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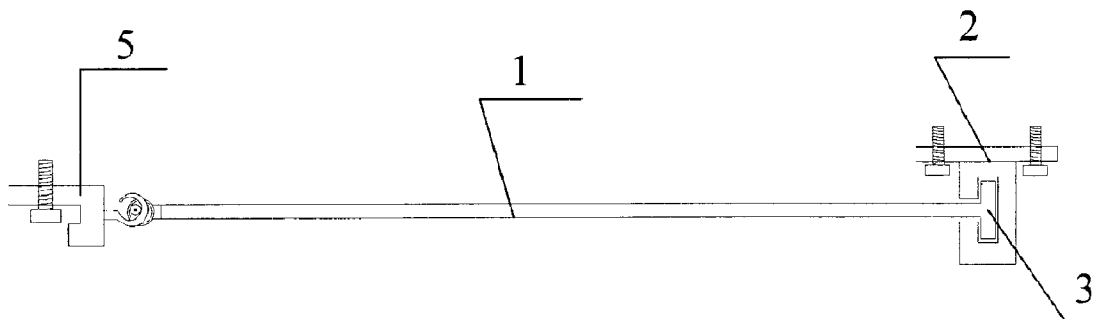
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(54) Titre : VOLET ROULANT COUPE-FEU A TUNNEL D'UN NOUVEAU TYPE

(54) Title: NOVEL TUNNEL FIREPROOF ROLLER SHUTTER



(57) **Abrégé/Abstract:**

The present invention relates to a novel tunnel fireproof roller shutter, comprising a front-end fixed component, more than two slats, a rear-end fixed component and a triggering device; the front-end fixed component and the rear-end fixed component are both fixedly installed on the ceiling and the wall of a tunnel; one end of each of the slats is connected with the front-end fixed component; the other end of each of the slats is connected with the rear-end fixed component; and the slats are partly overlaid in turn. The triggering device is installed on the wall of the tunnel, and connected with the slats through the rear-end fixed component. The quantity of the fireproof roller shutters in a tunnel can be determined according to the actual length and demands of the tunnel. The present invention is low in cost and low in service and maintenance fees, simple in structure, light, convenient and flexible, and is conveniently easily installed and used; as a pure mechanical structure, the novel tunnel fireproof roller shutter is easily manufactured, low in fault rate, safe, reliable, energy-saving, environmentally-friendly, conveniently operated and capable of quickly blocking the fire and smoke in time to facilitate escape.

Abstract

The present invention relates to a novel tunnel fireproof roller shutter, comprising a front-end fixed component, more than two slats, a rear-end fixed component and a triggering device; the front-end fixed component and the rear-end fixed component are both fixedly installed on the ceiling and the wall of a tunnel; one end of each of the slats is connected with the front-end fixed component; the other end of each of the slats is connected with the rear-end fixed component; and the slats are partly overlaid in turn. The triggering device is installed on the wall of the tunnel, and connected with the slats through the rear-end fixed component. The quantity of the fireproof roller shutters in a tunnel can be determined according to the actual length and demands of the tunnel. The present invention is low in cost and low in service and maintenance fees, simple in structure, light, convenient and flexible, and is conveniently easily installed and used; as a pure mechanical structure, the novel tunnel fireproof roller shutter is easily manufactured, low in fault rate, safe, reliable, energy-saving, environmentally-friendly, conveniently operated and capable of quickly blocking the fire and smoke in time to facilitate escape.

Description

Novel Tunnel Fireproof Roller Shutter

Technical Field

5 The present invention relates to a novel tunnel fireproof roller shutter.

Description of the Related Art

A tunnel fireproof roller shutter special for expressways are a steel fireproof roller shutters with escape doors. The slats of all roller shutters tend to slip out of the rails, and the escape
10 doors tend to falling and even collapse. The fireproof roller shutter is high in manufacturing and installation cost, is limited in the installation position, fails to form a sufficient and ideal fireproof area, and in use, is every high in service and maintenance cost. The steel roller shutter is every heavy, and cannot raise and lower flexibly when a fire occurs, thus causing failures to block the fire and smoke when the fire occurred in tunnels, even resulting in smoke and fire all
15 over the tunnel and causing massive death and injuries.

Detailed Contents of the Present Invention

The technical problem to be solved by the present invention is to provide a simply structured, light and convenient novel tunnel fireproof roller shutter, which can quickly and
20 effectively divide the fire field into independent areas to make an area or an adjacent tunnel with small or without fire as an emergency rescue shelter.

The technical solution employed by the present invention to solve the technical problem above is as follows. A novel tunnel fireproof roller shutter, includes a front-end fixed component, more than two slats, a rear-end fixed component and a triggering device; the
25 front-end fixed component and the rear-end fixed component are both fixedly installed on the

ceiling and the wall of a tunnel; one end of each of the slats is connected with the front-end fixed component; the other end of each of the slats is connected with the rear-end fixed component; the slats are partly overlaid in turn; and the triggering device is installed on the wall of the tunnel, and connected with the slabs through the rear-end fixed component.

5 The present invention has the following beneficial effects:

1. The present invention is low in cost and low in service and maintenance fees, simple in structure, light, convenient and flexible, and is conveniently easily installed and used; as a pure mechanical structure, the novel tunnel fireproof roller shutter is easily manufactured, low in fault rate, safe, reliable, energy-saving, environmentally-friendly, conveniently operated and
10 capable of quickly blocking the fire and smoke in time to facilitate escape. In the case of no fire, the roller shutter is hooked, not affecting the ventilation and is aesthetically pleasing.

2. When a fire occurs, the slats droop to the ground. After the slats droop to the ground, the previous slats overlays the next ones one by one in succession, thus playing a better sealing role and effectively blocking the spread of the smoke.

15 Based on the above technical solution, the present invention can be improved in the following way.

Further, the front-end fixed component includes a front-end fixed guide rail, T-shaped slat fixtures and a guide rail tail fastener; the front-end fixed component is fixedly installed on the ceiling and wall of the tunnel through bolts; the quantity of the T-shaped slat fixtures is
20 matched with the quantity of the slats; the slats are fixedly connected with the T-shaped slat fixtures; the slats are inserted into the front-end fixed guide rail and connected with the front-end fixed guide rail through the T-shaped slat fixtures; the guide rail tail fastener is respectively connected with two ends of the front-end fixed guide rail to close the two ends of the front-end fixed guide rail.

25 The beneficial effects of the above technical effects are as follows: the guide rail tail

fastener is respectively connected with the two ends of the front-end fixed guide rail to close the two ends of the front-end fixed guide rail, thus preventing the T-shaped slat fixtures from sliding out.

Further, the front-end fixed guide rail, the T-shaped slat fixtures and the guide rail tail fastener are all made from steel or aluminum alloy.

