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(54) TRAFFIC INTERCHANGE (VARIANTS)

(57) The invention relates to road building and can be used when designing traffic interchanges for intersecting high-volume, multi-lane, two-way automobile transport flows on two levels on which main roads and, linked therewith, secondary roads are laid; mutually parallel main roads divided by natural barriers and, linked therewith, secondary roads; a main road and secondary roads laid on one level in a location. The variants of the invention for various configurations of transport networks comprise the circular automobile traffic overpass with multi-lane, one-way traffic, in particular overpasses which are tangential to said interchange or which bypass said interchange on the outside, ramps for joining said bypasses and for exiting said bypasses to join (a) main road(s) and (a) secondary road(s), right turns in opposite directions of automobile traffic between main and secondary roads, and a straight road connecting the main and secondary roads. The invention makes it possible to eliminate automobile traffic congestion at road intersections, to eliminate the regulation thereof, to simplify and expedite the crossing of such intersections whilst observing the traffic speed limits, to reduce the accident rate on roads, and to improve the condition of the surrounding environment.

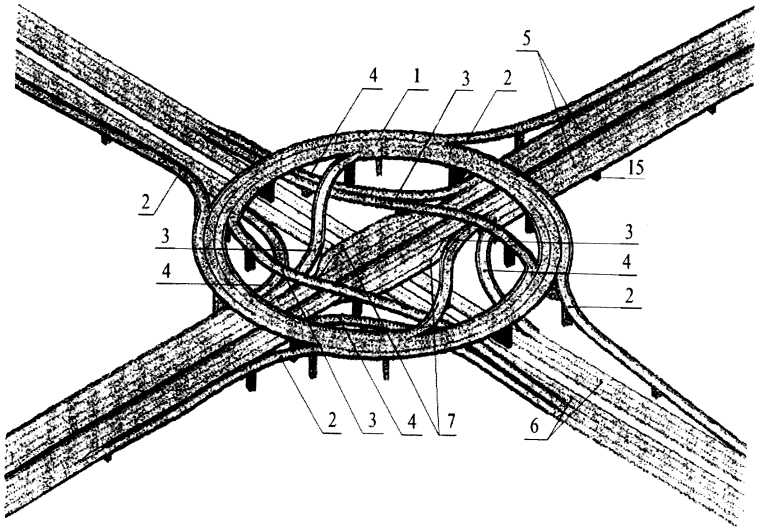

Fig. 1

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Description

Respective areas

[0001] The invention relates to road building and can be used when designing traffic interchanges for intersecting high-volume traffic flows of main roads on two levels, main and secondary roads on the same level as well as main and linked therein secondary roads laid on one level in a location and divided by railroad, river or other natural barriers.

Previous level of technical solutions

[0002] The known invention "Traffic regulation structure to prevent congestion at highway road intersections" includes a circular section of the main road with entering passes to it from secondary roads located on the same level in various directions toward it as well as alternative bridge intersection and bypasses to the secondary roads using circular sections, bridges and tunnels. These systems use one-way traffic roads. (WO/2008/102190 A1, МКП-8 E01C 1/04).

[0003] This technical solution to a certain extent solves the problem of prevention of automobile traffic congestion, do not require traffic lights control, but does not provide the possibility of transport return from the circular section of the main road to the corresponding secondary road to change the traffic direction.

[0004] To return the driving up automobiles to the opposite direction lane of the same secondary road need to turn with decline the continuation and speed of traffic flow or otherwise creation of an additional bypass roads is needed.

[0005] The closest technical solution to the claimed invention is the invention titled " Traffic network for urban settlement" in accordance with the option shown in FIG. 11 , comprising two straight main intersecting roads for multi-lane two-way automobile transport flows on two levels, located above them circular automobile traffic overpass with one-way multi-lane traffic and ramps for one-way automobile transport flow which are adjacent to the circular overpass for entering it from the outer side and for exiting it from inner side to the main roads (USA Patent 3,847,496, HK Ц 404/1, 12.11.1974)

[0006] This technical solution ensures continuous automobile flow by using the circular automobile traffic overpass with ramps for entering and exiting it to the corresponding transport flows of various directions of main roads.

[0007] Wherein the circular automobile traffic overpass as element of the city transport networks has complicated design that makes difficult to use it for rational entering and exiting in various direction of secondary or main roads, thus entered automobile flows aiming to reach the exiting points of the circular overpass have to cross its lanes moving from the left to right lane interfering and slowing the flow around the overpass with risks of accident situations; automobiles to turn from the right flow of the main upper road to the right flow of the main lower road as well as from the left flow of the main lower road to the left flow of the main upper road need to enter the circular automobile traffic overpass are complicating the traffic through the overpass and through the points of exiting it to corresponding main upper road.

THE ESSENCE OF THE INVENTION

[0008] The object of the "Traffic interchange (options)" invention is to eliminate automobile traffic congestion at road intersections of mains, main and supplementary roads with two-way traffic flow suitable for differently skilled drivers, to eliminate an expensive equipment and its continuous maintenance required for the traffic regulation and to simplify and expedite the crossing of such intersections whilst observing the traffic speed limits, to reduce the accident rate on roads, and to improve the condition of the surrounding environment due to automobiles emission reduction.

[0009] This object is achieved by implementation of the "Traffic interchange (options)" invention using its 9 options for various configurations of traffic networks described below:

- According to the option 1 the traffic interchange includes main roads for multi-lane two-way automobile transport flows on two levels, and located above them - the circular automobile traffic overpass with one-way multi-lane traffic, and ramps for one-way automobile transport flow, which are adjacent to the circular overpass for entering it from the outer side and for exiting it from inner side to the main roads. Wherein significant differences of the invention lies in the fact that the upper of two main roads at the intersection includes two stop points for public transport each linked to the rightmost lanes along the direction of traffic and main roads close to the intersection have equally right arc rounded one-way traffic overpasses connecting the second lanes from the rightmost side of the main upper level road to the first lane of the main lower level road as well as connecting the second lane of the lower level main road to the first lane of the upper level main road, the circular automobile traffic overpass has three lanes, rightmost of which at equal distances is connected to ramps to enter it from the outer right edge lanes of the main roads and the inner edge lane of the circular overpass is connected to ramps for exit it to the second right lanes of the main roads.
  In the option 1 of traffic interchange the circular automobile traffic overpass, ramps for entering and exiting it to the main roads as well as overpasses connecting the lanes of the main roads are based on piles.
- According to the option 2 the traffic interchange in-

cludes main roads for multi-lane two-way automobile transport flows on two levels, and located above them - the circular automobile traffic overpass with one-way multi-lane traffic, and ramps for one-way automobile transport flow, which are adjacent to the circular overpass for entering it from the inner side and for exiting it from outer side to the main roads. Wherein significant differences of the invention lies in the fact that each of main roads close to the intersection have equally arc rounded to the right overpasses with one-way traffic and connecting the second lanes from the rightmost side, the circular automobile traffic overpass has three lanes, inner edge of which at equal distances is connected to ramps to enter it from the rightmost lanes of the main roads and the outer edge lane of the circular overpass is connected to ramps for exiting it to the second right lanes of the main roads.

In the option 2 of traffic interchange the circular automobile traffic overpass, ramps for entering and exiting it to the main roads as well as overpasses connecting the lanes of the main roads are based on piles;

- According to the option 3 the traffic interchange includes main roads for multi-lane two-way automobile transport flows on two levels, and located above them - the circular automobile traffic overpass with one-way multi-lane traffic, and ramps for one-way automobile transport flow, which are adjacent to the circular overpass from the outer and inner sides. Wherein significant differences of the invention lies in the fact that each of main roads close to the intersection has equally arc rounded to the right overpasses with one-way traffic connecting the second lanes from the rightmost side of the main upper level road to the first lane of the main lower level road as well as connecting the second lanes of the lower level main road to the first lane of the upper level main road, wherein the traffic interchange has secondary two-way roads between each directions of mains roads close to the intersection, the circular automobile traffic overpass has three lanes, rightmost of which at equal distances is connected to ramps to enter it from the outer right edge lanes of the main roads and rightmost lanes of the secondary roads and the inner edge lane of the circular overpass is connected to ramps for exiting it to the second right lanes of the main roads, each ramp has an additional ramp branched to the right along the direction of traffic allowing exiting to the secondary roads' lanes with traffic in the opposite direction.

In the option 3 of traffic interchange the circular automobile traffic overpass, ramps for entering and exiting it to the main roads as well as overpasses connecting the lanes of the main roads are based on piles;

- According to the option 4 the traffic interchange includes main road for multi-lane two-way automobile transport flows, and located above it - the circular automobile traffic overpass with one-way multi-lane traffic, and ramps for one-way automobile transport flow, which are adjacent to the circular overpass from the outer and inner sides. Wherein significant differences of the invention lies in the fact that perpendicular to the main road from two sides along the same line there are situated two-way multi-lane secondary roads, the rightmost lanes of main road of each direction have right arc turn to the rightmost lanes of the secondary roads, the circular automobile traffic overpass has three lanes, rightmost of which at equal distances is connected to ramps to enter it from the outer right second lanes of the main and secondary roads and the inner edge lane of the circular overpass is connected to ramps for exiting it to the first right lanes of the main roads and middle lanes of the secondary roads. Ends of the ramps for entering the circular overpass from the secondary roads have adjacent to the rightmost lane of the overpass constituting an exiting ramp connecting the flow to the second right lanes of the secondary roads.

In the option 4 of traffic interchange the circular automobile traffic overpass, ramps for entering and exiting it to the main roads as well as overpasses connecting the lanes of the main roads are based on piles;

- According to the option 5 the traffic interchange includes main road for multi-lane two-way automobile transport flows, and located above it - the circular automobile traffic overpass with one-way multi-lane traffic, and ramps for one-way automobile transport flow, which are adjacent to the circular overpass from the outer and inner sides. Wherein significant differences of the invention lies in the fact that perpendicular to the main road from one side a two-way multi-lane secondary road is situated, and the second right lane of main road has right arc turn to the rightmost lane of the secondary road 8, and the second lane of the secondary road in opposite direction (i.e. forward to the main road) has the right arc turn to rightmost lane of the main road, the circular automobile traffic overpass has three lanes, rightmost of which at equal distances from main and secondary roads is connected to ramps for entering it from the opposite directions of right first lanes of the main road and ramps for exiting it from the first right lanes of the secondary road , and the inner edge lane of the circular overpass opposite the ramps for entering is connected to ramps for exiting it to the second right lanes of the main road in forward direction and to the first lane of the opposite direction of the road as well as ramp situated at equally distances between them for exiting to the second lane of the secondary road in the direction away from the circular overpass.

