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STRUCTURE AND METHOD FOR REINFORCING MANHOLE COVER ANCHORED WITH EXISTING ROAD SURFACE FOUNDATION BY MEANS OF DOWEL BARS.

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The present invention provides road foundation engineering construction technology, and particularly relates to a structure and method for reinforcing a manhole cover anchored with an existing road surface foundation by means of dowel bars. The structure is arranged at a sewer manhole mouth to reinforce a manhole cover support on an existing road surface. According to the present invention, the stability of the reinforced manhole cover support can be effectively improved, a road is smooth and esthetic, the existing road surface smoothness and driving comfort are ensured, and the traffic safety and service levels of urban roads are improved; moreover, the quality defect maintenance rate caused by the quality problem of a manhole cover in the later period is reduced, thereby saving on maintenance costs in the later period, reducing the influence of a road construction closing period on the surrounding social environment, reducing the influence of maintenance waste materials on the surrounding environment, and gaining relatively good economic and social benefits.

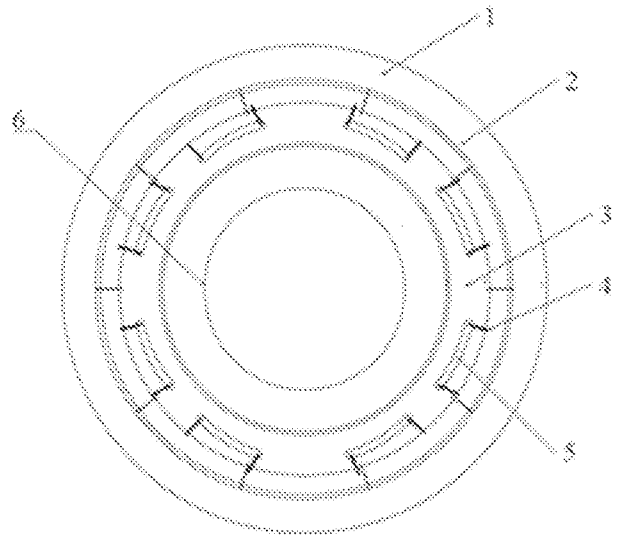


Fig. 1

**STRUCTURE AND METHOD FOR REINFORCING
MANHOLE COVER ANCHORED WITH EXISTING ROAD
SURFACE FOUNDATION BY MEANS OF DOWEL BARS**

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BACKGROUND

Field of Invention

The present invention provides a road foundation engineering construction technology, in particular relates to a manhole cover reinforcing structure and a method anchored by utilizing a dowel bar and an existing pavement foundation (structure and method for reinforcing manhole cover anchored with existing road surface foundation by means of dowel bars).

Background of the Invention

At present, lime stabilized soil, lime and fly ash stabilized soil, lime and fly ash stabilized aggregates and cement stabilized aggregates are adopted as base course structures for most urban roads in China, asphalt concrete is used as a road surface course structure, which belongs to the design of a semi-rigid plate bearing structure. The inspection well in the road is based on reinforced concrete, concrete masonry unit or brick masonry as a well body, a well periphery is backfilled with 2:8 lime soil or graded gravel, a well neck is masoned with prefabricated reinforced

concrete or building block(brick), a nodular cast iron well ring (cover) is wrapped by C30 concrete with a width of 30-50 cm and a thickness of 25 cm, and a thickness of 4 cm is reserved for constructing an asphalt concrete surface course structure, which belongs to the design of a rigid structure. An asphalt concrete lap joint is adopted between the two structures of road and inspection well, once the settlement of rigid and flexible structure is uneven, the asphalt concrete lap joint is easily sheared and damaged under the action of dynamic load, or the surface course is cracked due to the reasons that the backfilled soil (surface course) around the well periphery is not compacted, the pouring is not complete, the mortar strength is not enough, the manhole cover installation does not conform to the requirements. If it is not repaired in time, rainwater enters the road base, and the damaged surface may gradually enlarge.

Traditional manhole cover method utilizes red brick to adjust well head elevation to support the manhole cover bearing, due to the poor compression capacity of red bricks, the repaired manhole cover will still sink after being frequently rolled by vehicles.

SUMMARY

The purpose of the present invention is to overcome the above-mentioned problems in the prior art, and designing a structure and method that can reinforce the manhole cover bearing.

