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(54) **RUST REMOVAL SPRAYER HEAD FOR WIRE ROD.**

(57) Disclosed is a rust removal sprayer head for a wire rod, which includes a sprayer head body in which a first mixing cavity is arranged; a high-pressure water spraying device which includes a nozzle seat arranged in the sprayer head body; and a sand inlet structure which includes a sand inlet hole communicated with the first mixing cavity; a plurality of water spraying holes distributed in a circumferential direction are formed in the nozzle seat; one end of each water spraying hole is communicated with the first mixing cavity, and the other end is communicated with an annular water inlet slot which is communicated with a water inlet pipe; one end of the first mixing cavity is provided with a wire inlet channel, and the other end is provided with a wire outlet channel; a diameter of the wire inlet channel is greater than that of the wire rod; an annular second mixing cavity is formed between the outer side of the wire rod and an inner wall of the wire inlet channel; and a diameter of the wire outlet channel is matched with that of the wire rod. The rust removal sprayer head for the wire rod can completely remove a surface scale from a surface of the wire rod; the efficiency is high; and the operation is convenient.

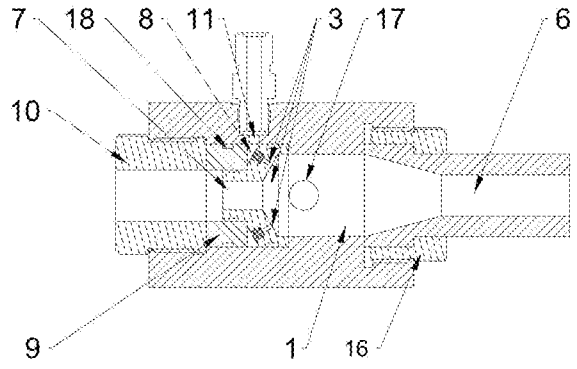

Fig. 1

RUST REMOVAL SPRAYER HEAD FOR WIRE ROD

Field of the Invention

The present invention relates to wired rod production equipment, specifically to a rust removal sprayer head for a wire rod.

Background of the Invention

In a production process of hot-rolled steel, a steel ingot is heated to more than 1,000 degrees Celsius. The high-temperature steel ingot is in contact with air, and an oxidation reaction occurs, so a layer of scale is formed on a surface of the steel. The scale will lower the corrosion resistance, weldability and mechanical properties of finished steel, affecting the quality of the steel.

In order to solve the above problems, the utility model patent with the authorized publication number CN 2425723Y discloses a high-pressure water phosphorus removal nozzle for an abrasive, which is composed of a high-pressure water supply device and a sandblasting device, and is characterized in that the high-pressure water supply device and the sandblasting device are assembled in a round bushing. The high-pressure water supply device includes a high-pressure hose, a connecting nut, a connecting head, an intermediate pipe, a rectifier, an ejector head, and a flat fan-shaped water nozzle. The sandblasting device includes a transparent hose, a connecting pipe, a sandblasting plate, an adjustment sheet group, and a compressed air spray pipe. The high-pressure hose is connected to a joint through the connecting nut. The connecting head is screwed on the intermediate pipe. The rectifier is installed inside the intermediate pipe. The ejector head is screwed on the intermediate pipe. The flat fan-shaped water nozzle is placed on a sprayer head sleeve and is fixed by the ejector head. The sprayer head sleeve and the ejector head are connected by screwing. The round bushing and the sprayer head sleeve are connected with a fixing screw. The transparent hose is tightly sleeved on the connecting pipe, and the connecting pipe is screwed in the sandblasting plate.

The sandblasting plate is fixed by a bolt and the sprayer head sleeve. The compressed air spray pipe and the adjustment sheet group are installed in the middle of the sandblasting plate. In the above sprayer head, high-pressure water and blasting sand are output from the high-pressure water supply device and the sandblasting device respectively and are mixed outside a water nozzle, and a flat fan-shaped high-pressure mortar hits a surface of the steel outside the sprayer head to remove the scale. However, the above nozzle still has the following shortcomings:

1. The nozzle mixes the high-pressure water and the blasting sand, and then sprays the mixture to the surface of the steel outside the nozzle. It can only have a rust removal effect on the surface of a wire rod that faces the mouth of the nozzle. The nozzle needs to be moved to the position above the corresponding surface when it is necessary to remove rust from surfaces in other directions, so that the workload is increased, resulting in low efficiency.