Further, the rear-end fixed component includes a rear-end fixed guide rail, rear-end slat fixtures and safety fuses with steel wires; the rear-end fixed guide rail is fixedly installed at the ceiling and wall of the tunnel through bolts; the quantity of the rear-end slat fixtures are matched with the quantity of the slats; the slats are fixedly connected with the rear-end slat fixture; the rear-end slat fixtures are provided with round pipes; one end of each of the safety fuses with steel wires is fixedly connected with the rear-end fixed guide rail; the other end passes the round pipes in turn and then is connected with the triggering device; the rear-end fixed guide rail is provided with more than two hooks ; and the slats are hooked in corresponding hooks through the exposed parts of the safety fuses with a steel wire between adjacent slats and then are connected with the rear-end fixed guide rail .

Further, the rear-end fixed guide rail and the rear-end slat fixtures are both made from steel or aluminum alloy.

Further, the triggering device includes a wire holder and a fire hydrant; the wire holder is positioned in fire hydrant; the fire hydrant is installed on the wall of the tunnel; and the safety fuses with the steel wires are connected with the wire holder.

Further, the wire holder includes a wire holding box, a bracket and a handle; the wire holding box is positioned in the fire hydrant; the bracket is located in the wire holding box; the handle is partly located in the wire holding box and is connected with the bracket; and one end of each of the safety fuses with the steel wires passes through the bracket and droops to the tunnel ground.

The operations of the triggering device can be classified into two types, namely manual triggering and automatic triggering, when a fire occurs.

1. Automatic triggering

When a fire occurs, the fire ignites the safety fuses with the steel wires. The safety fuses
5 are quickly exhausted. When the safety fuses with the steel wires only have the steel wires left, the diameter is greatly reduced. At this time, the gap between the bracket and the steel wires increase. By the gravity effect of the slats, the pulling force is far greater than the friction force between the bracket and the steel wire, and then the steel wires are automatic extracted from the bracket. Without the pulling force, the slats automatically drop off from the hooks of the
10 rear-end fixed guide rail and droops down automatically, thereby closing the fire field.

2. Manual triggering

When a fire just occurs and does not reach and ignite the safety fuse, the handle can be manually pulled down. When the handle is pulled down, the bracket releases, and the safety fuses with the steel wires are automatically extracted from the bracket by the effect of the
15 pulling force, so that the slats drop off, droop and close the tunnel.

Further, the slats are all made from high-temperature resistant, fireproof and flame-retarding materials.

Further, the high-temperature resistant, fireproof and flame-retarding materials are alkali-free glass fiber cloth.

20 The content of the alkali-free glass fiber R_2O is less than 0.8%, and the glass fiber is an alumina borosilicate element. The alkali-free glass fiber features high chemical stability, electric insulation and strength. The alkali-free glass fiber cloth is fireproof cloth formed by treatment with high-temperature-resistant, non-toxic and fireproof glue coatings. The alkali-free glass fiber cloth is the optimal fireproof material for manufacturing the fireproof
25 protector, flame-retarding and heat-insulating materials and fireproof roller shutters. The

alkali-free glass fiber cloth has advantages of non-combustion, high temperature resistance, no toxic gas emission, high heat insulation, fuselessness or no dropping, high strength and no heat shrinkage, etc.

The quantity of the slats can be set according to the specific length and the field situations
5 of a tunnel.

Description of Several Views of the Attached Drawings

FIG. 1 is a structural view of a novel tunnel fireproof roller shutter in a released state of the present invention.

10 FIG. 2 is a structural view of a novel tunnel fireproof roller shutter in a hooked state of the present invention.

FIG. 3 is a structural view of overlaid slats of the novel tunnel fireproof roller shutter of the present invention.

FIG. 4 is a structural view of a front-end fixed guide rail of the novel tunnel fireproof
15 roller shutter of the present invention.

FIG. 5 is a lateral sectional view of FIG. 4.

FIG. 6 is a structural view of a T-shaped slat fixture of the novel tunnel fireproof roller shutter of the present invention.

FIG. 7 is a lateral sectional view of FIG. 6.

20 FIG. 8 is a schematic view of connection between slats and the T-shaped slat fixture of the novel tunnel fireproof roller shutter of the present invention.

FIG. 9 is a lateral sectional view of FIG. 8.

FIG. 10 is a schematic view of connection between the front-end fixed guide rail and the T-shaped slat fixture of the novel tunnel fireproof roller shutter of the present invention.

25 FIG. 11 is a structural view of a guide rail tail fastener of the novel tunnel fireproof roller

shutter of the present invention.

FIG. 12 is a structural view of a rear-end fixed guide rail of the novel tunnel fireproof roller shutter of the present invention.

FIG. 13 is a lateral sectional view of FIG. 12.

5 FIG. 14 is a structural view of a rear-end slat fixture of the novel tunnel fireproof roller shutter of the present invention.

FIG. 15 is a structural view of connection between the rear-end slat fixture and slats as well as a safety fuse with a steel wire of the novel tunnel fireproof roller shutter of the present invention.

10 FIG. 16 is a structural view of connection between the rear-end fixed guide rail and slats of the novel tunnel fireproof roller shutter of the present invention.

FIG. 17 is a structural view of connection between hooked slats and hooks of the novel tunnel fireproof roller shutter of the present invention.

FIG. 18 is a structural view of the novel tunnel fireproof roller shutter of the present invention, wherein all slats are hooked.

FIG. 19 is a front bottom view of the novel tunnel fireproof roller shutter of the present invention, wherein all slats are hooked.

FIG. 20 is a structural view of a triggering device of the novel tunnel fireproof roller shutter of the present invention.

20 FIG. 21 is a structural view of connection among the triggering device, the safety fuse with the steel wire and the last hook at the rear-end fixed guide rail of the novel tunnel fireproof roller shutter of the present invention.

Below is a list of parts marked with numbers in the drawings:

1. Slat; 2. front-end fixed guide rail; 3. T-shaped slat fixture; 4. guide rail tail fastener; 5.
25 rear-end fixed guide; 6. rear-end slat fixture; 7. safety fuse with a steel wire; 8. pipe; 9. hook;

10. fire hydrant; 11. wire holding box; 12. bracket; 13. handle.

Detailed Description of the Present Invention

5 The principle and characteristic of the present invention are described in conjunction with the attached drawings. Embodiments here are used for explaining the present invention, not limiting the scope of the present invention.

10 A novel tunnel fireproof roller shutter, as shown in FIG. 1-21, includes a front-end fixed component, more than two slats , a rear-end fixed component and a triggering device. The front-end fixed component and the rear-end fixed component are both fixedly installed on the ceiling and the wall of a tunnel. One end of each of the slats 1 is connected with the front-end fixed component; the other end of each of the slats 1 is connected with the rear-end fixed component; and the slats 1 are partly overlaid in turn. The triggering device is installed on the wall of the tunnel, and is connected with the slats through the rear-end fixed component.