In order to achieve the above purpose, the present invention provides a manhole cover reinforcing structure anchored by utilizing a dowel bar and an existing pavement foundation, which is arranged at the sewer well head to reinforce the manhole cover bearing of the existing pavement; at 5 the same time, the present invention also provides a manhole cover reinforced method anchored by utilizing a dowel bar and an existing pavement foundation. The specific solutions of the present invention achieve the following beneficial effects: the manhole cover bearing is supported by concrete pouring, due to the strong compressive capacity of 10 the concrete, which can effectively improve the stability of the manhole cover bearing after reinforcement and make the road smooth and beautiful, the smoothness of the existing pavement and the driving comfort are ensured, and the traffic safety and the service level of urban roads are improved; meanwhile, the maintenance rate of quality defects 15 caused by the quality problem of the manhole cover in the later period is reduced, the maintenance cost in the later period is saved, the influence of the closed period of the road construction on the surrounding social environment is reduced, the influence of maintenance waste on the surrounding environment is reduced, and better economic and social 20 benefits are obtained.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic structural diagram of the installation of the manhole cover bearing and the manhole cover ring bar provided in an embodiment of the present invention;

5 Fig. 2 is a schematic structural diagram of the manhole cover reinforcing structure provided in an embodiment of the present invention before pouring;

Fig. 3 is a schematic structural diagram of the manhole cover reinforcing structure provided in an embodiment of the present invention
10 in a pouring state.

DETAILED DESCRIPTION OF THE EMBODIMENTS

As shown in Fig.1-3, a manhole cover reinforcing structure anchored by utilizing a dowel bar and an existing pavement foundation, which is
15 arranged at the sewer wellhead 9 to reinforce the manhole cover bearing³ of the existing pavement 8, the manhole cover reinforcing structure comprises:

a manhole cover bearing 3, correspondingly arranged at the sewer wellhead 9, in order to install a manhole cover 7;

20 an annular cutting groove 1, surrounding the manhole cover bearing 3;

a manhole cover ring bar 2, matched with the annular cutting groove

1, correspondingly placed in the annular cutting groove and located below the manhole cover bearing 3;

a support cushion formwork 6, arranged at the sewer wellhead 9, supporting the manhole cover bearing 3 and serve as a formwork for sealing a gap between manhole cover bearing 3 and the sewer wellhead 9;

a dowel bar 4, penetrating through the manhole cover bearing 3 and extending into the manhole cover ring bar 2 to serve as a prefabricated component to connect the manhole cover bearing 3 with the manhole cover ring bar 2;

a concrete 10, poured in the annular cutting groove 1, so that the manhole cover bearing 3 and the manhole cover ring bar 2 and the dowel bar 4 form a whole.

performing annular cutting on the existing pavement 8 along the outer edge of the manhole cover bearing 3 to form an annular cutting groove 1, the manhole cover ring bar 2 is arranged in the annular cutting groove 1, which is used as the supporting frame of the concrete, the manhole cover bearing 3 and the manhole cover ring bar 2 being connected through the dowel bar 4, and the manhole cover bearing 3 is supported by concrete 10 pouring in the annular cutting groove 1, due to the strong compressive capacity of concrete 10, it can effectively improve the stability of the manhole cover bearing 3 after reinforcement.

In this embodiment, the annular cutting groove 1 is concentric with the sewer manhole cover 7, the thickness of the annular cutting groove 1 is 25 cm; and the ring width of the ring corresponding to the annular cutting groove 1 is 30 cm.

5 In another embodiment, the support cushion formwork 6 is an airbag with a valve which can be inflated or deflated. The air bag is inflated as the supporting cushion formwork 6 to support the manhole cover bearing 3, which play a role of supporting the manhole cover bearing 3 and serving as a formwork, the air bag is deflated after pouring is completed,
10 it is convenient to disassemble and use.

In this embodiment, the outside of the air bag is provided with a cushion corresponding to the manhole cover bearing 3 and the sewer wellhead 9. This cushion can be a plastic film or a woven bag, which can avoid the air bag from being adhered after concrete pouring, and ensures
15 the service life of the air bag for recycling.

In another embodiment, the manhole cover reinforcing structure further comprises:

an asphalt paving layer 11 is paved above the concrete 10, wherein the upper surface of the asphalt paving layer and the existing pavement 8
20 are positioned on the same horizontal plane. Asphalt paving makes the road smooth and beautiful, the smoothness and the driving comfort of the existing pavement 8 are ensured, and the transport safety and the service

level of the urban road are improved.