In the option 5 of traffic interchange the circular automobile traffic overpass, ramps for entering and exiting it to the main roads as well as overpasses con-

necting the lanes of the main roads are based on piles;

- According to the option 6 the traffic interchange includes main road for multi-lane two-way automobile transport flows, and located above it - the circular automobile traffic overpass with one-way multi-lane traffic, and ramps for one-way automobile transport flow, which are adjacent to the circular overpass from the outer and inner sides. Wherein significant differences of the invention lies in the fact that the main road in plan view has right angle Γ-shape with smooth connection at the turn, and two two-way multi-lane secondary roads situated in the directions of straight parts of the main road before the circular automobile traffic overpass which has three lanes, rightmost of which at equal distances is connected to ramps to enter it from the outer right second lanes of the opposite direction of the first and second straight parts of the main road and third forward direction lanes of secondary roads and the inner edge lane of the circular overpass opposite the ramps for entering it from main and secondary roads is connected to ramps for exiting it to the second right lanes of the second part of main roads and second lane of the secondary road in the direction of the second straight part of the main road and third lane of the secondary road in the direction of the first straight part of the main road, the first right lane of the second part of the main road has the right arc turn to connect to the contiguous first right lane of the secondary road and the first right lane of the secondary road (which is on the same line with the second part of the main road) has the right arc turn to connect to the first right lane of the opposite direction of the main road, the first right lane of the secondary road (which is on the same line with the first part of the main road) has the right arc turn to connect the first lane of the other secondary road (which is on the same line with the second part of the main road). The first right lane of the first part of the main road is connected to the second lane of the secondary road located in the same direction by overpass which is adjacent to the rightmost lane of the circular automobile traffic overpass, and the second right lane of the opposite flow of the secondary road located in the same direction with the first part of main road is connected by similar overpass to the second lane of the opposite flow of the first part of main road, and the second lane of the secondary road which is in the same direction with the second part of the main road is connected by similar overpass to the first rightmost lane of the forward flow of the second part of main road, and the third lane of the second part of main road is connected by straight the same level road to the third lane of the secondary road that is situated in the same direction with the said second part of main road.

  In the option 6 of traffic interchange the circular automobile traffic overpass, ramps for entering and exiting it to the main roads as well as overpasses connecting the lanes of the main roads are based on piles;

- According to the option 7 the traffic interchange includes main road for multi-lane two-way automobile transport flows, and located above it - the circular automobile traffic overpass with one-way multi-lane traffic, and ramps for one-way automobile transport flow, which are adjacent to the circular overpass from the outer and inner sides. Wherein significant differences of the invention lies in the fact that perpendicular to the each side of main road there are situated two-way multi-lane secondary roads, both of which are directed to the circular automobile traffic overpass which has elliptical shape with its long axis along the main road and has three lanes, rightmost of which at equal distances from its transverse axis of the ellipse are connected to two pair of ramps to enter it from the outer right first lanes of both directions of the main road and ramps to enter it from the second lanes of secondary roads and the inner edge lane of the circular overpass in locations close to the enters is connected to ramps for exiting to the second right lanes of the main road in opposite direction and the second right lanes of the main road in opposite direction of the secondary roads, the rightmost lanes for the both flow of the secondary roads have ramps for entering the circular overpass which are adjacent to the rightmost lane of the circular overpass, and right lanes of the main road in both directions have right arc turns in the central part of the interchange to connect with the third right lanes of the traffic flows of the secondary roads directed away from the interchange.

  In the option 7 of traffic interchange the circular automobile traffic overpass, ramps for entering and exiting it to the main roads as well as overpasses connecting the lanes of the main roads are based on piles;

- According to the option 8 the traffic interchange includes main roads for multi-lane two-way automobile transport flows, and located above it - the circular automobile traffic overpass with one-way multi-lane traffic, and ramps for one-way automobile transport flow, which are adjacent to the circular overpass from the outer and inner sides. Wherein significant differences of the invention lies in the fact that main roads are mutually paralleled and on the same level with a distance between them and from their outer sides in perpendicular to the each main road there are situated two-way multi-lane secondary roads, the circular automobile traffic overpass has elliptical shape with its long axis perpendicular to the main roads and has three lanes for automobile traffic , rightmost of which at equal distances has two pair of ramps to enter it from the main roads and from the secondary roads with the most possible short distance and the

inner edge lane of the circular overpass in locations close to the enters is connected to ramps for exiting to the second right lanes of the main roads in opposite direction and the second right lanes of the secondary road in forward direction, the second right lane of each main road has right arc turn to the first right lane of the corresponding secondary road, the second right lane of each secondary road has right arc turn to the first right lane of the corresponding main road.

In the option 8 of traffic interchange the circular automobile traffic overpass, ramps for entering and exiting it to the main roads as well as overpasses connecting the lanes of the main roads are based on piles;

- According to the variant 9 the traffic interchange includes main roads for multi-lane two-way automobile transport flows, and located above it - the circular automobile traffic overpass with one-way multi-lane traffic, and ramps for one-way automobile transport flow, which are adjacent to the circular overpass from the outer and inner sides, wherein main roads are mutually paralleled on the same level and with a distance between them where the rail road is situated and from their outer sides perpendicular to the each main road there are situated two-way multi-lane secondary roads, the circular automobile traffic overpass has elliptical shape with its long axis perpendicular to the main roads and rail road, and has three lanes, rightmost of which at equal distances is linked to ramps to enter it from the rightmost lanes of both directions of the main roads and ramps to enter it from the forward to the circular overpass secondary roads with the most possible short distance and the inner edge lane of the circular overpass in locations close to the enters is connected to ramps for exiting to the second right lanes of the main roads in opposite direction and the second right lanes of the secondary road in opposite direction, left of the ramps for exiting to the main roads there are ramps for exiting to the second lanes of opposite direction of the secondary roads, the second right lane of each secondary road has right arc turn to the first right lane of the corresponding main road, the first right lane of each main road has right arc turn to the first right lane of the same direction lane of each of secondary road.

  In the option 9 of traffic interchange the circular automobile traffic overpass, ramps for entering and exiting it to the main roads as well as overpasses connecting the lanes of the main roads are based on piles;

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The invention is illustrated by drawings, where:

Fig. 1. Axonometric view of the traffic interchange (option 1);

Fig. 2. Axonometric view of the traffic interchange (option 2);

Fig. 3. Axonometric view of the traffic interchange (option 3);

Fig. 4. Axonometric view of the traffic interchange (option 4);

Fig. 5. Axonometric view of the traffic interchange (option 5);

Fig. 6. Axonometric view of the traffic interchange (option 6);

Fig. 7. Axonometric view of the traffic interchange (option 7);

Fig. 8. Axonometric view of the traffic interchange (option 8);

Fig. 9. Axonometric view of the traffic interchange (option 9);

Embodiments

[0011] The essence of the claimed invention "Traffic interchange (options)" is that:

- According to the option 1 the traffic interchange includes main roads 5 and 6 for multi-lane two-way automobile transport flows on two levels, and located above them - the circular automobile traffic overpass 1 with one-way multi-lane traffic, and ramps for one-way automobile transport flow, which are adjacent to the circular overpass for entering it 2 from the outer side and for exiting it 3 from inner side to the main roads 5 and 6. Upper of two main roads 5 at the intersection above main road 6 includes two stop points 7 for public transport each linked to the rightmost lanes along the direction of traffic and main roads 5 and 6 close to the intersection have equally right arc rounded one-way traffic overpasses 4 connecting the second lanes from the rightmost side of the main upper level road 5 to the first lane of the main lower level road as well as connecting the second lane of the lower level main road 6 to the first lane of the upper level main road, the circular automobile traffic overpass 1 has three lanes, rightmost of which at equal distances is connected to ramps for entering it 2 from the outer right edge lanes of the main roads 5 and 6 and the inner edge lane of the circular overpass 1 is connected to ramps for exiting it 3 opposite the entering it 2 to the second right lanes of the main roads 5 and 6.

  The circular automobile traffic overpass 1, ramps for entering it 2 and exiting it 3 to the main roads 5 and 6 as well as overpasses 4 connecting the lanes of the main roads 5 and 6 are based on piles 15;
- According to the option 2 the traffic interchange includes main roads 5 and 6 for multi-lane two-way automobile transport flows on two levels, and located above them - the circular automobile traffic overpass 1 with one-way multi-lane traffic, and ramps for one-

way automobile transport flow, which are adjacent to the circular overpasses 2 for entering it from the inner side and overpasses 3 for exiting it from outer side to the main roads, wherein each of main roads 5 and 6 close to the intersection have equally arc rounded to the right one-way traffic overpasses 4 connecting the second lanes from the rightmost side, the circular automobile traffic overpass 1 has three lanes, inner edge of which at equal distances is connected to ramps 2 to enter it from the outer right edge lanes of the main roads 5 and 6 and the outer edge lane of the circular overpass is connected to ramps 2 for exiting it to the second right lanes of the main roads 5 and 6.

The circular automobile traffic overpass 1, ramps for entering it 2 and exiting it 3 to the main roads 5 and 6 as well as overpasses 4 connecting the lanes of the main roads 5 and 6 are based on piles 15.