2. The nozzle mixes the high-pressure water with the sand, and then sprays the mixture to the surface of the steel outside the sprayer head. Along a lengthwise direction of a wire pipe, a rust removal area is only a contact surface between the mixed liquid and the wire rod, so that the rust removal area per unit time is small, and the rust removal efficiency is low.

Summary of the Invention

The present invention aims to overcome the shortcomings in the prior art and to provide a rust removal sprayer head for a wire rod. The rust removal sprayer head for the wire rod can completely remove a scale from an entire circumferential surface of a wire rod and has good rust removal quality. In another aspect, the rust removal sprayer head for the wire rod has a wider rust removal range per unit time, has high efficiency, and is convenient to operate.

The technical solution of the present invention to solve the above technical problems is as follows:

A rust removal sprayer head for a wire rod is characterized by including a sprayer head body, a high-pressure water spraying device, and a sand inlet structure. A first mixing cavity is arranged in the sprayer head body; the sand inlet structure includes a sand inlet hole communicated with the first mixing cavity; the high-pressure water spraying device includes a nozzle seat arranged in the sprayer head body; a plurality of water spraying holes distributed in a circumferential direction are formed in the nozzle seat; one end of each water spraying hole is communicated with the first mixing cavity, and the other end is communicated with an annular water inlet slot; the annular water inlet slot is communicated with a water inlet pipe; one end of the first mixing cavity is provided with a wire inlet channel having an outer diameter less than that of the mixing cavity, and the other end is provided with a wire outlet channel; a diameter of the wire inlet channel is greater than that of the wire rod; an annular second mixing cavity is formed between the outer side of the wire rod and an inner wall of the wire inlet channel; and a diameter of the wire outlet channel is matched with that of the wire rod.

The working principle of the above rust removal sprayer head for the wire rod is as follows:

A wire rod that is required to be subjected to surface scale removal is subjected to rust removal inside the rust removal sprayer head for a wire rod, specifically as follows: The wire rod enters the first mixing cavity from the wire inlet channel and passes through the first mixing cavity from the wire outlet channel. After the wire rod enters the wire inlet channel, the high-pressure water spraying device and the sand inlet structure are turned on. High-pressure water flow enters the annular water inlet slot from the water inlet pipe. One end of each water spraying hole is communicated with the annular water inlet slot, and the other end is communicated with the first mixing cavity. In this way, the high-pressure water flow enters the first mixing cavity through the water spraying holes after entering the annular water inlet slot. At the same time, blasting sand enters the first mixing cavity from the sand inlet hole. The high-pressure water flow drives the blasting sand to move to form mixed liquid that

moves at a high speed. The high-speed mixed liquid is discharged from the second mixing cavity. On the one hand, since the second mixing cavity is formed by the outer side of the wire rod and the inner wall of the wire inlet channel, and the outer diameter of the wire inlet channel is less than that of the first mixing cavity, a section of the second mixing cavity is much smaller than a section of the first mixing cavity, and the mixed liquid in the second mixing cavity flows faster. On the other hand, a flowing direction of the mixed liquid is opposite to an advancing direction of a wire pipe, which further increases the relative speed between the mixed liquid and the wire pipe, so that topspeed mixed liquid is formed in the second mixing cavity. The topspeed mixed liquid scours a circumferential surface of the entire wire rod which enters the wire inlet channel, so as to remove a scale from the circumferential surface of the entire wire rod. After the wire rod enters the first mixing cavity, the high-speed mixed liquid formed by the high-pressure water flow driving the blasting sand further scours the surface of the wire rod. There are a plurality of water spraying holes which are distributed along the circumferential direction, so that the entire circumferential surface of the wire rod is full of the high-speed mixed liquid, and the scale on the entire surface of the wire rod can be completely removed. In the above process, the rust removal effect on the entire circumferential surface of the wire rod can be achieved without moving the position of the sprayer head back and forth; the rust removal quality is good; and the efficiency is high. In addition, in the process that the wire rod enters the rust removal sprayer head, the mixed liquid in both the first mixing cavity and the second mixing cavity removes rust from the entire circumferential surface of the wire rod, so that the rust removal range per unit time is wider, and the rust removal efficiency is high.

