. 201720767705.5, and the Chinese patent "Road Dust Collection and Drainage Canal" with the patent application No. 2017211526433 disclose an urban road drainage canal capable of automatically cleaning a road using natural wind, traffic stream whirlwind and rainwater, and automatically collecting and removing dust. The present invention provides a new structure of the road dust collection and drainage canal based on the above invention advantages, which not only retains the advantages of the self-cleaning road in the above patent, but also has features of improved robustness, simple construction and maintenance, low construction cost and the like.

[0003] Taken together, the present invention has the following advantages.

[0004] The present invention has an advantage of reducing frequency of mechanical or manual road cleaning and saving money for municipal governments.

[0005] The present invention has another advantage of effectively reducing flooding on a road and effectively improving an impact resistance of the road, thus guaranteeing a driving safety.

[0006] The present invention has a further advantage that the road dust collection and drainage canal may be used after simple installation without additional fixing with cement mortar, is convenient for mechanized construction and maintenance, and is easily replaced as a wearing part.

SUMMARY OF THE INVENTION

[0007] The present invention is intended to design an urban road drainage canal having a self-cleaning function, especially automatically cleaning a road using natural wind, traffic stream whirlwind and rainwater, and automatically collecting and removing dust.

[0008] Therefore, the problem to be solved by the present invention is as follows.

[0009] A road dust collection and drainage canal includes a drainage ditch and a cover plug that covers the drainage ditch, wherein the drainage ditch is used for collecting dust, debris and rainwater on a road, and the cover plug is higher than a road surface and plays a role of a curbstone or a road edge stone, so as to guarantee that a motor vehicle runs in a motor vehicle lane. The cover plug should take into account an effect of the curbstone, should be subjected to an impact force in a horizontal right direction of a vehicle, and should also be subjected to a downward rolling force of the vehicle, and meanwhile, an impact force to a left end of the cover plug under braking of the vehicle also includes a vertically upward impact force component, and the vertically upward force enables the cover plug to rotate clockwise around a force bearing point at a right end.

[0010] The specific embodiments of the present invention are described in detail hereinafter.

[0011] In solution 1 of the road dust collection and drainage canal according to the present invention, a roadside edge of a road surface is provided with a dust collection and drainage canal, the dust collection and drainage canal comprises a U-shaped drainage ditch adjacent to the roadside edge and a cover plug that covers the drainage ditch; a side surface of the cover plug is in a T-shape, a cover plug head is embedded in the drainage ditch, and cover plug shoulders are supported on platforms formed by left and right ditch walls of the drainage ditch to bear a weight of the whole cover plug; and a front surface of the cover plug is in an inverted U-shape, a semi-open cavity formed by the inverted U-shape forms a dust absorption channel (dust collection passage) with a part of the drainage ditch, the dust absorption channel provides communication between the drainage ditch and an external space, and dust and debris on a road get into and fall into a bottom of the drainage ditch from the external space through the dust absorption channel under driving of an external force.

[0012] In solution 2 according to the solution 1, the front surface of the cover plug is in the inverted U-shape, and a concave extent is gradually decreased on a cross section of the inverted U-shape from left to right or from front to back.

[0013] In solution 3 according to the solution 1, the side surface of the cover plug is in the T-shape, may be symmetrical or asymmetrical, and is matched with a symmetry of the U-shaped drainage ditch.

[0014] In solution 4 according to the solution 1, a size of the cover plug head is matched with a size of the drainage ditch, so as to reduce a left-right shaking amplitude of the cover plug, and bear or transmit an impact force from a vehicle on a road to a horizontal component force of the cover plug.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] FIG. **1** is a top view illustrating a relative position relationship between a road dust collection and drainage canal according to the present invention, and a road and a sand sediment trap.

[0016] FIG. **2** is a first I-I cross-sectional view of the road dust collection and drainage canal according to the present invention in FIG. **1**, which is already enlarged.

[0017] FIG. **3** is a diagram of FIG. **2** with a cover plug lifted from a drainage ditch, and a relative relationship among the cover plug, the drainage ditch and a road surface may be distinguished from a side surface.

[0018] FIG. **4** is a stereoscopic view and an enlarged view of the cover plug in FIG. **3**.

[0019] FIG. **5** is a second I-I cross-sectional view of the road dust collection and drainage canal according to the present invention in FIG. **1**, which is already enlarged.

[0020] FIG. **6** is a diagram of FIG. **5** with the cover plug lifted from the drainage ditch, and the relative relationship among the cover plug, the drainage ditch and the road surface may be distinguished from the side surface. The stereoscopic view of the cover plug refers to FIG. **4**.