- According to the option 3 the traffic interchange includes main roads 5 and 6 for multi-lane two-way automobile transport flows on two levels, and located above them - the circular automobile traffic overpass 1 with one-way multi-lane traffic, and ramps for one-way automobile transport flow, which are adjacent to the circular overpass 2,3 from the outer and inner sides. Each of main roads 5 and 6 close to the intersection has equally arc rounded to the right one-way traffic overpasses 4 connecting to the second lanes from the rightmost side of the main upper level road 5 to the first lane of the main lower level road 6 as well as connecting the second lane of the lower level main road 6 to the first lane of the upper level main road 5. And the traffic interchange has secondary two-way roads 8 between each two direction of mains roads 5 and 6 close to the intersection, the circular automobile traffic overpass 1 has three lanes, rightmost of which at equal distances is connected to ramps 2 to enter it from the outer right edge lanes of the main roads 5 and 6 and rightmost lanes of the secondary roads 8 and the inner edge lane of the circular overpass 1 is connected to ramps 2 for exiting it to the second right lanes of the main roads 5 and 6 , each ramp 3 has an additional ramp 10 branched to the right along the direction of traffic allowing exiting to the secondary 8 roads' lanes with traffic in the opposite direction (away from the intersection).

  The circular automobile traffic overpass 1, ramps for entering it 2 and exiting it 3 to the main roads 5 and 6, ramps to entering 2 from the secondary road to the circular automobile traffic overpass 1, ramps for exiting 10 to the secondary roads as well as overpasses 4 connecting the lanes of the main roads 5 and 6 are based on piles 15;
- According to the option 4 the traffic interchange includes main road 5 for multi-lane two-way automobile transport flows, and located above it - the circular automobile traffic overpass 1 with one-way multi-lane traffic, and ramps 2,3 for one-way automobile transport flow, which are adjacent to the circular overpass from the outer and inner sides, wherein perpendicular to the main road 5 from two sides along the same line are situated two-way multi-lane secondary roads 8, the rightmost lanes of main road 5 of each direction have right arc turn 11 to the rightmost lanes of the secondary roads 8, the circular automobile traffic overpass 1 has three lanes, rightmost of which at equal distances is connected to ramps 2 to enter it from the outer right second lanes of the main 5 and secondary roads 8 and the inner edge lane of the circular overpass 1 is connected opposite the ramps 2 for entering to ramps 3 for exiting it to the first right lanes of the main roads 5 and middle lanes of the secondary roads 8. Ends of the ramps 2 for entering the circular overpass 1 from the secondary roads are adjacent to the rightmost lane of the circular overpass 9 allowing the flow to pass to the second right lanes of the secondary roads 8.

  The circular automobile traffic overpass 1, ramps for entering it 2 from the main road 5 and secondary roads 8 and exiting it 3 to them, overpasses 9 connecting the second right lanes of secondary roads 8 are based on piles 15;
- According to the option 5 the traffic interchange includes main road 5 for multi-lane two-way automobile transport flows, and located above it - the circular automobile traffic overpass 1 with one-way multi-lane traffic, and ramps 2,3 for one-way automobile transport flow, which are adjacent to the circular overpass from the outer and inner sides. Perpendicular to the main road 5 from one side the two-way multi-lane secondary road 8 is situated, and the second right lane of main road 5 has right arc turn 11 to the rightmost lane of the secondary road 8 and the second lane of the secondary road 8 in opposite direction (i.e. forward to the main road) has the right arc turn 11 to rightmost lane of the main road 5, the circular automobile traffic overpass 1 has three lanes, rightmost of which at equal distances from main 5 and secondary roads 8 is connected to ramps 2 for entering it from the opposite directions of right first lanes of the main road 5 and ramps 9 for exiting it from the first right lanes of the secondary road 8, and inner edge lane of the circular overpass 1 opposite the ramps 2 for entering is connected to ramps 3 for exiting it to the second right lanes of the main road 5 in forward direction and to the first lane of the opposite direction of the road 5 as well as ramp 10 situated at equally distances between them for exiting to the second lane of the secondary road 8 in the direction away from the circular overpass 1.

  The circular automobile traffic overpass 1, ramps for entering it 2 and 9 respectively from main road 5 and secondary road 8 and exiting it 3 and 10 respectively to the main roads 5 and secondary road 8 are based on piles 15.

- According to the option 6 the traffic interchange includes the main road 5 for multi-lane two-way automobile transport flows, and located above it - the circular automobile traffic overpass 1 with one-way multi-lane traffic, and ramps 2, 3 for one-way automobile transport flow, which are adjacent to the circular overpass from the outer and inner sides. The main road 5 in plan view has right angle Γ-shape with smooth connection at the turn, and two two-way multi-lane secondary roads 8 situated in the directions of straight parts of the main Γ-shape road 5 before the circular automobile traffic overpass 1 which has three lanes, rightmost of which at equal distances is connected to ramps 2 to enter it from the outer right second lanes of the away from intersection direction of straight parts of the main road 5 and ramps 9 connected the forward directed third lanes of secondary roads 8, and the inner edge lane of the circular overpass 1 is opposite the ramps 2 connected to to the second right lanes of the second part of main road 5 and entering ramps 9 connecting the secondary road 8 with the exiting ramps 3 to pass to second right lane of the second straight part of the main road 5 and the start point of ramps 10 for exiting to the second lane of the secondary road 8, located in the direction of the second part of the main road 5. The first right lane of the second part of the main road has the right arc turn 11 to connect to the contiguous first right lane of the secondary road 8 and the first right lane of the secondary road 8 (which is on the same line with the second part of the main road 5) has the right arc turn 11 to connect to the first right lane of the opposite direction of the main road 5. The first right lane of the secondary road 8 (which is on the same line with the second part of the main road) has the right arc turn 13 to connect the first lane of the other secondary road 8 (which is on the same line with the second part of the main road 5). The first right lane of the first part of the main road 5 is connected to the second lane of the secondary road 8 located in the same direction by overpass 12 which is adjacent to the rightmost lane of the circular automobile traffic overpass 1, and the second right lane of the opposite flow of the secondary road 8 located in the same direction with the first part of main road 5 is connected by similar overpass 12 to the second lane of the away from the interchange flow of the first part of main road 5, and the second lane of the secondary road 8 which is in the same direction with the second part of the main road 5 and is connected by similar overpass 12 to the first rightmost lane of the forward flow of the second part of main road 5, and the third lane of the second part of main road is connected by straight the same level road 14 to the third lane of the secondary road 8 that is situated in the same direction with the said second part of main road.
  The circular automobile traffic overpass 1, ramps for entering it 2 from main road 5 and ramps 9 for entering it from secondary roads, ramps 3 for exiting to main road and 10 to secondary roads 8 as well as overpasses 12 adjacent to the rightmost lane of the circular automobile traffic overpass 1 are based on piles 15;
- According to the option 7 the traffic interchange includes main road 5 for multi-lane two-way automobile transport flows, and located above it - the circular automobile traffic overpass 1 with one-way multi-lane traffic, and ramps 2,3 for one-way automobile transport flow, which are adjacent to the circular overpass from the outer and inner sides. Wherein significant differences of the invention lies in the fact that the perpendicular to the each side of main road 5 there are two-way multi-lane secondary roads 8, both directed to the circular automobile traffic overpass 1, which has elliptical shape situated with its long axis along the main road 5 and has three lanes, rightmost of which at equal distance from the transverse axis of the ellipse are connected to two, pair of ramps 2 to enter it from the outer right first lanes of backward directions of the main road 5 and ramps 9 to enter it from the second lanes of secondary roads 8 and the inner edge lane of the circular overpass 1 in locations close to the enters is connected to ramps 3 for exiting to the second right lanes of the main road in opposite direction and the second right lanes of the main road 5 in opposite direction of the main road and ramps 10 for exiting to the second right lanes of opposite flows of the secondary roads 8, the rightmost lanes for the forward flow of the secondary roads have ramps 2 for entering the circular overpass 1 which is connected to the overpass 12 which is adjacent to the rightmost lane of the circular overpass 1 and passes under the ramps 2 for exiting the main road 5, and right lanes of the main road in both directions of the main road 5 have right arc turns 11 in the central part of the interchange to connect to the third right lanes of the opposite traffic flow of the secondary roads 8.
  In the option 7 the circular automobile traffic overpass 1, ramps for entering it 2 from the main roads 5, ramps for entering it 9 from the secondary roads 8 as well as ramps for exiting it 3 to main roads 5 and ramps for exiting it 10 to secondary roads 8 as well as overpasses 12 which are adjacent to the edge right lane of the circular traffic overpass 1 are based on piles;
- According to the option 8 the traffic interchange includes main roads 5 for multi-lane two-way automobile transport flows, and located above it-the circular automobile traffic overpass 1 with one-way multi-lane traffic, and ramps 2,3 for one-way automobile transport flow, which are adjacent to the circular overpass from the outer and inner sides. Wherein significant differences of the invention lies in the fact that the main roads 5 are located mutually paralleled

on the same level and with a distance 16 between them and from their outer sides perpendicular to the each main road there are two-way multi-lane secondary roads 8, the circular automobile traffic overpass 1 has elliptical shape with its long axis perpendicular to the main roads 5 and has three lanes, rightmost of which at equal distances has two pair of ramps 2 and 9 to enter it from the main roads 5 and from the secondary roads 8 with the most possible short distance and the inner edge lane of the circular overpass 1 in locations close to the enters is connected to ramps 3 for exiting to the second right lanes of the main roads 5 in opposite direction and ramps 10 for exiting to the second right lanes of the secondary road 8 forward direction, the second right lane of each main road 5 has right arc turn 4 to the first right lane of the corresponding secondary road 8. The second right lane of each secondary road 8 has right arc turn 11 to the first right lane of the corresponding main road to ensure the flow in the same direction of the main road 5.