15 The front-end fixed component includes a front-end fixed guide rail 2, T-shaped slat fixtures 3 and a guide rail tail fastener 4. The front-end fixed component 2 is fixedly installed on the ceiling and wall of the tunnel through bolts. The quantity of the T-shaped slat fixtures 3 is matched with the quantity of the slats 1, and the slats 1 are fixedly connected with the T-shaped slat fixtures 3. The slats 1 are inserted into the front-end fixed guide rail 2 and connected with the front-end fixed guide rail 2 through the T-shaped slat fixtures 3. The guide rail tail fastener 4 is respectively connected with two ends of the front-end fixed guide rail 2 to close the two ends of the front-end fixed guide rail 2.

20

The front-end fixed guide rail 2, the T-shaped slat fixtures 3 and the guide rail tail fastener 4 are all made from steel or aluminum alloy.

25 The rear-end fixed component includes a rear-end fixed guide rail 5, rear-end slat fixtures

6 and safety fuses 7 with steel wires. The rear-end fixed guide rail 5 is fixedly installed at the ceiling and wall of the tunnel through bolts. The quantity of the rear-end slat fixtures 6 are matched with the quantity of the slats 1, and the slats 1 are fixedly connected with the rear-end slat fixture 6; the rear-end slat fixtures 6 are provided with round pipes 8. One end of each of the safety fuses with steel wires 7 is fixedly connected with the rear-end fixed guide rail 5, and the other end passes the round pipes 8 in turn and then is connected with the triggering device. The rear-end fixed guide rail 5 is provided with more than two hooks 9. The slats 1 are hooked in corresponding hooks 9 through the exposed parts of the safety fuses 7 with a steel wire between adjacent slats 1 and then are connected with the rear-end fixed guide rail 5.

10 The rear-end fixed guide rail 5 and the rear-end slat fixtures 6 are both made from steel or aluminum alloy.

The triggering device includes a wire holder and a fire hydrant 10. The wire holder is positioned in fire hydrant 10. The fire hydrant 10 is installed on the wall of the tunnel. The safety fuses 7 with the steel wires are connected with the wire holder.

15 The wire holder includes a wire holding box 11, a bracket 12 and a handle 13. The wire holding box 11 is positioned in the fire hydrant 10. The bracket 12 is located in the wire holding box 11. The handle 13 is partly located in the wire holding box 11 and is connected with the bracket 12. One end of each of the safety fuses 7 with the steel wires passes through the bracket 12 and droops to the tunnel ground.

20 In the case of no fire, the roller shutter is hooked, not affecting the ventilation and is aesthetically pleasing. When a fire occurs, the slats 1 droop to the ground. After the slats 1 droops to the ground, the previous slats overlays the next ones one by one in succession, thus playing a better sealing role and effectively blocking the spread of the smoke.

The operations of the triggering device can be classified into two types, namely manual triggering and automatic triggering, when a fire occurs.

1. Automatic triggering

When a fire occurs, the fire ignites the safety fuses 7 with the steel wires. The safety fuses are quickly exhausted. When the safety fuses 7 with the steel wires only have the steel wires left, the diameter is greatly reduced. At this time, the gap between the bracket 12 and the steel wires increase. By the gravity effect of the slats 1, the pulling force is far greater than the friction force between the bracket 12 and the steel wire, and then the steel wires are automatic extracted from the bracket 12. Without the pulling force, the slats 1 automatically drop off from the hooks 9 of the rear-end fixed guide rail 5 and droops down automatically, thereby closing the fire field.

2. Manual triggering

When a fire has just occurred and has not reached and ignited the safety fuse, the handle 13 can be manually pulled down. When the handle 13 is pulled down, the bracket 12 releases, and the safety fuses 7 with the steel wires are automatically extracted from the bracket 12 by the effect of the pulling force, so that the slats 1 drop off, droop and close the tunnel.

The above embodiments are only preferred embodiments of the present invention and shall not be regarded as limit of the present invention. Any modifications, equivalent changes and improvement made within the concept and principle of the present invention shall fall within the protective scope of the present invention.

Claims

1. A novel tunnel fireproof roller shutter, comprising a front-end fixed component, more than two slats, a rear-end fixed component and a triggering device, wherein the front-end fixed component and the rear-end fixed component are spaced apart along a length of a ceiling and a wall of a tunnel and both fixedly installed on the ceiling and the wall of the tunnel; one end of each of the slats is connected with the front-end fixed component, and the other end of each of the slats is connected with the rear-end fixed component; the slats are partly overlaid in turn; the triggering device is installed on the wall of the tunnel, and connected with the slats through the rear-end fixed component; the rear-end fixed component comprises a rear-end fixed guide rail, rear-end slat fixtures and safety fuses with steel wires; the quantity of the rear-end slat fixtures are matched with the quantity of the slats; the slats are fixedly connected with the rear-end slat fixture; the rear-end slat fixtures are provided with round pipes; one end of each of the safety fuses with steel wires is fixedly connected with the rear-end fixed guide rail, while the other end passes the round pipes in turn and then is connected with the triggering device; the rear-end fixed guide rail is provided with more than two hooks, and the slats are hooked in corresponding hooks through the exposed parts of the safety fuses with a steel wire between adjacent slats and then are connected with the rear-end fixed guide rail; the slats are installed against the ceiling and the wall of the tunnel in a hooked state, and the triggering device is configured to drop the slats to a released state.

2. The novel tunnel fireproof roller shutter according to claim 1, wherein the front-end fixed component includes a front-end fixed guide rail, T-shaped slat fixtures and a guide rail tail fastener; the front-end fixed guide rail is fixedly installed on the ceiling and wall of the tunnel through bolts; the quantity of the T-shaped slat fixtures is matched with the quantity of the slats; the slats are fixedly connected with the T-shaped slat fixtures; the slats are

inserted into the front-end fixed guide rail and connected with the front-end fixed guide rail through the T-shaped slat fixtures; and the guide rail tail fastener is respectively connected with two ends of the front-end fixed guide rail to close the two ends of the front-end fixed guide rail.

3. The novel tunnel fireproof roller shutter according to claim 2, wherein the front-end fixed guide rail is fixedly installed on the ceiling and wall of the tunnel through bolts.

4. The novel tunnel fireproof roller shutter according to claim 2 or 3, wherein the front-end fixed guide rail, the T-shaped slat fixtures and the guide rail tail fastener are all made from steel or aluminum alloy.

5. The novel tunnel fireproof roller shutter according to any one of claims 1 to 4, wherein the rear-end fixed guide rail is fixedly installed at the ceiling and wall of the tunnel through bolts.

6. The novel tunnel fireproof roller shutter according to any one of claims 1 to 5, wherein the rear-end fixed guide rail and the rear-end slat fixtures are both made from steel or aluminum alloy.

7. The novel tunnel fireproof roller shutter according to any one of claims 1 to 6, wherein the triggering device includes a wire holder and a fire box; the wire holder is positioned in the fire box; the fire box is installed on the wall of the tunnel; and the safety fuses with the steel wires are connected with the wire holder.