[0021] FIG. **7** is a third I-I cross-sectional view of the road dust collection and drainage canal according to the present invention in FIG. **1**, which has been enlarged.

[0022] FIG. **8** is a diagram of FIG. **7** with the cover plug lifted from the drainage ditch, and the relative relationship among the cover plug, the drainage ditch and the road surface may be distinguished from the side surface.

[0023] FIG. **9** is a stereoscopic view and an enlarged view of the cover plug in FIG. **8**.

DETAILED DESCRIPTION

[0024] Embodiment 1 of the present invention: the embodiment is described with reference to FIG. **1**, FIG. **2**, FIG. **3**, and FIG. **4**.

[0025] According to a road dust collection and drainage canal (sewer) of the present invention, a road edge of a road surface **2** is provided with a road dust collection and drainage canal **1** adjacent to a roadside flatstone **5**, and the road dust collection and drainage canal **1** is composed of two major parts including a U-shaped drainage ditch **11** adjacent to the road edge and a cover plug **10** that covers the drainage ditch **11**. The drainage ditch **11** may be built with cement or cast with cement in situ before laying the road surface **2** and the flatstone **5**. The drainage ditch **11** is cast into a U-shape, platforms **11**C on a left wall and a right wall thereof are generally symmetrical or asymmetrical, and a symmetrical mode is used in the embodiment. Moreover, the platforms **11**C are as high as the road surface or the flatstone **5**. A pressure from the road surface caused by a vehicle running on the road surface enables the flatstone **5** to abut against the left wall of the drainage ditch **11**, as shown in FIG. **2**, and a cover plug head **10***b* of the cover plug **10** is embedded in the drainage ditch **11**. Therefore, the pressure is transmitted to the right wall of the drainage ditch **11**, then is borne by a cushion layer **14** and a non-motor vehicle road surface **13**, and finally reaches the soil.

[0026] As shown in FIG. **3**, a side view of the cover plug **10** is in a T-shape, the cover plug head **10***b* is a protruding head, and cover plug shoulders **10***c* are protruding shoulders. The cover plug head **10***b* is embedded in the drainage ditch **11**, and the cover plug shoulders **10***c* are supported on the platforms on the left wall and the right wall of the drainage ditch **11** to bear a weight of the whole cover plug **10**. Moreover, a front view of the cover plug **10** is in an inverted U-shape, and an body of the inverted U-shape, together with a part of the drainage ditch, forms a dust absorption channel (dust collection passage) **10***a*. The dust absorption channel **10***a* provides communication between the drainage ditch **11** and an external space. Dust **16** and debris on the road surface **2** get into and fall into a bottom of the drainage ditch **11** from the external space through the dust absorption channel **10***a* under driving of an external force such as wind, rainwater and the like.

[0027] As shown in FIG. **2** and FIG. **3**, a cross section of the cover plug **10** tends to increase in area from left to right, which on one hand is beneficial for the cover plug **10** to bear a larger downward pressure due to a rolling force of the vehicle, and on the other hand is beneficial for maintaining a stability of the cover plug **10** itself without additional reinforcement due to the increase in the weight of the cover plug **10** itself.

[0028] The dust absorption channel **10***a* has a narrow area, and a minimum size thereof determines a diameter of smallest debris capable of entering the area, thus preventing too many large-sized objects from entering the drainage ditch **11**.

[0029] Generally, if the cover plug head **10***b* is longer, a larger part of the cover plug head **10***b* is embedded in the drainage ditch **11**, and the cover plug **10** is more stable, so that the cover plug **10** is more capable of withstanding an impact of an external force from the vehicle and the like. For example, when a height of the cover plug head **10***b* is equal to that of the common curbstone, which is 150 mm, and a depth of the drainage ditch **11** is more than 300 mm, a better effect is achieved. The smaller the clearance fit between the cover plug head **10***b* and the drainage ditch **11** is, the better the effect is, which can prevent the cover plug head **10***b* from shaking left and right. Generally, a dimension of the cover plug head **10***b* may be smaller than that of the drainage ditch **11** by 1 mm.

[0030] Although the cover plug head **10***b* has a symmetrical shape in the embodiment, the cover plug head **10***b* may also be asymmetrical, as long as the cover plug head **10***b* is matched with a symmetry of the U-shaped drainage ditch **11**.

[0031] A large amount of dust and debris may accumulate in a drainage channel **11***a* contained in the drainage ditch **11**, and get into a sand sediment trap **20** under an impact of rainwater. In the case of too much debris in the trap, a trap cover **20***c* may be opened for cleaning.