According to one preferable solution of the present invention, the sprayer head body includes a sprayer head front part, and a sprayer head rear part used for mounting the high-pressure water spraying device; the rear part of the sprayer head body is provided with a liquid inlet cavity communicated with the first mixing cavity; and an aperture of the liquid inlet cavity is greater than that of the first mixing cavity. By the arrangement of the sprayer head body of the structure, the high-pressure water spraying device is arranged at the sprayer head rear part. All the functional

modules have a reasonable layout, so that the structure is compact, and the function is powerful.

According to one preferable solution of the present invention, the nozzle seat includes a nozzle seat front part and a nozzle seat rear part; an outer diameter of the nozzle seat front part is greater than that of the nozzle seat rear part, thus forming a first step between the nozzle seat front part and the nozzle seat rear part; the first step facing the nozzle seat rear part is provided with a chamfer surface; the nozzle seat rear part is provided with a wire passing hole matched with the wire rod; the wire passing hole constitutes the wire outlet channel; the nozzle seat front part is provided with a first conical hole communicated with the wire outlet channel; the first conical hole is communicated with the first mixing cavity and has an aperture that gradually increases towards the first mixing cavity; and the water spraying holes pass through the chamfer surface and an inner wall of the first conical hole. By the arrangement of the nozzle seat of the structure, the high-pressure water flow enters from the chamfer surface and passes through the inner wall of a first conical surface. Since the first conical hole is communicated with the first mixing cavity, the high-pressure water flow passing through the first conical surface can be directly sprayed to a surface of the wire rod in the first mixing cavity and can drive the blasting sand in the first mixing cavity to rush to the surface of the wire rod at a high speed, thus removing the scale from the surface of the wire rod.

According to one preferable solution of the present invention, the high-pressure water spraying device further includes a pressing structure, a water inlet hole, a water inlet joint arranged on an outer side of the water inlet hole, a sealing sleeve, and a ruby nozzle mounted in the sealing sleeve; the pressing structure is arranged in the liquid inlet cavity; one end of the pressing structure resists against the first step; an end surface of the pressing structure close to the first mixing cavity, the chamfer surface, and the inner wall of the liquid inlet cavity form the annular water inlet slot; the water inlet hole is communicated with the annular water inlet slot; and the sealing sleeve is mounted on one side of the water spraying holes close to the chamfer surface. By the arrangement of the above high-pressure water spraying

device, the water inlet pipe is connected with the water inlet joint. The high-pressure water flow enters the annular water inlet slot via the water inlet hole. The high-pressure water flow in the annular water inlet slot enters the water spraying holes through the ruby nozzle, and is then sprayed to the surface of the wire rod in the first mixing cavity.

Preferably, the pressing structure includes a pressing sleeve and a locking pressing cap; an outer diameter of the pressing sleeve is matched with an inner diameter of the liquid inlet cavity; the pressing sleeve and the locking pressing cap are both provided with internal holes matched with the nozzle seat rear part; the pressing sleeve is sleeved on the nozzle rear part, and one end of the pressing sleeve resists against the first step; and the locking pressing cap is in threaded connection with the liquid inlet cavity, and one end of the locking pressing cap resists against the pressing sleeve. During assembling, the pressing sleeve is sleeved on the nozzle seat rear part, and the nozzle seat is then assembled to the liquid inlet cavity. In the process of locking the locking pressing cap, the locking pressing cap resists against one end of the pressing sleeve to achieve forward pushing, and the other end of the pressing sleeve resists against the first step until the front part of the nozzle seat resists against a rear end of the first mixing cavity. At this time, the locking pressing cap fixes the pressing sleeve and the nozzle seat at the front part of the rust removal sprayer head for a wire rod, thus completing the installation.

Preferably, the sealing sleeve is a copper material. Copper is used as the material of the sealing sleeve. On the one hand, during assembling, the copper is convenient for installation due to its low hardness. On the other hand, the copper material will not be rusted even if it contacts a water flow for a long time, so it is more stable and durable.