In the option 8 the circular automobile traffic overpass 1, ramps for entering it 2 from the main roads 5, ramps for entering it 9 from the secondary roads 8 as well as ramps for exiting it 3 to main roads 5 and ramps for exiting it 10 to secondary roads 8 are based on piles 15;

- According to the option 9 the traffic interchange includes main roads 5 for multi-lane two-way automobile transport flows, and located above it - the circular automobile traffic overpass 1 with one-way multi-lane traffic, and ramps 2,3 for one-way automobile transport flow, which are adjacent to the circular overpass from the outer and inner sides. The main roads 5 are mutually paralleled and situated on the same level, and with a distance between them where the rail road 17 is located, and from their outer sides perpendicular to the each main road 5 there are situated two-way multi-lane secondary roads 8, the circular automobile traffic overpass 1 has elliptical shape with its long axis perpendicular to the main roads 5 and rail road 17, and has three lanes, rightmost of which at equal distances is linked to ramps 2 to enter it from the rightmost lanes of both directions of the main roads 5 and ramps 9 to enter it from the forward direction of secondary roads 8 with the most possible short distance and the inner edge lane of the circular overpass 1 in locations close to the enters is connected to ramps 3 for exiting to the second right lanes of the main roads 5 in opposite direction and the second right lanes of the secondary road in opposite direction. Lefthand of the ramps 3 for exiting to the main roads 5 there are ramps 10 for exiting to the second lanes of opposite direction of the secondary roads 8, the second right lane of each secondary road 8 has right arc turn 11 to the first right lane of the corresponding main road 5, the first right lane of each main road 5 has right arc turn 4 to the first right lane of the same direction lane of secondary road 8.

In the option 9 the circular automobile traffic overpass 1, ramps for entering it 2 from the main roads 5, ramps for entering it 9 from the secondary roads 8 as well as ramps for exiting it 3 from the circular traffic overpass 1 to main roads 5 and secondary roads 8 are based on piles 15.

[0012] The claimed invention - "Traffic interchange (options)" ensures a circular traffic of automobile transport in a familiar and standard manner, high speed of transport passing through intersections to the various directions of non-stop flows. Transport interchanges building proposed design can be implemented without interrupting the existing traffic flows. Driving by the circular overpass allows timely correcting of drivers' mistakes, especially in case of low-skilled drivers or in case of bushed drivers. Driving on the circular overpass in any options of traffic interchanges represent familiar and typical actions, reducing the probability of errors and preventing accidents. At the moment of entering the circular overpass there is no need to look in the rear view mirror as an automobile is entering the lane not occupied by other vehicles, because their intention is to drive to the other edge of the lane to exit from the circular overpass.

[0013] A diverse range of applications of traffic interchanges is offered to link them to the different local features. Claimed traffic interchanges provide non-stop traffic, increasing its capacity and reducing the actual time of internal combustion engine working in the speed regime changing conditions integrally reducing fuel consumption and emissions (improving the local environmental conditions).

[0014] The essence of proposed options of the traffic interchange is in a smooth change of lanes after standard entering to the circular overpass (rule of circular flow) following by the centripetal movement toward exits within the circle, resembling "funnel" movement or vice versa when it is with entering through the inner edge of the circular overpass with the centrifugal movement toward exits from the outer edge, i.e. "funnel" movement towards exiting i.e. "centrifugal" movement towards exiting, avoiding interference of the traffic flows. Rules of circular driving are recognized as optimal by experts in the most megalopolis with hard traffic. One third of automobile road accidents happens on the road crossing points. The claimed invention and provided technical solutions of the traffic interchanges minimize accidents on the roads by using the non-stop traffic where traffic flows don't intersect. As a rule, the exiting points should be situated before the entering points. This requirement is met and is common for the claims. An application of traffic interchanges in accordance with the proposed options allows changing the driving direction without any interfering flows at the conflict points. Proposed traffic interchange (options) can be placed on any level of crossing highways, namely, below the roads, between the roads, un-

der the roads (below ground level or in tunnels). Preferably, the construction of such traffic interchanges should be at intersections with a capacity of over one thousand vehicles per hour, driving in all directions. Options of the traffic interchange allow organizing the transport hub for public transport passengers with pedestrian crossings in areas linked to main roads and not outside of the interchanges. It reduces the cost of construction because there is no need to build underground or over ground pedestrian crossings. Entering and exiting ramps to the circular overpass are assumed to constitute curves with a radius close to the radius of the circular overpass. Light metal frames in conjunction with point supports for the closed circular traffic allow to create the most robust and reliable structure.

Field of application

[0015] The claimed invention - "Traffic interchange (options)" nowadays is of current interest and can be realized with the use of modern technology, industrial designs and materials both in the Russian Federation and abroad.

Claims

1. Traffic interchange comprising main roads for multi-lane two-way automobile transport flows on two levels, and located above them - the circular automobile traffic overpass with one-way multi-lane traffic, and ramps for one-way automobile transport flow, which are adjacent to the circular overpass for entering it from the outer side and for exiting it from inner side to the main roads, wherein the upper of two main roads at the intersection includes two stop points for public transport each linked to the rightmost lanes with the direction of traffic and main roads close to the intersection have equally right arc rounded one-way traffic overpasses connecting the second lanes from the rightmost side of the main upper level road to the first lane of the main lower level road as well as connecting the second lane of the lower level main road to the first lane of the upper level main road, the circular automobile traffic overpass has three lanes, rightmost of which at equal distances is connected to ramps to enter it from the outer right edge lanes of the main roads and the inner edge lane of the circular overpass is connected to ramps for exit it to the second right lanes of the main roads.

2. Traffic interchange as claimed in claim 1, wherein the circular automobile traffic overpass, ramps for entering and exiting it to the main roads as well as overpasses connecting the lanes of the main roads are based on piles.

3. Traffic interchange comprising main roads for multi-lane two-way automobile transport flows on two levels, and located above them - the circular automobile traffic overpass with one-way multi-lane traffic, and ramps for one-way automobile transport flow, which are adjacent to the circular overpass for entering it from the inner side and for exiting it from outer side to the main roads, wherein each of main roads close to the intersection have equally arc rounded to the right one-way traffic overpasses connecting the second lanes from the rightmost side, the circular automobile traffic overpass has three lanes, inner edge of which at equal distances is connected to ramps to enter it from the outer right edge lanes of the main roads and the outer edge lane of the circular overpass is connected to ramps for exiting it to the second right lanes of the main roads.

4. Traffic interchange as claimed in claim 3, wherein the circular automobile traffic overpass, ramps for entering and exiting it to the main roads as well as overpasses connecting the lanes of the main roads are based on piles.

5. Traffic interchange comprising main roads for multi-lane two-way automobile transport flows on two levels, and located above them - the circular automobile traffic overpass with one-way multi-lane traffic, and ramps for one-way automobile transport flow, which are adjacent to the circular overpass from the outer and inner sides, wherein each of main roads close to the intersection has equally arc rounded to the right one-way traffic overpasses connecting the second lanes from the rightmost side of the main upper level road to the first lane of the main lower level road as well as connecting the second lane of the lower level main road to the first lane of the upper level main road, wherein the traffic interchange has secondary two-way roads between each two direction of mains roads close to the intersection, the circular automobile traffic overpass has three lanes, rightmost of which at equal distances is connected to ramps to enter it from the outer right edge lanes of the main roads and rightmost lanes of the secondary roads and the inner edge lane of the circular overpass is connected to ramps for exiting it to the second right lanes of the main roads, each ramp has an additional ramp branched to the right along the direction of traffic allowing exiting it to the secondary road to the lanes with opposite traffic direction.

6. Traffic interchange as claimed in claim 5, wherein the circular automobile traffic overpass, ramps for entering and exiting it to the main roads as well as overpasses connecting the lanes of the main roads are based on piles.

7. Traffic interchange comprising main road for multi-lane two-way automobile transport flows, and locat-

ed above it - the circular automobile traffic overpass with one-way multi-lane traffic, and ramps for one-way automobile transport flow, which are adjacent to the circular overpass from the outer and inner sides, wherein perpendicular to the main road from two sides along the same line are situated two-way multi-lane secondary roads, the rightmost lanes of main road of each direction have right arc turn to the rightmost lanes of the secondary roads, the circular automobile traffic overpass has three lanes, rightmost of which at equal distances is connected to ramps to enter it from the outer right second lanes of the main and secondary roads and the inner edge lane of the circular overpass is connected to ramps for exiting it to the first right lanes of the main roads and middle lanes of the secondary roads. Ends of the ramps for entering the circular overpass from the secondary roads are adjacent to the rightmost lane of the overpass constituting an exiting ramp connecting the flow to the second right lanes of the secondary roads.

8. Traffic interchange as claimed in claim 7, wherein the circular automobile traffic overpass, ramps for entering and exiting it to the main roads as well as overpasses connecting the lanes of the main roads are based on piles.

9. Traffic interchange comprising main road for multi-lane two-way automobile transport flows, and located above it - the circular automobile traffic overpass with one-way multi-lane traffic, and ramps for one-way automobile transport flow, which are adjacent to the circular overpass from the outer and inner sides, wherein perpendicular to the main road from one side is situated two-way multi-lane secondary road, and the second right lane of main road has right arc turn to the rightmost lane of the secondary road and the second lane of the secondary road in opposite direction has the right arc turn to rightmost lane of the main road, the circular automobile traffic overpass has three lanes, rightmost of which at equal distances from main and secondary roads is connected to ramps for entering it from the opposite directions of right first lanes of the main road and opposite directions right first lane of the secondary roads and the inner edge lane of the circular overpass is connected to ramps for exiting it to the first right lanes of the main road in opposite direction and the second right lanes of the main road in forward direction as well as ramp situated equally between them for exiting to the second lane of the secondary roads in the direction away from the circular overpass.

10. Traffic interchange as claimed in claim 9, wherein the circular automobile traffic overpass, ramps for entering and exiting it to the main roads as well as overpasses connecting the lanes of the main roads are based on piles.