In this embodiment, the height difference between the upper surface of the concrete 10 and the existing pavement 8 is 5 cm, which is used for paving asphalt.

5 In another embodiment, the manhole cover reinforcing structure further comprises:

support bar 12, at least two support bars 12 and the manhole cover bearing 3 being connected through a binding bar 13, so that the upper surface of the manhole cover bearing 3 and the existing pavement 8 are
10 positioned on the same horizontal plane.

at least two support bars 12 are placed horizontally on the existing pavement 8, and the binding bar 13 is arranged between the support bars 12 and the manhole cover bearing 3, the upper surface of the manhole cover bearing 3 and the existing pavement 8 are posed on the same
15 horizontal plane through the binding bar 13, so that ensure the smoothness of the existing pavement 8 after reinforcement. After concrete 10 pouring is finished, the binding bar 13 is cut off, and the support bars 12 are taken down.

In another embodiment, the outer edge of the manhole cover bearing
20 3 has a plurality of sockets 5 corresponding to the dowel bars 4, the sockets 5 are evenly distributed in the circumferential direction of the manhole cover bearing 3;

the dowel bar 4 is n-shaped, and at least one end of the dowel bar 4 penetrates through the socket 5 and extends into the manhole cover ring bar 2.

Taking a reserved hole on the side edge of the existing manhole cover bearing 3 as the socket 5, inserting one end of the dowel bar 4 into the socket 5, and inserting the other end of the dowel bar 4 into the manhole cover ring bar 2 outside the manhole cover bearing 3 and to utilize its n-shaped structure to carry out the longitudinal spacing on the manhole cover bearing 3, so as to ensure that the manhole cover bearing 3, the manhole cover ring bar 2 and the dowel bar 4 form a whole after concrete pouring is finished.

In this embodiment, the manhole cover ring bar 2 is made of steel bar with a diameter of $\phi 16$, and the dowel bar 4 is made by bending a steel bar with a diameter of $\phi 12$. The manhole cover ring bar 2 consists of two layers arranged along the top and bottom, and each layer includes two rings of ring reinforcement arranged coaxially, the stirrups are arranged along the radial direction to fix the ring reinforcements, and a plurality of stirrups are uniformly distributed in circumferential directions.

a manhole cover reinforced method anchored by utilizing a dowel bar and an existing pavement foundation comprising the following steps:

step S1, performing annular cutting on the existing pavement 8 along

the outer edge of the manhole cover bearing 3 to form the annular cutting groove 1;

step S2, tying the manhole cover ring bar 2 matched with the annular cutting groove 1, wherein the manhole cover ring bar 2 is correspondingly placed in the annular cutting groove 1 and positioned below the manhole cover bearing 3;

step S3, arranging the support cushion formwork 6 at the sewer wellhead9;

step S4, penetrating the dowel bar 4 through the manhole cover bearing 3 and extending into the manhole cover ring bars 2;

step S5, the annular cutting groove 1 is poured through concrete 10.

performing annular cutting on the existing pavement 8 along the outer edge of the manhole cover bearing 3 to form an annular cutting groove 1, the manhole cover ring bar 2 is arranged in the annular cutting groove 1, the manhole cover ring bar 2 is used as the supporting frame of the concrete, the manhole cover bearing 3 and the manhole cover ring bar 2 are connected 10 with the dowel bar 4, and the manhole cover bearing 3 is supported by concrete 10 pouring in the annular cutting groove 1, due to the strong compressive capacity of concrete 10, it can effectively improve the stability of the manhole cover bearing 3 after reinforcement.

In this embodiment, a hand-push type manhole cover 7 circle cutter is used for cutting by taking the center of the manhole cover 7 as the

circle center and taking the radius of the manhole cover 7 plus 30 cm as the cutting radius, wherein the cutting thickness is 25 cm, and manual cleaning is performed.

In another embodiment, in step S2, at least two support bars 12 and the manhole cover bearing 3 being connected through a binding bar 13, so that the upper surface of the manhole cover bearing 3 and the existing pavement 8 are positioned on the same horizontal plane. At least two support bars 12 are placed horizontally on the existing pavement 8, and the binding bar 13 is arranged between the support bar 12 and the manhole cover bearing 3, the upper surface of the manhole cover bearing 3 and the existing pavement 8 are positioned on the same horizontal plane through the binding bar 13, so that ensure the smoothness of the existing pavement 8 after reinforcement.