According to one preferable solution of the present invention, the high-pressure water spraying device further includes a waterproof structure; the waterproof structure includes a waterproof slot, and a waterproof gasket mounted on the waterproof slot; and the waterproof slot includes a first waterproof slot arranged on

the pressing sleeve, a second waterproof slot arranged at the nozzle seat rear part, and a third waterproof slot arranged at the nozzle seat front part. By the arrangement of the above waterproof structure, the first waterproof slot is arranged on the pressing sleeve to prevent the high-pressure water flow from flowing out of the rear part of the rust removal sprayer head for a wire rod from the liquid inlet cavity; the second waterproof slot is arranged at the nozzle seat rear part to prevent the high-pressure water flow from flowing out of the rear part of the rust removal sprayer head for a wire rod from the inner wall of the pressing sleeve; and the third waterproof slot is arranged at the nozzle seat front part to prevent the high-pressure water flow from entering the first mixing cavity from a junction between the liquid inlet cavity and the first mixing cavity. In conclusion, by the arrangement of the waterproof structure, it can be ensured that the high-pressure water flow can only enter the first mixing cavity from the water spraying holes, so as to be sprayed to the surface of the wire rod in the first mixing cavity, which enhance the rust removal effect.

According to one preferable solution of the present invention, a mixing nozzle structure is further included; the mixing nozzle structure includes a mixing nozzle, and a nozzle pressing cap used for mounting the mixing nozzle at the sprayer head front part; the mixing nozzle includes a nozzle front part and a nozzle rear part; an outer diameter of the nozzle front part is less than that of the nozzle rear part, thus forming a second step between the nozzle front part and the nozzle rear part; the wire inlet hole is formed in the nozzle front part; the nozzle rear part is provided with a second conical hole communicated with the wire inlet hole; and the second conical hole is communicated with the first mixing cavity and has an aperture that gradually increases towards the first mixing cavity. By the arrangement of the mixing nozzle of the above structure, in the process that the mixed liquid of the high-pressure water flow and the blasting sand flows through the wire inlet hole from the first mixing cavity, the fluid section of the mixed liquid decreases dramatically. The inner wall of the second conical hole has a back-flushing effect on the mixed liquid. In this way, the mixed liquid that is back-flushed by the inner wall of the second conical hole scours the entire circumferential surface of the wire rod again, so that the effect of

removing the scale from the surface of the wire rod can be enhanced.

Preferably, the nozzle pressing cap includes a locking part and a buckling part; a locking hole matched with the nozzle rear part is formed in the locking part; a buckling hole matched with the nozzle front part is formed in the buckling part; and the locking part is in threaded connection with the liquid outlet cavity. When the mixing nozzle device is mounted, the nozzle pressing cap is cooperatively sleeved on the mixing nozzle; the buckling hole resists against the second step; the locking part then cooperates with the liquid outlet cavity; the locking part is tightened along a direction of the first mixing cavity; the mixing nozzle is pushed to the position of the first mixing cavity until the mixing nozzle rear part resists against the front end of the first mixing cavity; and at this time, the locking part is locked to the liquid outlet cavity to mount the mixing nozzle on the rust removal sprayer head for a wire rod.

According to one preferable solution of the present invention, there are two sand inlet holes which are symmetrically arranged on the sprayer head body. By the arrangement of the two symmetric sand inlet holes, the blasting sand simultaneously enters the first mixing cavity from two sides of the sprayer head body, so that the blasting sand in the first mixing cavity is distributed more uniformly, and the entire circumferential surface of the wire rod is filled with the blasting sand, thus enhancing the rust removal effect.

According to one preferable solution of the present invention, the sand inlet structure further includes a sand inlet joint which is mounted at an outer end of the sand inlet hole. By the arrangement of the above sand inlet structure, quick installation and removal of a sand inlet pipeline and the rust removal sprayer head for a wire rod can be achieved, and maintenance is facilitated.

Compared with the prior art, the present invention has the following beneficial effects.