11. Traffic interchange comprising main road for multi-lane two-way automobile transport flows, and located above it - the circular automobile traffic overpass with one-way multi-lane traffic, and ramps for one-way automobile transport flow, which are adjacent to the circular overpass from the outer and inner sides, wherein the main road in plan view has right angle Γ-shape with smooth connection at the turn, and two two-way multi-lane secondary roads situated in the directions of straight parts of the main road before the circular automobile traffic overpass which has three lanes, rightmost of which at equal distances is connected to ramps to enter it from the outer right second lanes of the opposite direction of straight parts of the main road and third forward direction lanes of secondary roads and the inner edge lane of the circular overpass is connected to ramps for exiting it to the second right lanes of the second part of main roads and second lane of the secondary road in the direction of the second straight part of the main road and third lane of the secondary road in the direction of the first straight part of the main road, the first right lane of the second part of the main road has the right arc turn to connect to the contiguous first right lane of the secondary road and the first right lane of the secondary road (which is on the same line with the second part of the main road) has the right arc turn to connect to the first right lane of the opposite direction of the main road, the first right lane of the secondary road (which is on the same line with the second part of the main road) has the right arc turn to connect the first lane of the other secondary road (which is on the same line with the second part of the main road), the first right lane of the first part of the main road is connected to the second lane of the secondary road located in the same direction by overpass which is adjacent to the rightmost lane of the circular automobile traffic overpass, and the second right lane of the opposite flow of the secondary road located in the same direction with the first part of main road is connected by similar overpass to the second lane of the opposite flow of the first part of main road, and the second lane of the secondary road which is in the same direction with the second part of the main road is connected by similar overpass to the first rightmost lane of the forward flow of the second part of main road, and the third lane of the second part of main road is connected by straight the same level road to the third lane of the secondary road that is situated in the same direction with the said second part of main road.

12. Traffic interchange as claimed in claim 11, wherein the circular automobile traffic overpass, ramps for

entering and exiting it to the main roads as well as overpasses connecting the lanes of the main roads are based on piles.

13. Traffic interchange comprising main road for multi-lane two-way automobile transport flows, and located above it - the circular automobile traffic overpass with one-way multi-lane traffic, and ramps for one-way automobile transport flow, which are adjacent to the circular overpass from the outer and inner sides, wherein perpendicular to the each side of main road there are situated two-way multi-lane secondary roads, both of which are directed to the circular automobile traffic overpass which has elliptical form situated with its long axis along the main road and has three lanes, rightmost of which at equal distances from its transverse axis of the ellipse are connected to two pair of ramps to enter it from the of outer right first lanes of opposite directions of the main road and ramps to enter it from the second lanes of secondary roads and the inner edge lane of the circular overpass in locations close to the enters is connected to ramps for exiting to the second right lanes of the main road in opposite direction and the second right lanes of the main road in opposite direction of the main road and ramps for exiting to the second right lanes of opposite flows of the secondary roads, the rightmost lanes for the forward flow of the secondary roads have ramps for entering the circular overpass which are adjacent to the rightmost lane of the circular overpass, and right lanes of the main road in both directions have right arc turns in the central part of the interchange to connect with the third right lanes of the opposite traffic flow of the secondary roads.

14. Traffic interchange as claimed in claim 13, wherein the circular automobile traffic overpass, ramps for entering and exiting it to the main roads as well as overpasses connecting the lanes of the main roads are based on piles.

15. Traffic interchange comprising main roads for multi-lane two-way automobile transport flows, and located above it - the circular automobile traffic overpass with one-way multi-lane traffic, and ramps for one-way automobile transport flow, which are adjacent to the circular overpass from the outer and inner sides, wherein main roads are located in parallel on the same level and with a distance between them and from their outer sides perpendicular to the each main road there are situated two-way multi-lane secondary roads, the circular automobile traffic overpass has elliptical shape with its long axis perpendicular to the main roads and has three lanes, rightmost of which at equal distances has two pair of ramps to enter it from the main roads and from the secondary roads with the most possible short distance and the inner edge lane of the circular overpass in locations close to the enters is connected to ramps for exiting to the second right lanes of the main roads in opposite direction and the second right lanes of the secondary road in forward direction, the second right lane of each main road has right arc turn to the first right lane of the corresponding secondary road, the second right lane of each secondary road has right arc turn to the first right lane of the corresponding main road.

16. Traffic interchange as claimed in claim 15, wherein the circular automobile traffic overpass, ramps for entering and exiting it to the main roads as well as overpasses connecting the lanes of the main roads are based on piles.

17. Traffic interchange comprising main roads for multi-lane two-way automobile transport flows, and located above it - the circular automobile traffic overpass with one-way multi-lane traffic, and ramps for one-way automobile transport flow, which are adjacent to the circular overpass from the outer and inner sides, wherein main roads are mutually parallel on the same level and with a distance between them where the rail road is situated and from their outer sides perpendicular to the each main road there are situated two-way multi-lane secondary roads, the circular automobile traffic overpass has elliptical shape with its long axis perpendicular to the main roads and rail road, and has three lanes, rightmost of which at equal distances is linked to ramps to enter it from the rightmost lanes of both directions of the main roads and ramps to enter it from the forward to the circular overpass secondary roads with the most possible short distance and the inner edge lane of the circular overpass in locations close to the enters is connected to ramps for exiting to the second right lanes of the main roads in opposite direction and the second right lanes of the secondary road in opposite direction, lefthand of the ramps for exiting to the main roads there are ramps for exiting to the second lanes of opposite direction of the secondary roads, the second right lane of each secondary road has right arc turn to the first right lane of the corresponding main road, the first right lane of each main road has right arc turn to the first right lane of the same direction lane of secondary road.

18. Traffic interchange as claimed in claim 17, wherein the circular automobile traffic overpass, ramps for entering and exiting it to the main roads as well as overpasses connecting the lanes of the main roads are based on piles.