8. The novel tunnel fireproof roller shutter according to claim 7, wherein the wire holder includes a wire holding box, a bracket and a handle; the wire holding box is positioned in the fire box; the bracket is located in the wire holding box; the handle is partly located in the

wire holding box and is connected with the bracket; and one end of each of the safety fuses with the steel wires passes through the bracket and droops to the tunnel ground.

9. The novel tunnel fireproof roller shutter according to claim 8, configured for automatic triggering, wherein a fire ignites the safety fuses with the steel wires and the safety fuses are exhausted; when the safety fuses with the steel wires only have the steel wires left, a diameter is reduced, and a gap between the bracket and the steel wires increase; gravity force of the slats is greater than friction force between the bracket and the steel wire, and the steel wires are extracted from the bracket; and the slats drop off from the hooks of the rear-end fixed guide rail.

10. The novel tunnel fireproof roller shutter according to claim 8 or 9, configured for manual triggering, wherein the handle is pulled down, the bracket releases, and the safety fuses with the steel wires are extracted from the bracket by the effect of the pulling force; and the slats drop off from the hooks of the rear-end fixed guide rail.

11. The novel tunnel fireproof roller shutter according to any one of claims 1 to 10, wherein the slats are all made from high-temperature resistant, fireproof and flame-retarding materials.

12. The novel tunnel fireproof roller shutter according to claim 11, wherein the high-temperature resistant, fireproof and flame-retarding materials are alkali-free glass fiber.