In another embodiment, the support cushion formwork 6 is an airbag with a valve for inflation or deflation. The air bag is inflated as the supporting cushion formwork 6 to support the manhole cover bearing 3, which play a role of supporting the manhole cover bearing 3 and serving as a formwork, the air bag is deflated after concrete pouring is finished, it is convenient to disassemble and use.

In this embodiment, the outside of the air bag is provided with a cushion corresponding to the manhole cover bearing 3 and the sewer wellhead 9. This cushion can be a plastic film or a woven bag, which can

avoid the air bag from being adhered after concrete pouring, and ensures the service life of the air bag for recycling.

In another embodiment, the manhole cover reinforced method further comprises:

- 5 step S6, after concrete 10 pouring is finished, watering, covering and maintaining are carried out, the support cushion formwork 6 is taken out after the completion of maintenance. Specifically, after concrete 10 pouring is finished, watering, covering and maintaining are carried out for at least 7 days, the air bag shall be deflated and taken out for recycling
10 after the completion of maintenance.

In another embodiment, the manhole cover reinforced method further comprises:

- step S7, paving the asphalt above the concrete 10, wherein the upper surface of the asphalt paving layer and the existing pavement 8 are
15 positioned on the same horizontal plane. Wherein performing concrete 10 pouring after the manhole cover ring bar 2 is installed, and C30 concrete 10 is poured, vibrating with a vibrating needle, and the concrete 10 is poured until 5cm to ground. Filling the course layer with a thickness of 5cm fine-grained asphalt, and compacting by a road roller to ensure that
20 the upper surface and the existing road surface 8 are on the same horizontal plane.

In summary, in the present invention, in order to ensure the quality

of the reinforcement of the manhole cover 7, The air bag is inflated as the supporting cushion formwork to support the manhole cover bearing 3, which play a role of supporting the manhole cover bearing and serving as a formwork, then pour concrete 10 to annular cutting groove 1 and then the airbag is deflated and taken out, so that the cushion material of the manhole cover bearing 3 is changed from the original red brick to the stronger concrete 10 material, so as to achieve the purpose of increasing the compressive strength. The manhole cover ring bar 2 and the dowel bar 4 are manufactured to enable the manhole cover bearing 3, the manhole cover ring bar 2 and the dowel bar 4 as a whole, when the concrete 10 is poured, the manhole cover ring bar 2 and the surrounding concrete 10 are tightly combined to ensure that the reverse tension is provided for the manhole cover 7 when vehicles pass above the manhole cover. Thereby the quality of the manhole cover 7 reinforcement is ensured, and construction maintenance and rework is reduced. The extra cost caused by the manhole cover 7 maintenance is greatly reduced, and the requirements for road quality are met.

CLAIMS

1. A manhole cover reinforcing structure anchored by utilizing a dowel bar and an existing pavement foundation, which is arranged at a sewer wellhead to reinforce a manhole cover bearing of an existing pavement, characterized in that the manhole cover reinforcing structure
5 comprises:

a manhole cover bearing, correspondingly arranged at the sewer wellhead, in order to install a manhole cover;

an annular cutting groove, surrounding the manhole cover bearing;

10 a manhole cover ring bar, matched with the annular cutting groove, correspondingly placed in the annular cutting groove and located below the manhole cover bearing;

a support cushion formwork, arranged at the sewer wellhead, supporting the manhole cover bearing and serve as a formwork for
15 sealing a gap between manhole cover bearing and the sewer wellhead;

a dowel bar, penetrating through the manhole cover bearing and extending into the manhole cover ring bar to serve as a prefabricated component to connect the manhole cover bearing with the manhole cover ring bar;

20 concrete, poured in the annular cutting groove, so that the manhole cover bearing and the manhole cover ring bar and the dowel bar form a whole.

2. The manhole cover reinforcing structure anchored by utilizing a dowel bar and an existing pavement foundation according to claim 1, characterized in that the support cushion formwork is an air bag, and the
5 air bag is provided with a valve which can be inflated or deflated.

3. The manhole cover reinforcing structure anchored by utilizing a dowel bar and an existing pavement foundation according to claim 1, characterized in that the manhole cover reinforcing structure further
10 includes:

an asphalt paving layer, which is paved above the concrete, and the upper surface of the asphalt paving layer and the existing pavement are positioned on the same horizontal plane.