[0032] The drainage ditch **11** is cast with concrete in situ, built with stone, or built with brick and concrete. The cover plug **10** is prefabricated with concrete, including resin concrete, and may also be cast with cast iron.

[0033] The implementation of the present invention can effectively reduce road dust pollution and guarantee a driving safety and a pedestrian safety on the road.

[0034] Embodiment 2 of the present invention:

[0035] The embodiment is described with reference to FIG. **1**, FIG. **5**, FIG. **6** and FIG. **4**.

[0036] Compared with Embodiment 1, in this embodiment, a drainage ditch **11** is cast into a U-shape, and platforms (top sides) **11**C on a left wall and a right wall thereof are not as high as the top surface of a road surface or a flatstone **5**, but are lower than the road surface or the flatstone **5**. Such a structure makes the flatstone **5** directly abut against a front surface of a cover plug **10**, and directly transmits a horizontal force from a vehicle to a cushion layer **14** and a non-motor vehicle road surface **13**, and finally transmits the horizontal force to the soil, thus effectively protecting the drainage ditch **11** from being easily damaged. Moreover, after constructing and installing the cover plug **10** in place, the cover plug **10** can be further fixed with cement mortar **15** to make up or partially make up for a deficiency that a cover plug head **10***b* is embedded in the drainage ditch **11** in a shallower manner.

[0037] A dust absorption/collection channel (passage) **10***a* also has a narrower area, and a minimum size thereof determines a diameter of smallest debris capable of entering the area, thus preventing too many large-sized objects from entering the drainage ditch **11**. However, it is very obvious that compared with Embodiment 1, the narrower area is much larger, and a size of debris allowed to enter the area is much larger. Therefore, a grid or a mesh may be arranged in the dust absorption channel **10***a* to prevent debris or objects of certain sizes from entering the drainage ditch **11**.

[0038] A perspective view of the cover plug **10** in this embodiment may be as shown in FIG. **4**.

[0039] The rest is the same as in Embodiment 1.

[0040] Embodiment 3 of the present invention:

[0041] The embodiment is described with reference to FIG. **1**, FIG. **7**, FIG. **8** and FIG. **9**.

[0042] An inner cavity of a cover plug **10** in the embodiment is larger, which may save materials, is light in weight and easy to construct, but has a poor strength and a poor impact and pressure resistance compared with the above two examples.

[0043] A dust absorption channel **10***a* almost has no narrower area to prevent too many large-sized objects from entering a drainage ditch **11**. Therefore, a grid or a mesh may be arranged in the dust absorption channel **10***a* to prevent debris or objects of certain sizes from entering the drainage ditch **11**.

[0044] The rest is the same as in Embodiment 1 and 2.

[0045] All these embodiments merely illustrate a part of the present invention and are not exhaustive. Those skilled in the art have various technical means to make modifications. For example, the cover plug **10** is changed from the U-shape to a circular arch shape in the front view; and a part of the inverted T-shape is cut out in the side view to be concave, so as to save materials, etc. The inventor also believes that the cover plug **10** is essentially a cover plug structure, which is a cover and a plug with respect to the drainage ditch **11**. No matter what shape the drainage ditch is or how the cover plug **10** is changed, the cover plug structure is essential.

What is claimed is:

1. A road dust collection and drainage canal, wherein the dust collection and drainage canal is for disposition at a roadside edge of a road surface, the dust collection and drainage canal comprises a drainage ditch and a cover plug that covers the drainage ditch; a side surface of the cover plug is in a T-shape, a cover plug head is embedded in the drainage ditch, and cover plug shoulders are supported on platforms formed by left and right ditch walls of the drainage ditch to bear a weight of the cover plug; and a front surface of the cover plug is in an inverted U-shape and forms a dust absorption channel with a part of the drainage ditch, the dust absorption channel provides communication between the drainage ditch and an external space, and dust and debris on a road get into and fall into a bottom of the drainage ditch from the external space through the dust absorption channel under driving of an external force.

2. The road dust collection and drainage canal according to claim **1**, wherein the front surface of the cover plug is in the inverted U-shape, and a concave extent is gradually decreased on a cross section of the inverted U-shape.

3. The road dust collection and drainage canal according to claim **1**, wherein the side surface of the cover plug is in the T-shape, and is matched with a symmetry of the U-shaped drainage ditch.

4. The road dust collection and drainage canal according to claim **1**, wherein a size of the cover plug head is matched with a size of the drainage ditch, so as to reduce a left-right shaking amplitude of the cover plug, and bear or transmit an impact force from a vehicle on a road to a horizontal component force of the cover plug.

* * * * *