Drawings of the Description

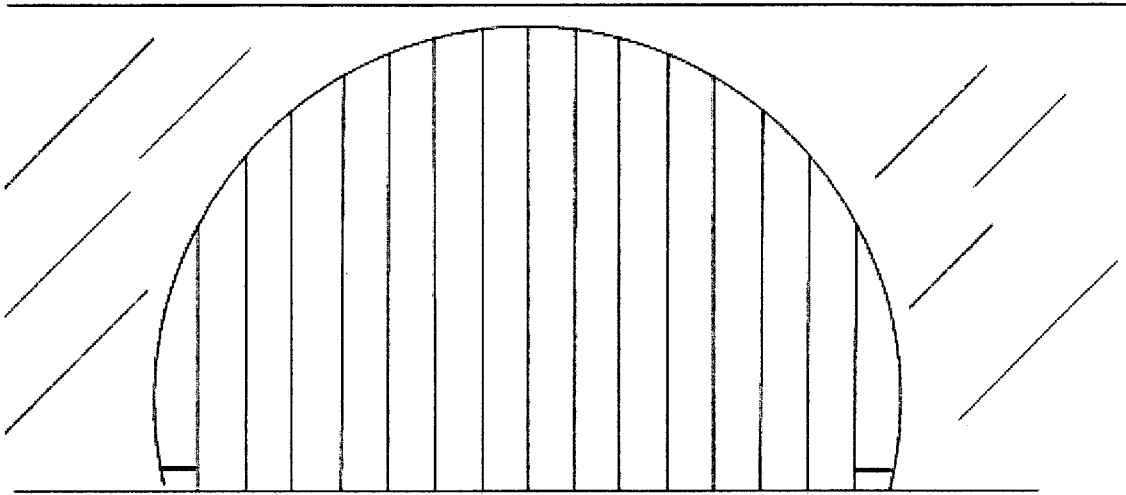


FIG. 1

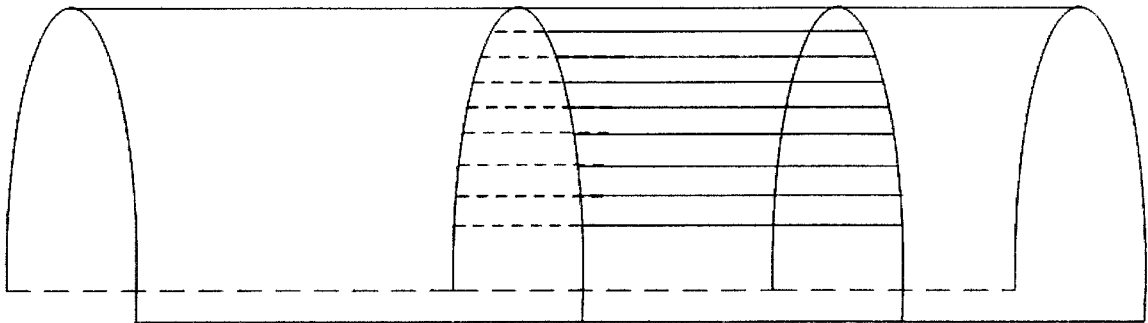


FIG. 2

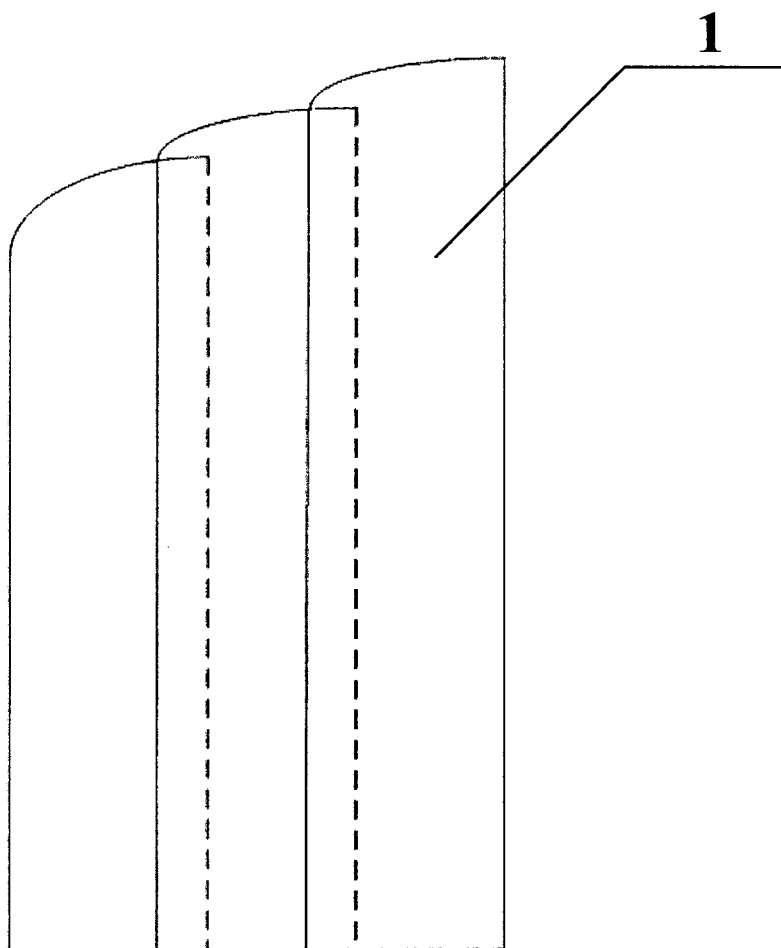


FIG. 3

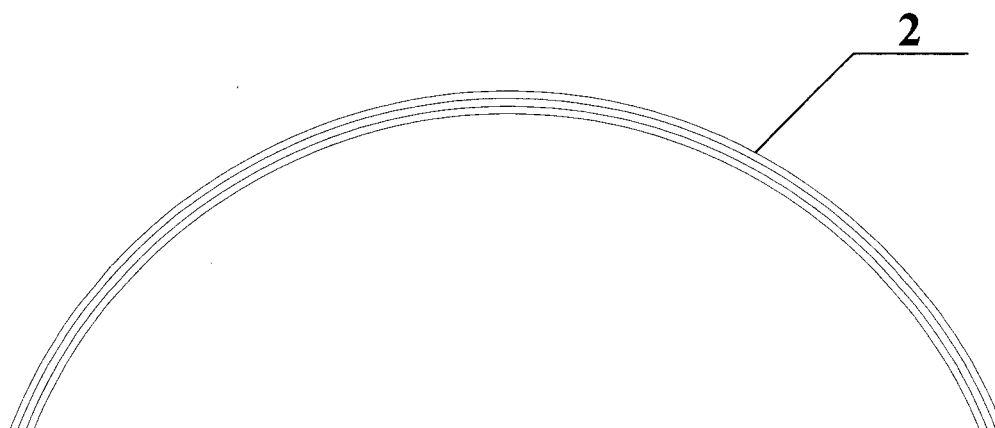


FIG. 4

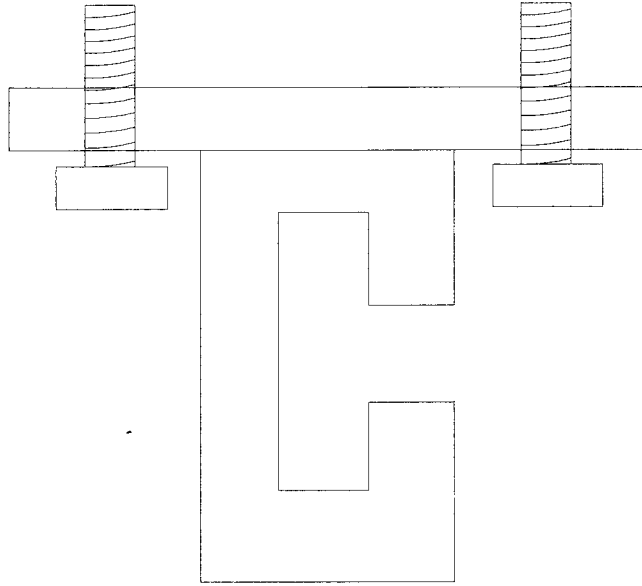