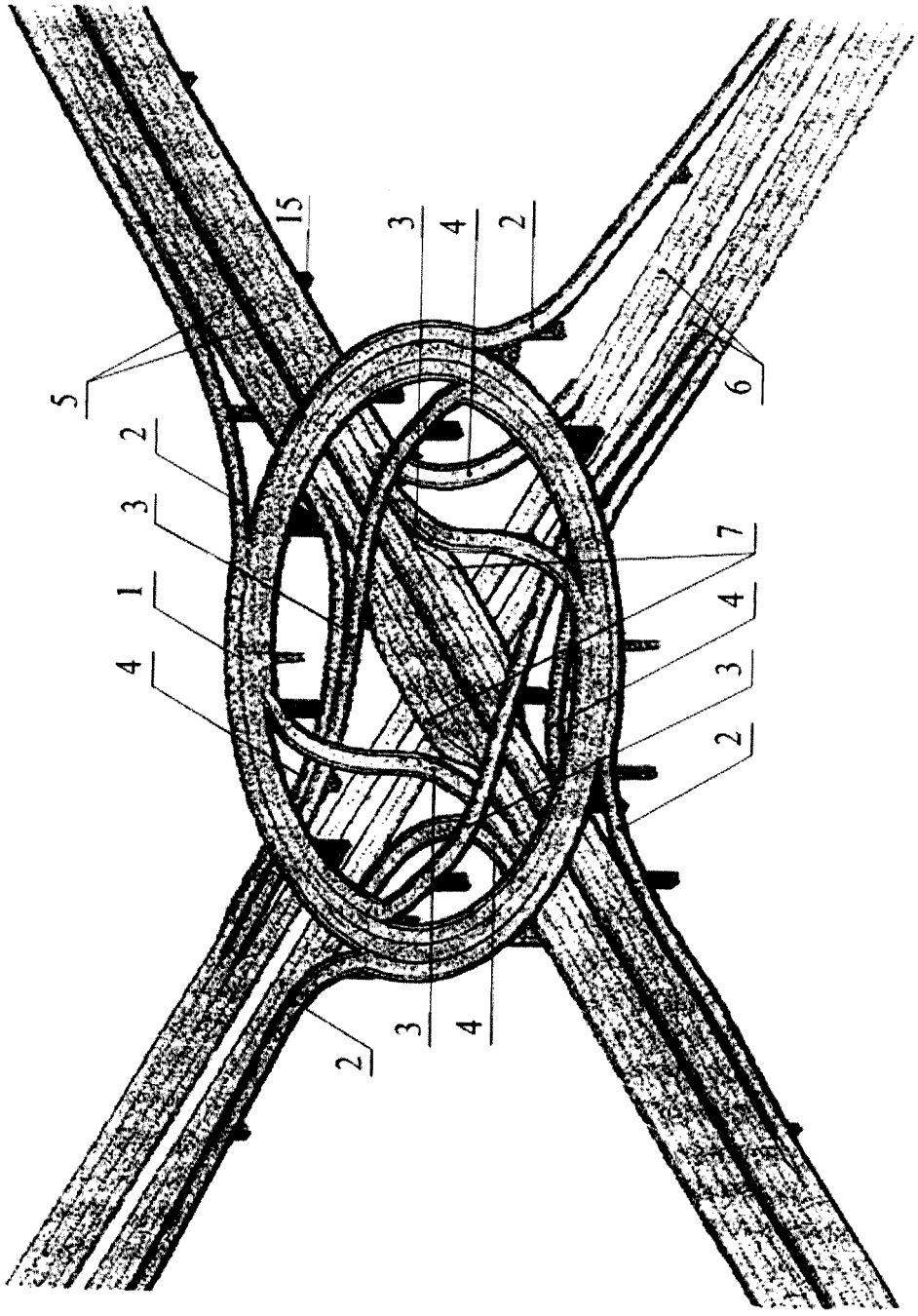


Fig. 1

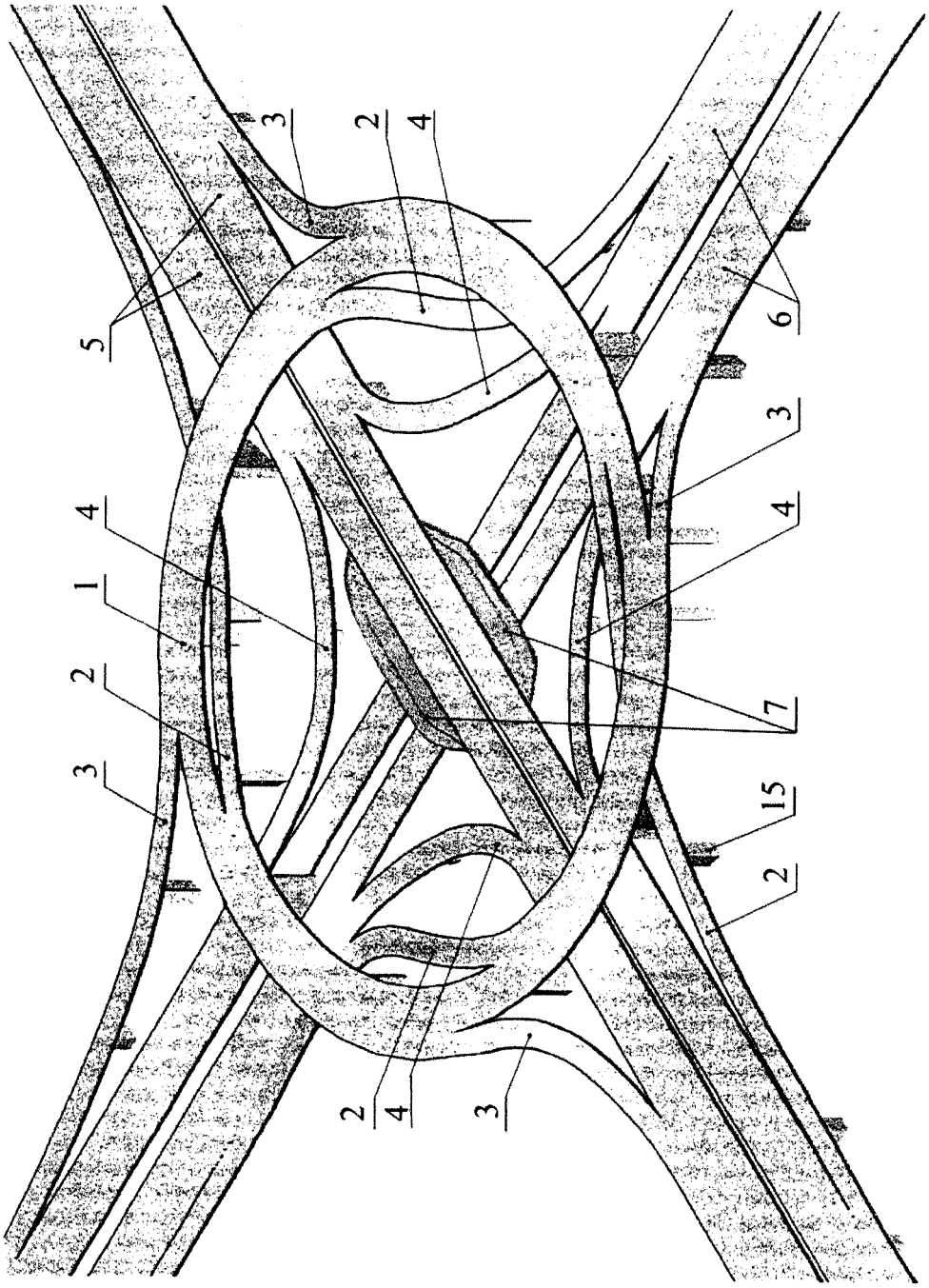


Fig. 2

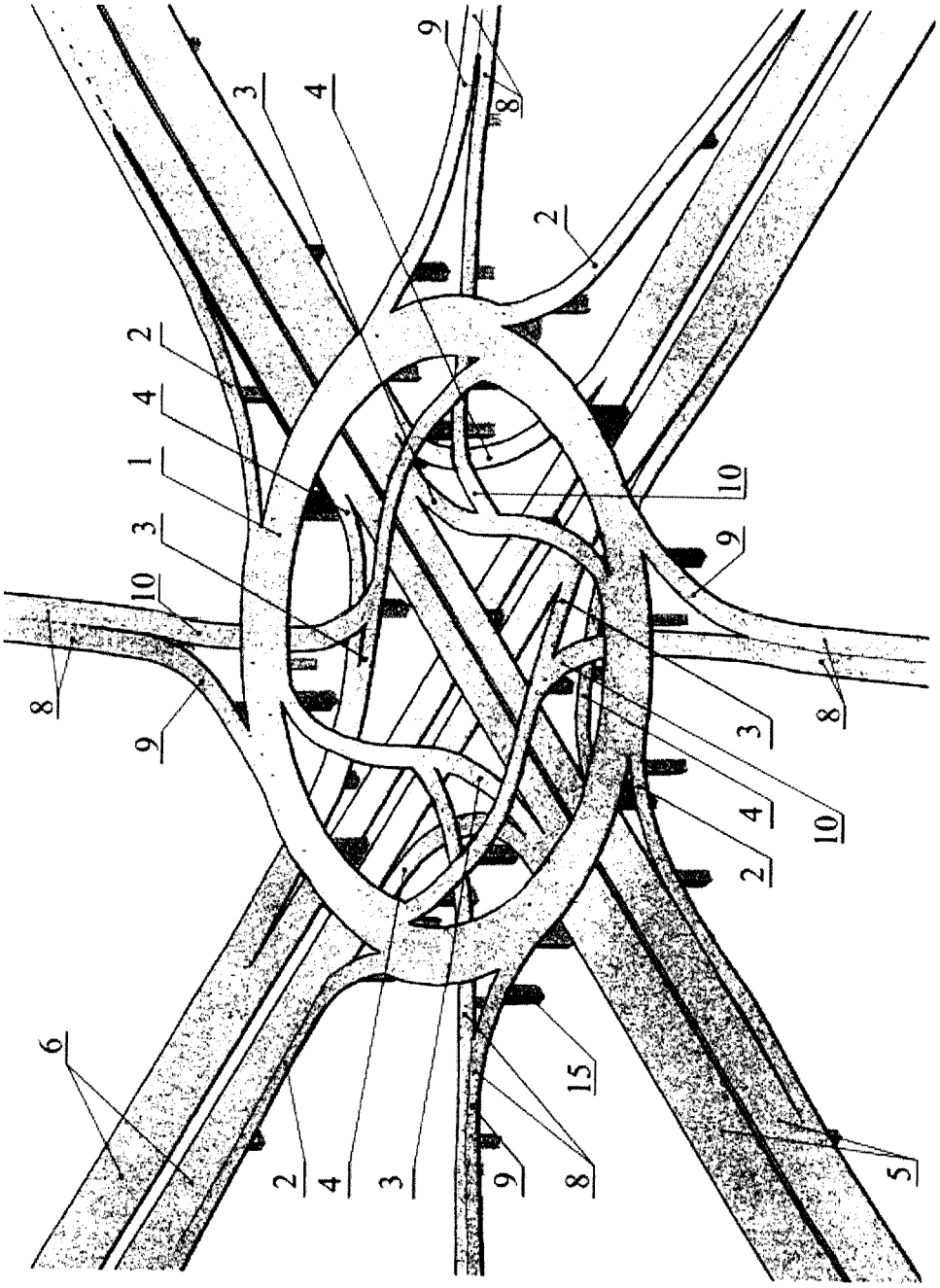


Fig. 3

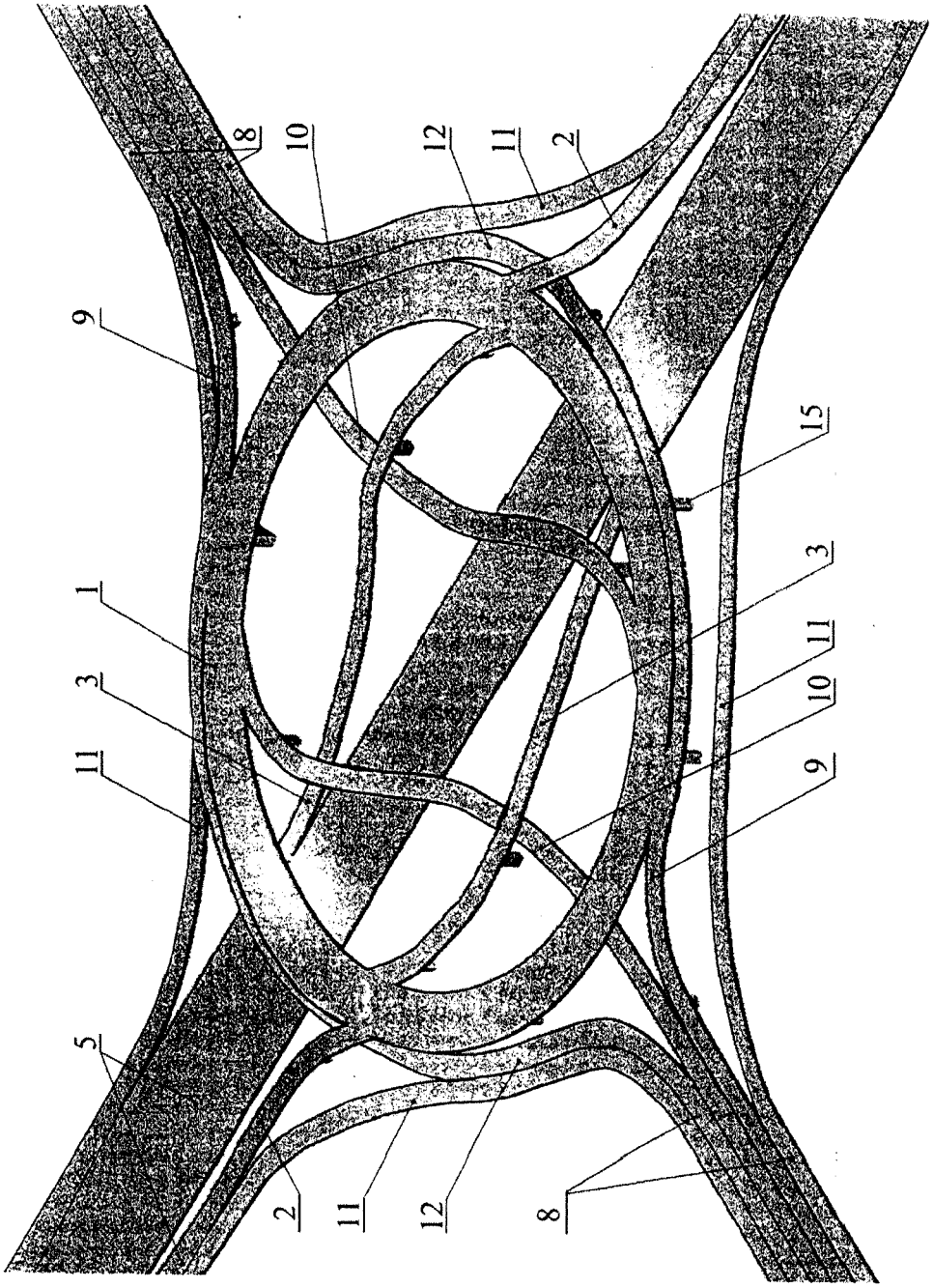


Fig. 4