15 4. The manhole cover reinforcing structure anchored by utilizing a dowel bar and an existing pavement foundation according to claim 1, characterized in that the manhole cover reinforcing structure further includes:

a support bar, at least two support bars and the manhole cover
20 bearing being connected through a binding bar, so that the upper surface of the manhole cover bearing and the existing pavement are positioned on the same horizontal plane.

5. The manhole cover reinforcing structure anchored by utilizing a dowel bar and an existing pavement foundation according to claim 1, characterized in that the outer edge of the manhole cover bearing has a plurality of sockets corresponding to the dowel bar, the sockets are evenly distributed in the circumferential direction of the manhole cover bearing; the dowel bar is n-shaped, and at least one end of the dowel bar penetrates through the sockets and extends into the manhole cover ring bar.

6. The manhole cover reinforced method anchored by utilizing a dowel bar and an existing pavement foundation is characterized by comprising the following steps:

step S1, performing annular cutting on the existing pavement along the outer edge of the manhole cover bearing to form the annular cutting groove;

step S2, tying a manhole cover ring bar matched with the annular cutting groove, wherein the manhole cover ring bar is correspondingly placed in the annular cutting groove and is positioned below the manhole cover bearing;

step S3, arranging the support cushion formwork at the sewer wellhead;

step S4, penetrating a dowel bar through the manhole cover bearing

and extending into the manhole cover ring bar;

step S5, the annular cutting groove is poured through concrete.

7.The manhole cover reinforced method anchored by utilizing a
5 dowel bar and an existing pavement foundation according to claim 6,
characterized in that the method further comprises:

step S6, after concrete pouring is finished, watering, covering and
maintaining are carried out, the support cushion formwork is taken out
after the completion of maintenance.

10

8.The manhole cover reinforced method anchored by utilizing a
dowel bar and an existing pavement foundation according to claim 6,
characterized in that the method further comprises:

step S7, paving the asphalt above the concrete, wherein the upper
15 surface of the asphalt paving layer and the existing pavement are
positioned on the same horizontal plane.

20

Ansprüche

1. Schachtabdeckungsverstärkungsstruktur zur Verankerung an einem bestehenden Straßenbelagunterbau unter Verwendung einer Einsetzbewehrung, welche Schachtabdeckungsverstärkungsstruktur an der Kanalschachtöffnung vorgesehen ist, um eine Schachtabdeckungshalterung des bestehenden Straßenbelags zu verstärken, dadurch gekennzeichnet, dass die Schachtabdeckungsverstärkungsstruktur Folgendes umfasst:

eine Schachtabdeckungshalterung, die entsprechend an der Kanalschachtöffnung für den Einbau der Schachtabdeckung angebracht ist;

einen Ringschneideschlitz, der die Schachtabdeckungshalterung umgibt;

eine Schachtabdeckungsringbewehrung, die an den Ringschneideschlitz angepasst, entsprechend in dem Ringschneideschlitz angeordnet ist und sich unterhalb der Schachtabdeckungshalterung befindet;

eine Stützschiene, die an der Kanalschachtöffnung angebracht ist, die Schachtabdeckungshalterung stützt und als Schablone zum Abdichten des Spalts zwischen der Schachtabdeckungshalterung und der Kanalschachtöffnung dient;

eine Einsetzbewehrung, die durch die Schachtabdeckungshalterung hindurchgeht und sich innerhalb der Schachtabdeckungsringbewehrung erstreckt, um als ein Vorfertigungselement die

Schachtabdeckungshalterung und die Schachtabdeckungsringbewehrung zu verbinden;

Beton, der in den Ringschneideschlitz gegossen wird, um die Schachtabdeckungshalterung, die Schachtabdeckungsringbewehrung und die Einsetzbewehrung als eine einzige Einheit zu bilden.

2. Schachtabdeckungsverstärkungsstruktur zur Verankerung an einem bestehenden Straßenbelagunterbau unter Verwendung einer Einsetzbewehrung nach Anspruch 1, dadurch gekennzeichnet, dass die Stützschiene ein Luftsack ist, wobei der Luftsack ein Ventil zum Aufblasen oder Entleeren aufweist.