FIG. 5

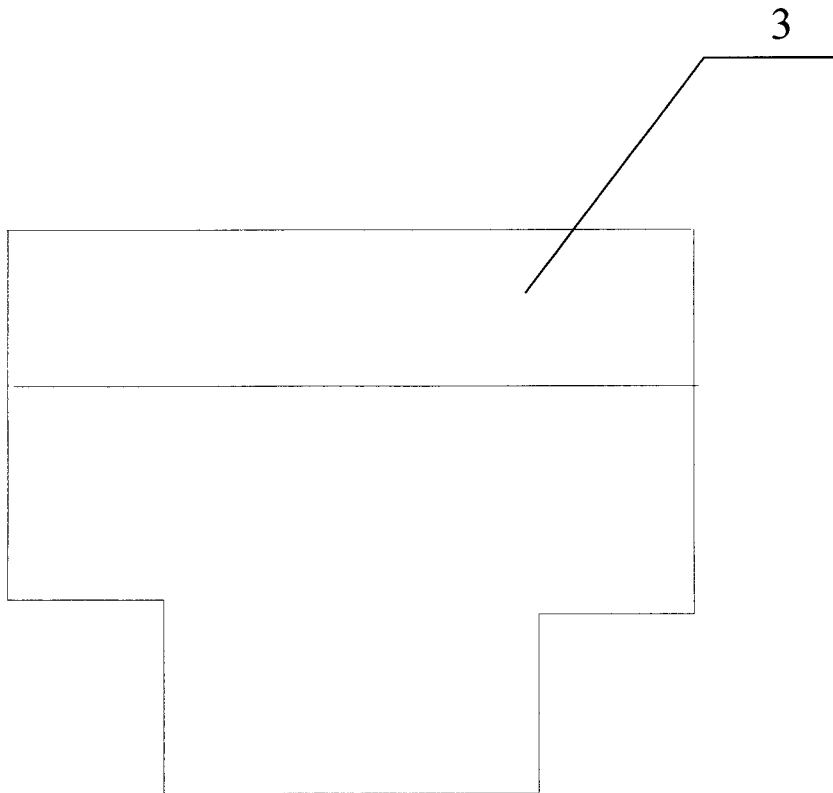


FIG. 6

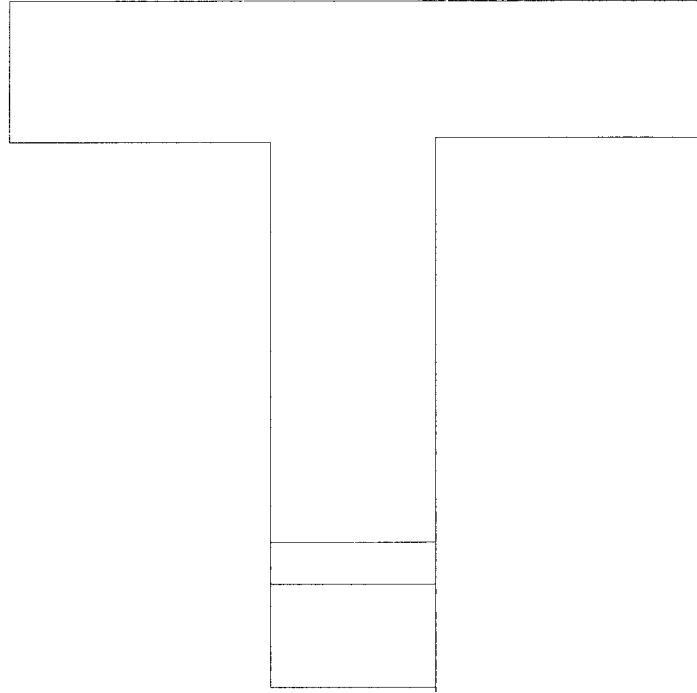


FIG. 7

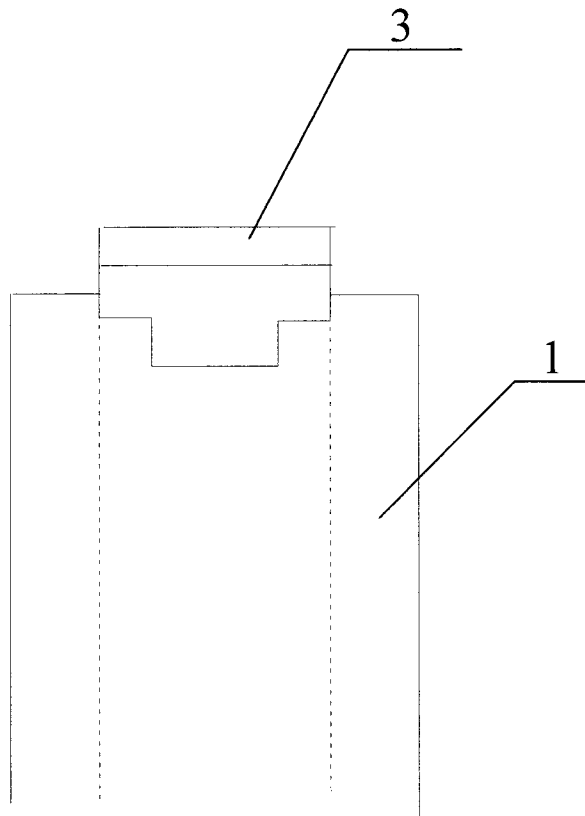


FIG. 8

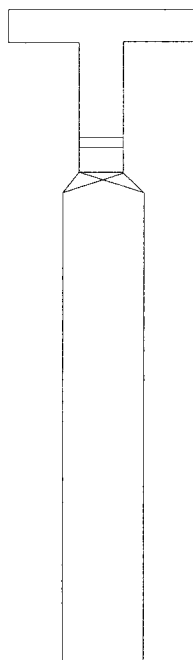


FIG. 9

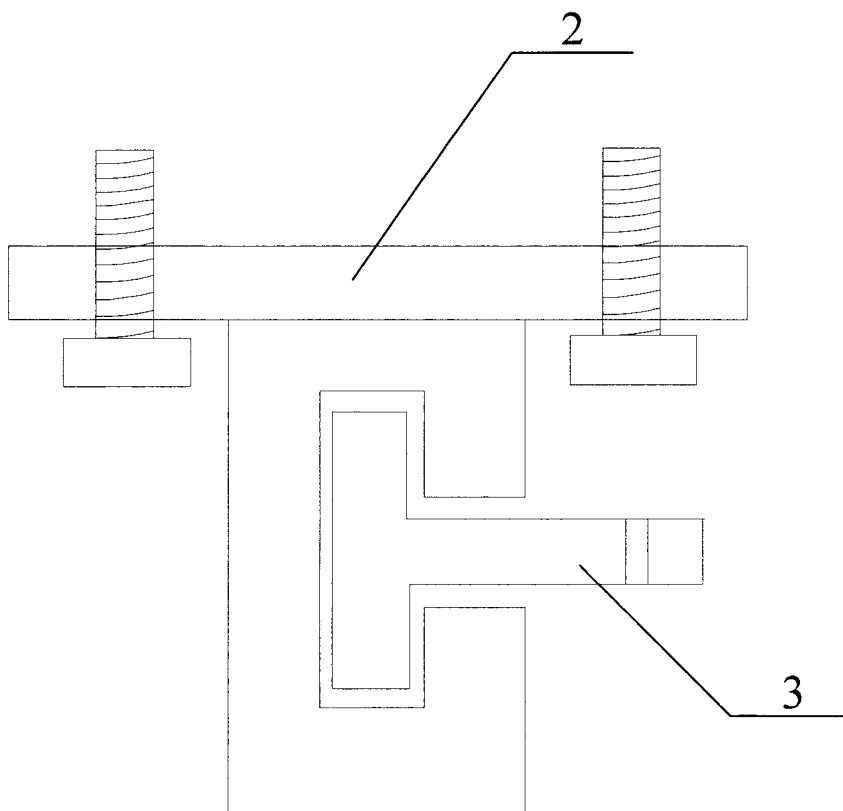