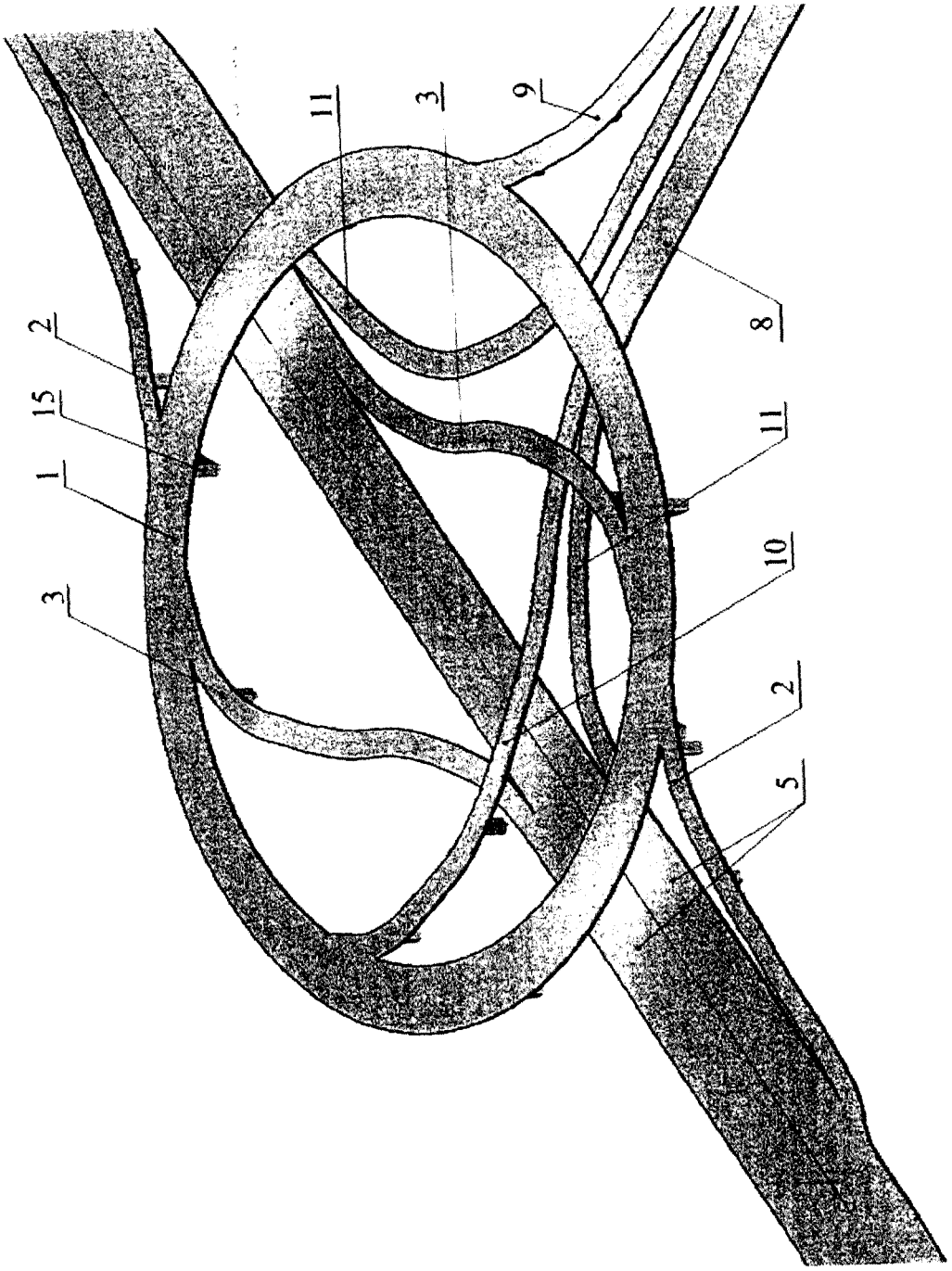
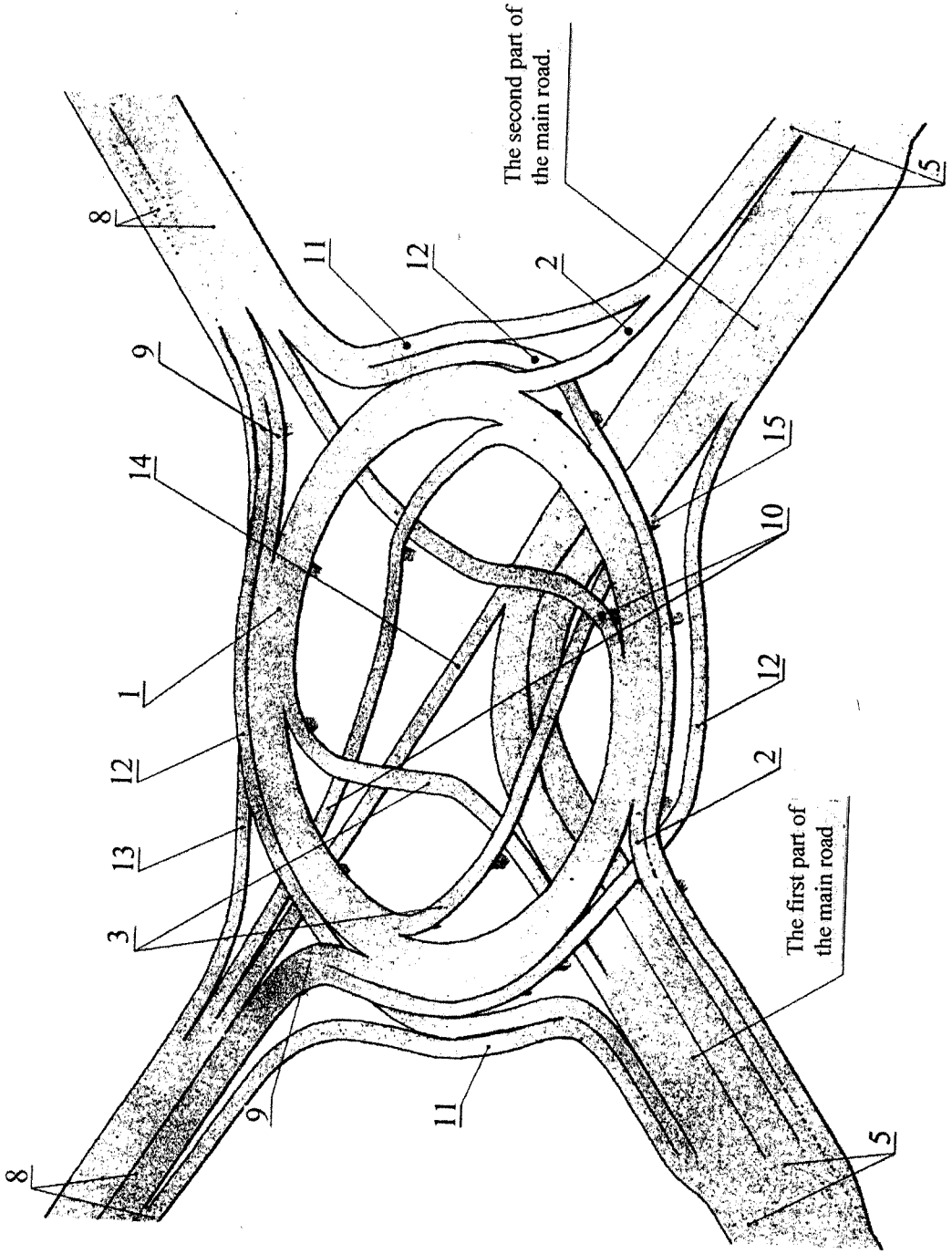


Fig. 5


The second part of the main road.
The first part of the main road
1
2
3
5
8
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13
14
15