3. Schachtabdeckungsverstärkungsstruktur zur Verankerung an einem bestehenden Straßenbelagunterbau unter Verwendung einer Einsetzbewehrung nach Anspruch 1, dadurch gekennzeichnet, dass die Schachtabdeckungsverstärkungsstruktur ferner umfasst:

eine Asphaltschicht, die auf den Beton aufgebracht wird und deren Oberseite sich auf derselben horizontalen Ebene befindet wie der vorhandene Straßenbelag.

4. Schachtabdeckungsverstärkungsstruktur zur Verankerung an einem bestehenden Straßenbelagunterbau unter Verwendung einer Einsetzbewehrung nach Anspruch 1, dadurch gekennzeichnet, dass die Schachtabdeckungsverstärkungsstruktur ferner umfasst:

Stützstangen, wobei mindestens zwei der Stützstangen die Schachtabdeckungshalterung durch Bügelbewehrung verbinden, so dass die Oberseite der Schachtabdeckungshalterung auf derselben horizontalen Ebene befindet wie der vorhandene Straßenbelag.

5. Schachtabdeckungsverstärkungsstruktur zur Verankerung an einem bestehenden Straßenbelagunterbau unter Verwendung einer Einsetzbewehrung nach Anspruch 1 dadurch gekennzeichnet, dass die Schachtabdeckungshalterung mehrere Einsetzbohrungen an der Außenkante aufweist, die den Einsetzbewehrungen entsprechen, wobei die Einsetzbohrungen gleichmäßig über den Umfang der Schachtabdeckungshalterung verteilt sind; dass die Einsetzbewehrungen n-förmig ausgebildet sind, wobei mindestens ein Ende der Einsetzbewehrungen durch die Einsetzbohrungen verläuft und sich in die Schachtabdeckungsringbewehrungen erstreckt.

6. Verfahren zur Verstärkung einer Schachtabdeckung unter Verwendung einer Einsetzbewehrung zur Verankerung an einem bestehenden Straßenbelagunterbau, dadurch gekennzeichnet, umfassend:

Schritt S1: Ringschneiden am vorhandenen Straßenbelag entlang der Außenkante der Schachtabdeckungshalterung, um einen Ringschneideschlitz zu bilden;

Schritt S2: Binden einer an den Ringschneideschlitz angepassten Schachtabdeckungsringbewehrung, wobei die

Schachtabdeckungsringbewehrung entsprechend in dem Ringschneideschlitz platziert und unterhalb der Schachtabdeckungshalterung angeordnet ist;

Schritt S3: Vorsehen einer Stützschaablone an der Kanalschachtöffnung;

Schritt S4: Durchführen der Einsetzbewehrung durch die Schachtabdeckungshalterung und in die Schachtabdeckungsringbewehrung;

Schritt S5; Ausgießen des Ringschneideschlitzes mit Beton.

7. Verfahren zur Verstärkung einer Schachtabdeckung unter Verwendung einer Einsetzbewehrung zur Verankerung an einem bestehenden Straßenbelagunterbau nach Anspruch 6, dadurch gekennzeichnet, umfassend:

Schritt S6, bei dem der Beton nach dem Gießen zur Instandhaltung mit Wasser besprengt und abgedeckt wird und die Stützschaablone nach Abschluss der Instandhaltung entfernt wird.

8. Verfahren zur Verstärkung einer Schachtabdeckung unter Verwendung einer Einsetzbewehrung zur Verankerung an einem bestehenden Straßenbelagunterbau nach Anspruch 6, dadurch gekennzeichnet, umfassend:

Schritt S7: Aufbringen des Asphalts auf den Beton, wobei die Oberseite des Asphalts auf gleicher Höhe mit dem bestehenden Straßenbelag liegt.