FIG. 10

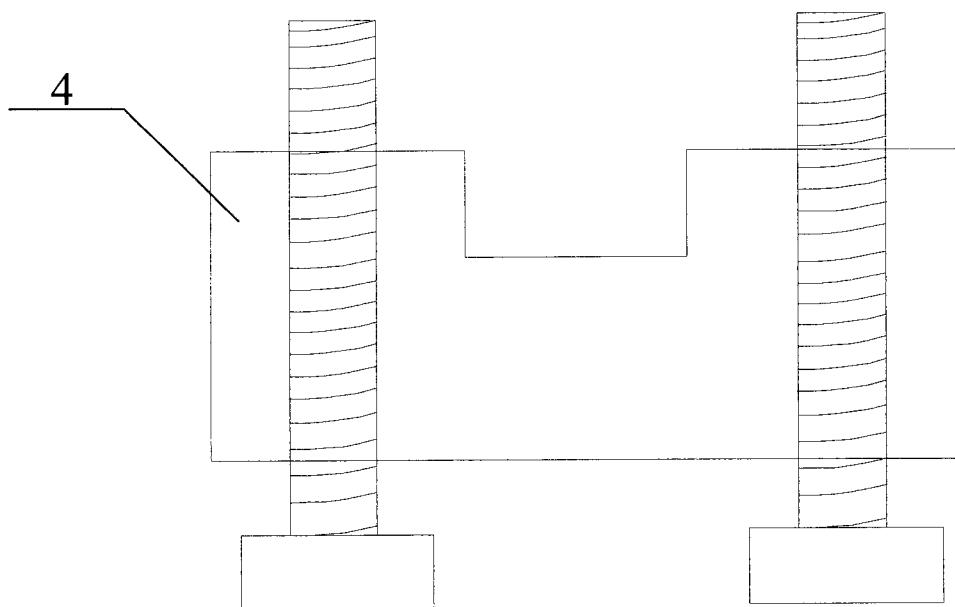


FIG. 11

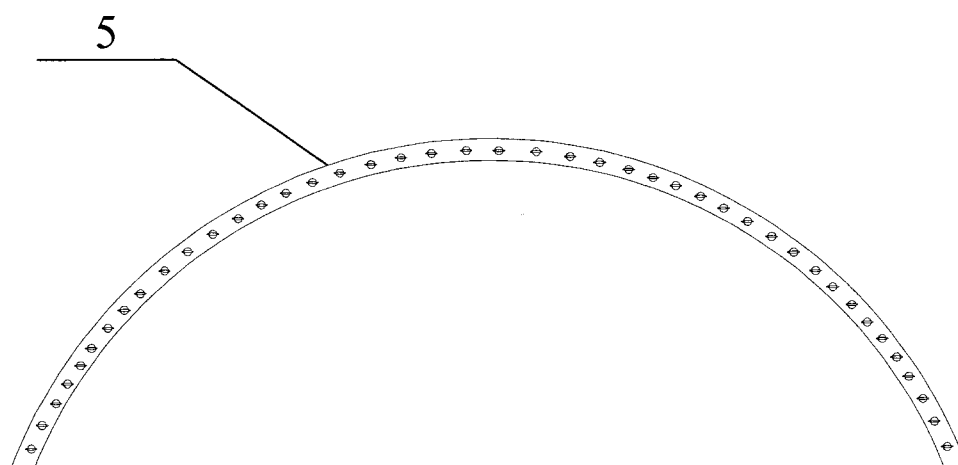


FIG. 12

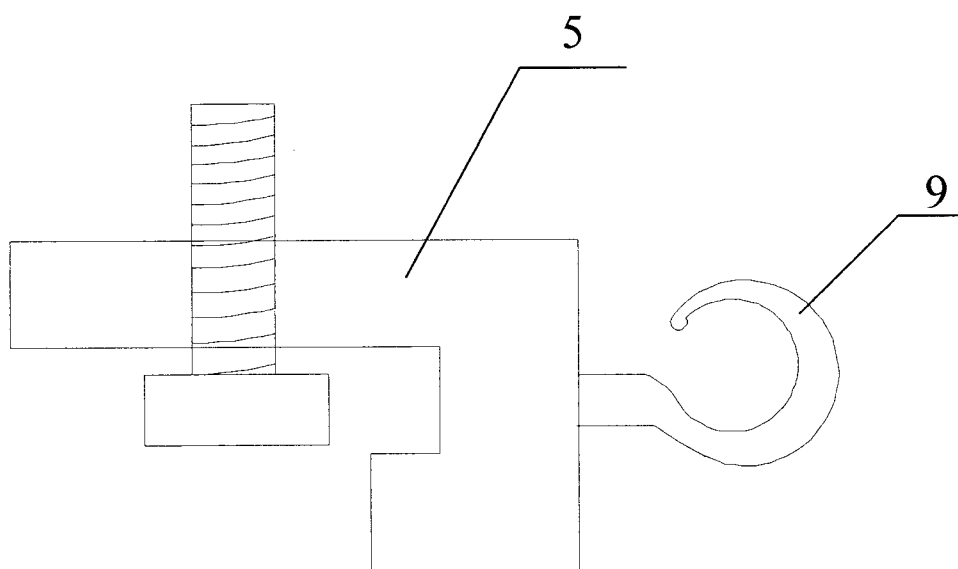


FIG. 13

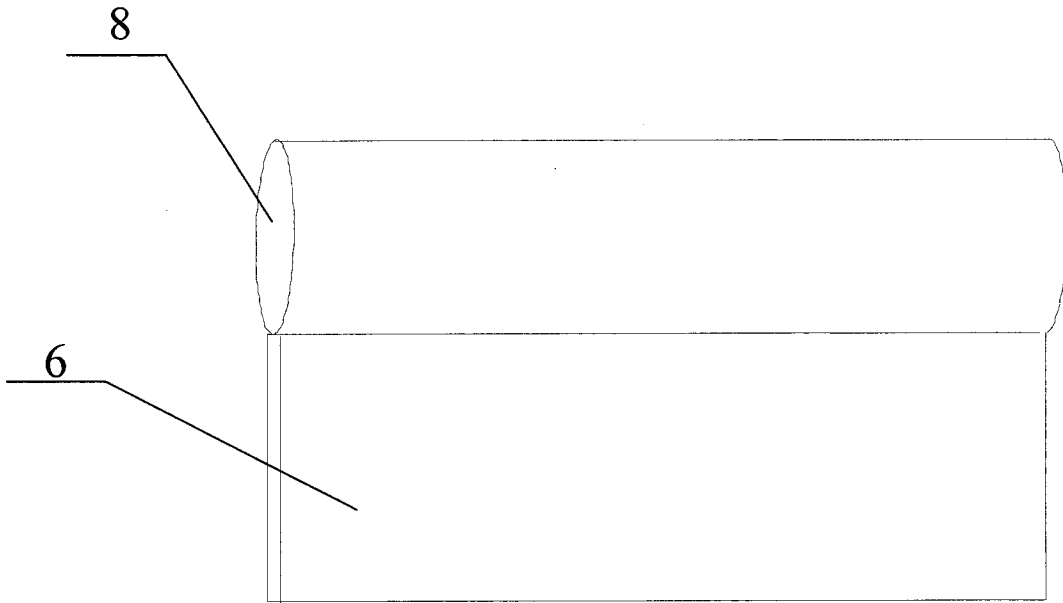


FIG. 14

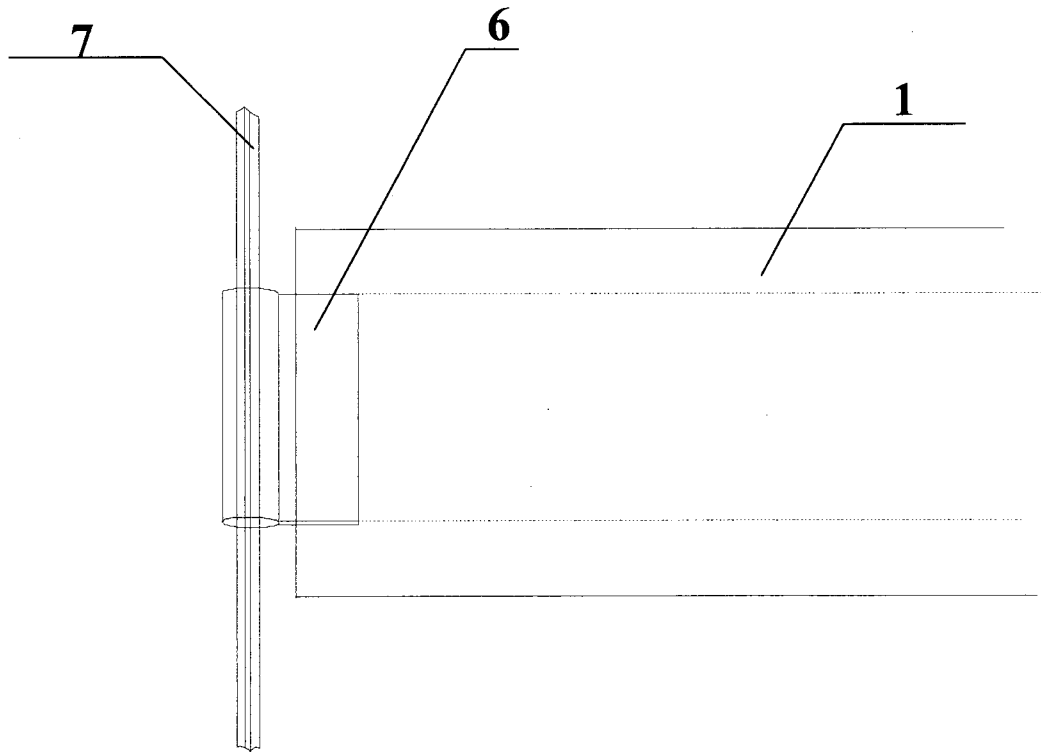


FIG. 15