Fig. 6

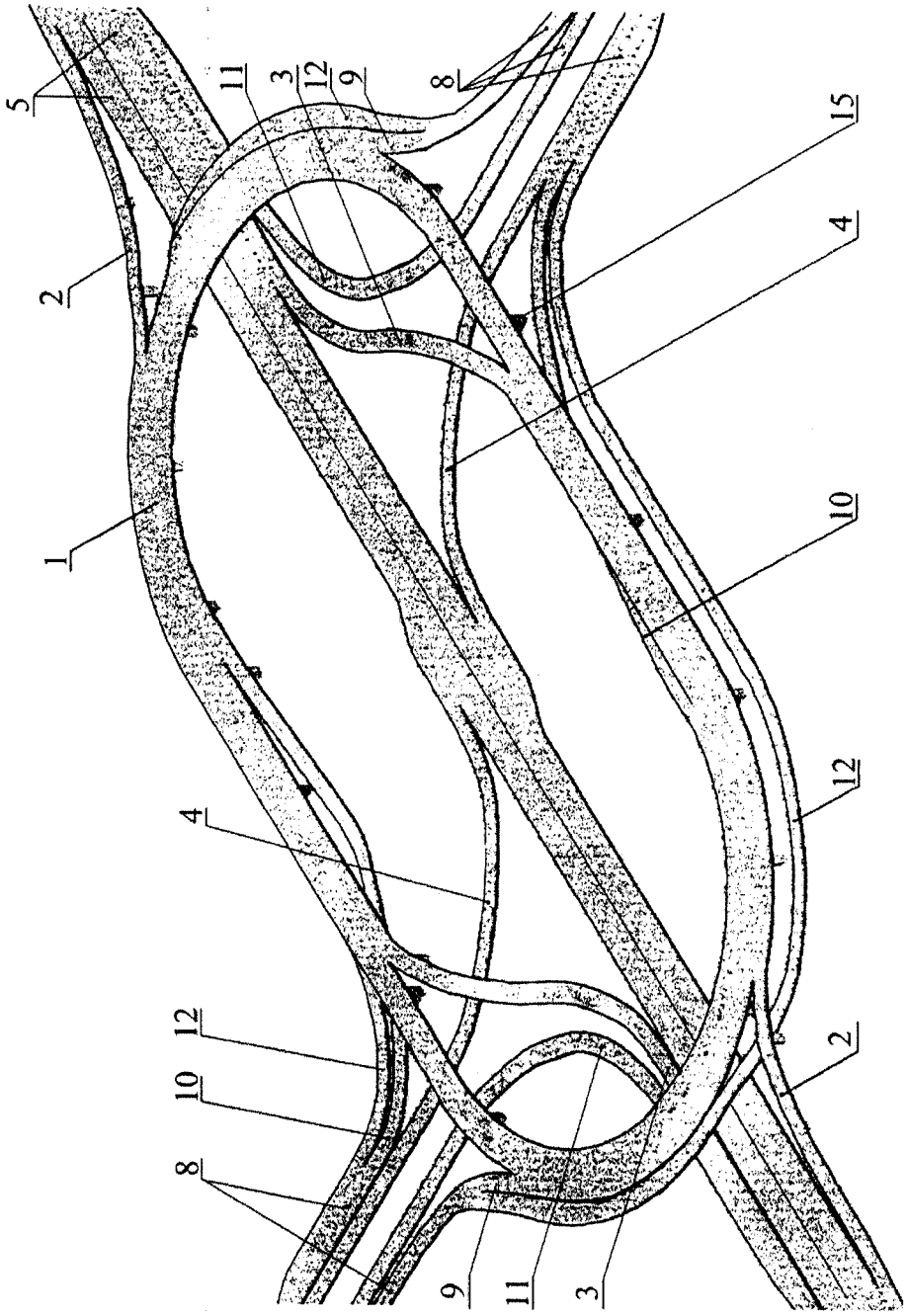

Fig. 7

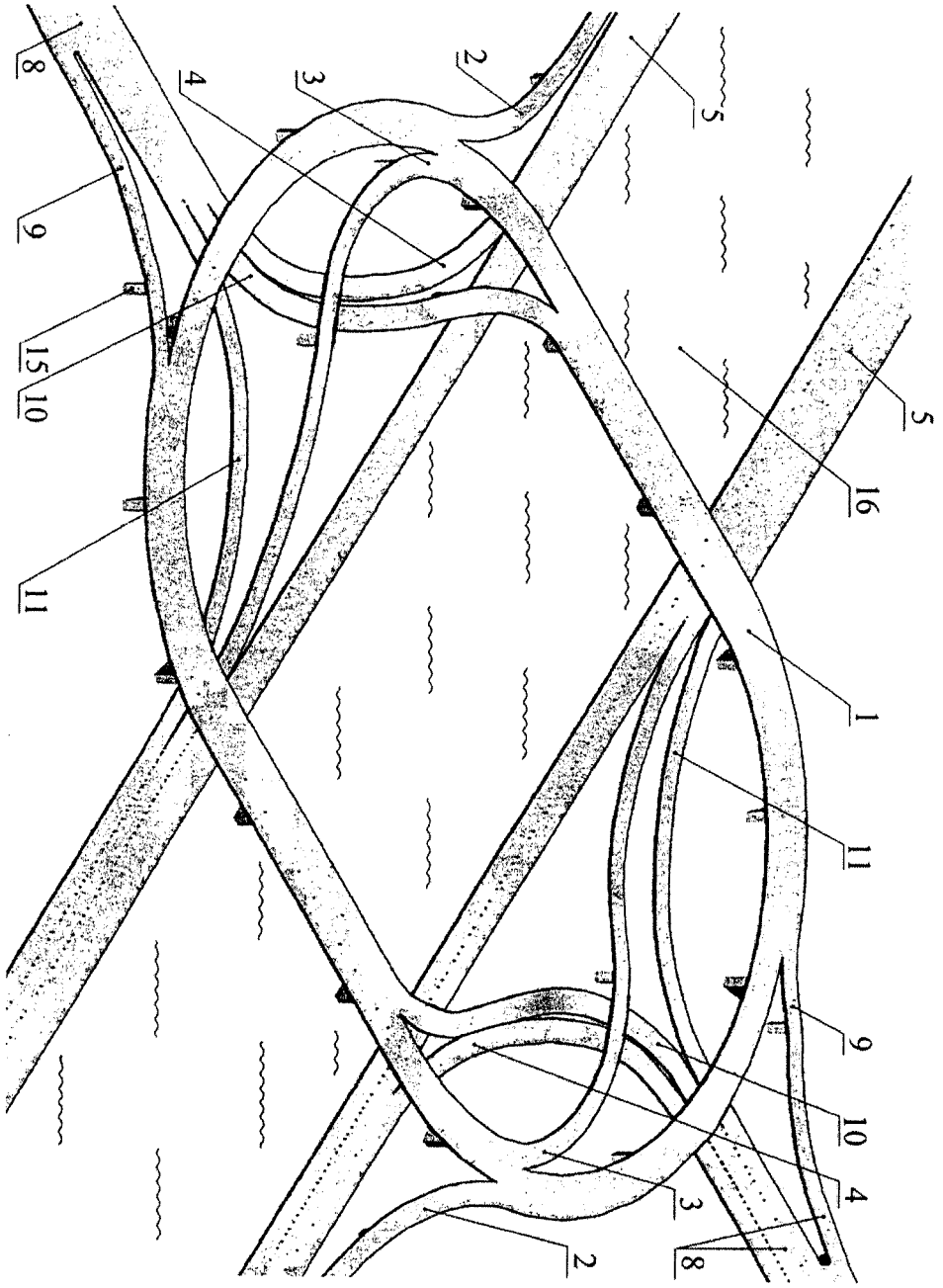

Fig. 8

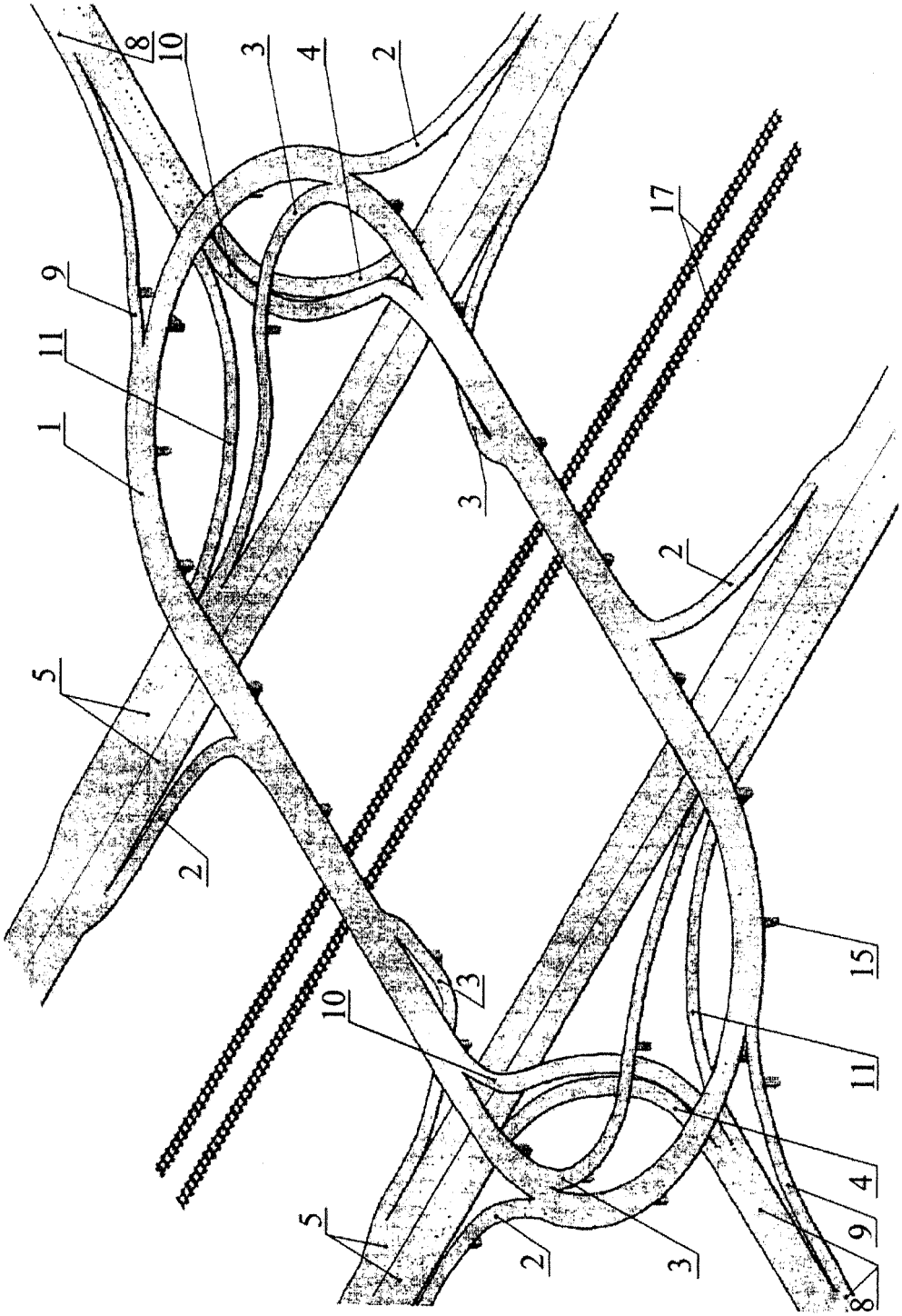

Fig. 9

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 2008102190 A1 **[0002]**
- US 3847496 A **[0005]**