DRAWINGS

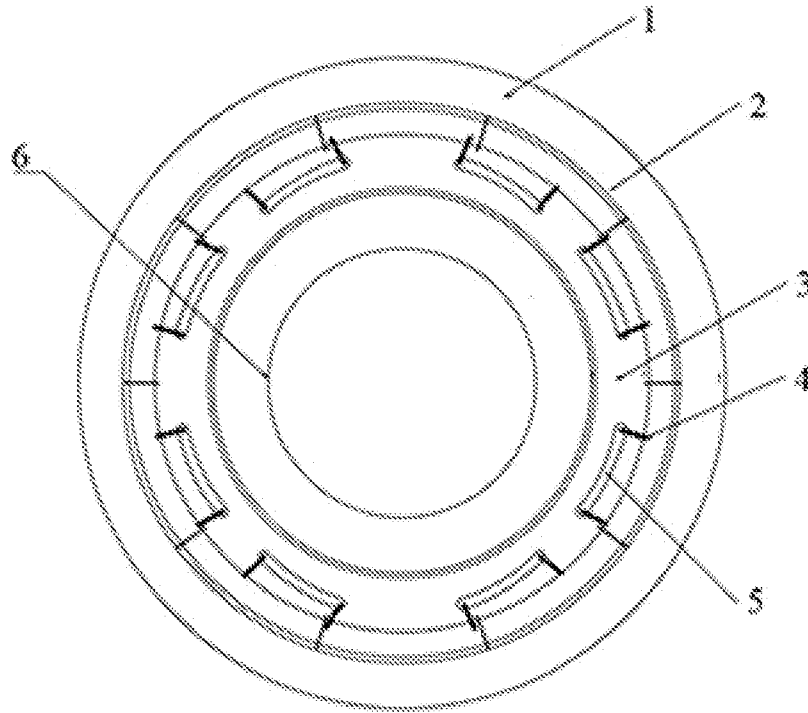


Fig. 1

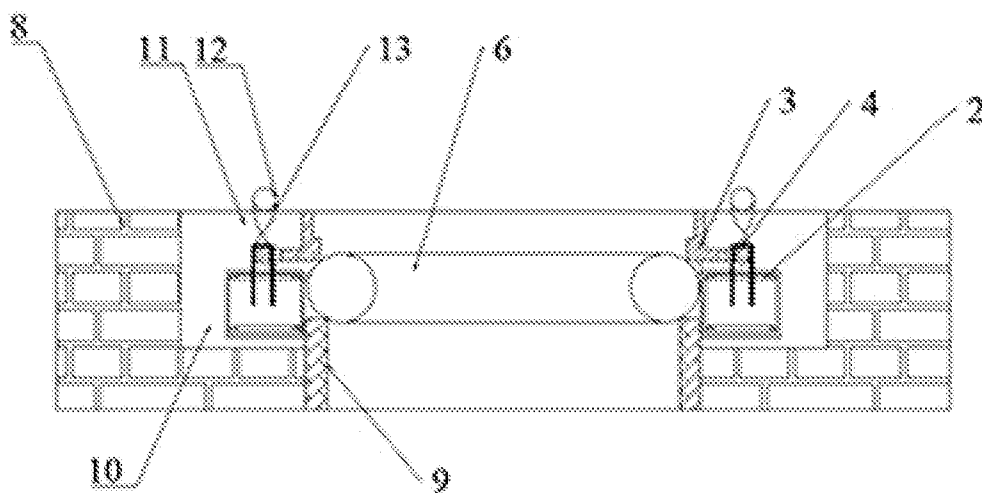


Fig. 2

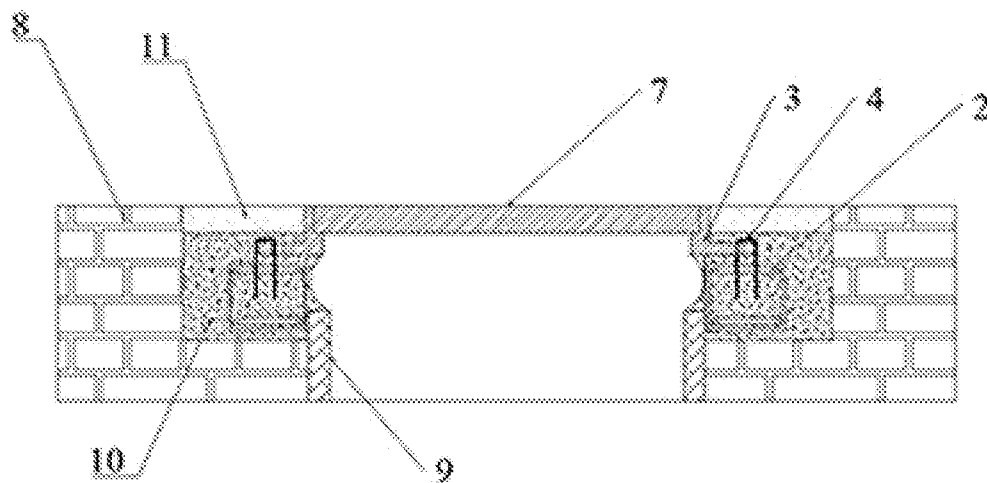


Fig. 3