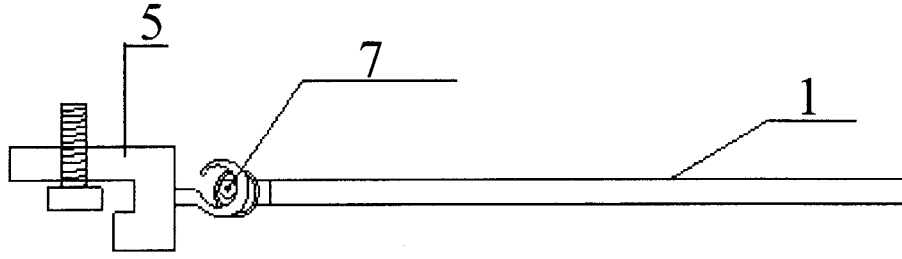


FIG. 16

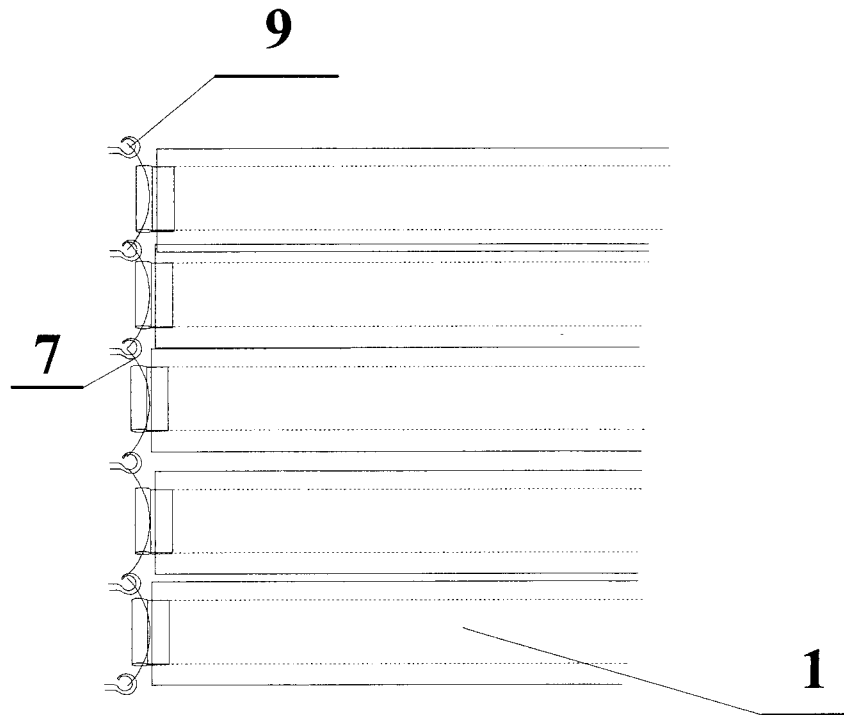


FIG. 17

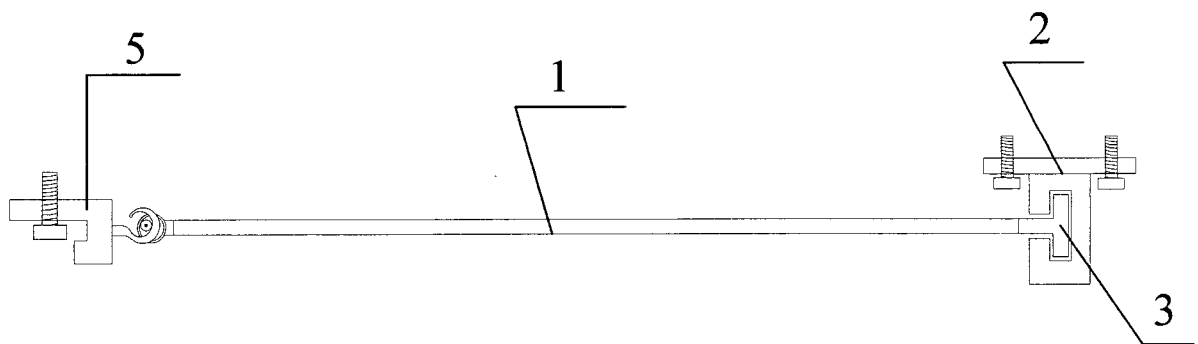


FIG. 18



FIG. 19

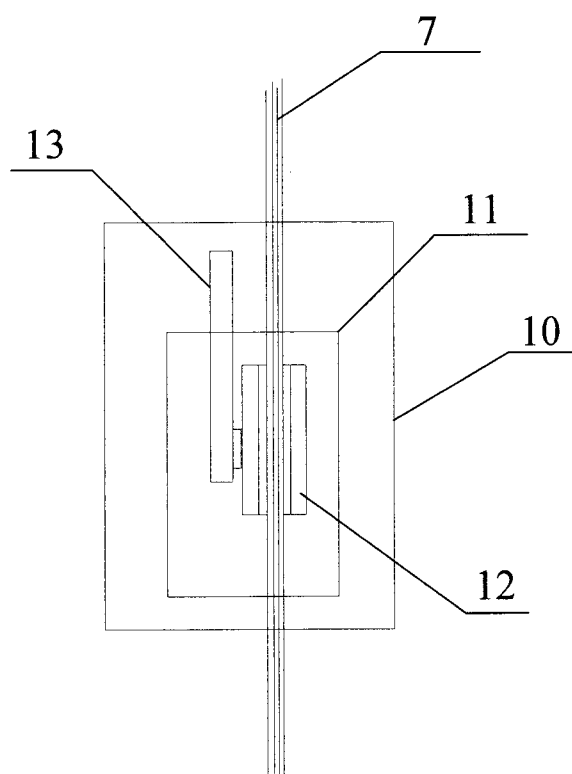


FIG. 20

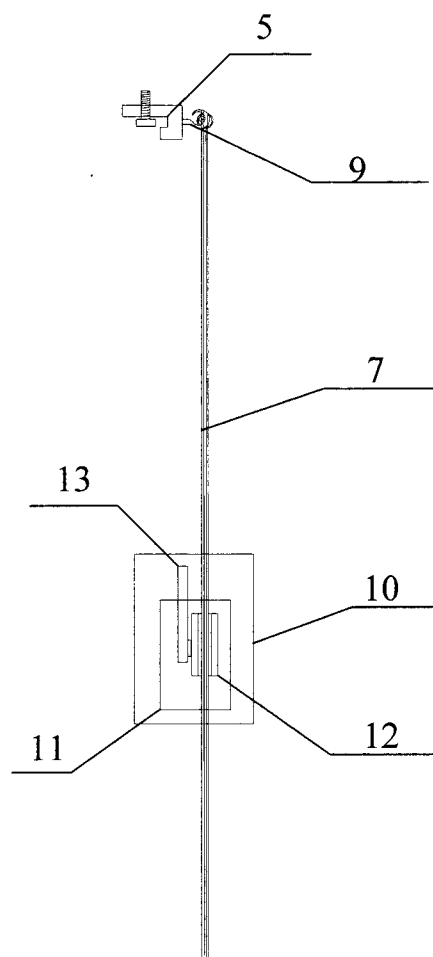


FIG. 21