1. The rust removal sprayer head for the wire rod of the present invention

includes the sprayer head body, the high-pressure water spraying device, and the sand inlet structure. The first mixing cavity is arranged in the sprayer head body; one end of the first mixing cavity is provided with the wire inlet channel; the annular second mixing cavity is formed between the outer side of the wire rod and the inner wall of the wire inlet channel; the section of the second mixing cavity is much smaller than the section of the first mixing cavity, so that the high-speed mixed liquid from the first mixing cavity has a higher flowing speed in the second mixing cavity; since the flowing direction of the mixed liquid is opposite to the direction where the wire rod enters the rust removal sprayer head, the relative speed between the mixed liquid and the wire rod is further increased; and the topspeed mixed liquid is formed in the second mixing cavity, so that the entire circumferential surface of the wire rod is subjected to complete rust removal, the rust removal quality is good, and the efficiency is high.

2. The rust removal sprayer head for the wire rod of the present invention includes the sprayer head body, the high-pressure water spraying device, and a sand inlet structure; the first mixing cavity is arranged in the sprayer head body; after the wire rod enters the first mixing cavity of the rust removal sprayer head from the wire inlet channel, the high-speed mixed liquid formed by the high-pressure water flow driving the blasting sand further scours the surface of the wire rod. There are a plurality of water spraying holes which are distributed along the circumferential direction, so that the entire circumferential surface of the wire rod is full of the high-speed mixed liquid, and the scale on the entire circumferential surface of the wire rod can be completely removed.

3. According to the rust removal sprayer head for the wire rod of the present invention, in the process that the wire rod enters the rust removal sprayer head, the mixed liquid in both the first mixing cavity and the second mixing cavity removes rust from the entire circumferential surface of the wire rod, so that the rust removal range per unit time is wider, and the rust removal efficiency is high.

4. According to the rust removal sprayer head for the wire rod of the present

invention, functions of spraying high-pressure water, feeding sand, and flushing the mixed liquid are integrated; the structure is compact; the function is powerful; and the production and manufacturing cost is low.

Brief Description of the Drawings

Fig. 1 is a front sectional view of a rust removal sprayer head for a wire rod of the present invention.

Fig. 2 is a three-dimensional diagram of one visual angle of a rust removal sprayer head for a wire rod of the present invention.

Fig. 3 is a sectional view of a sprayer head body.

Fig. 4 is a sectional view of a nozzle seat.

Fig. 5 is a three-dimensional diagram of mounting a ruby nozzle on a nozzle seat.

Fig. 6 is a sectional view of a mixing nozzle.

Detailed Description of the Embodiments

The present invention is further described in detail below in combination with the embodiments and accompanying drawings, but the implementations of the present invention are not limited to this.

Referring to Fig. 1 to Fig. 6, a rust removal sprayer head for a wire rod is characterized by including a sprayer head body, a high-pressure water spraying device, and a sand inlet structure. A first mixing cavity 1 is arranged in the sprayer head body; the sand inlet structure includes a sand inlet hole 17 communicated with the first mixing cavity 1; the high-pressure water spraying device includes a nozzle seat arranged in the sprayer head body; a plurality of water spraying holes 3

distributed in a circumferential direction are formed in the nozzle seat; one end of each water spraying hole 3 is communicated with the first mixing cavity 1, and the other end is communicated with an annular water inlet slot 8; the annular water inlet slot 8 is communicated with a water inlet pipe; one end of the first mixing cavity 1 is provided with a wire inlet channel 6 having an outer diameter less than that of the mixing cavity, and the other end is provided with a wire outlet channel 7; a diameter of the wire inlet channel 6 is greater than that of the wire rod; an annular second mixing cavity is formed between the outer side of the wire rod and an inner wall of the wire inlet channel 6; and a diameter of the wire outlet channel 7 is matched with that of the wire rod.

Referring to Fig. 1 and Fig. 3, the sprayer head body includes a sprayer head front part, and a sprayer head rear part used for mounting the high-pressure water spraying device; the rear part of the sprayer head body is provided with a liquid inlet cavity 2 communicated with the first mixing cavity 1; and an aperture of the liquid inlet cavity 2 is greater than that of the first mixing cavity 1. By the arrangement of the sprayer head body of the structure, the high-pressure water spraying device is arranged at the sprayer head rear part. All the functional modules have a reasonable layout, so that the structure is compact, and the function is powerful.

Referring to Fig. 1, Fig. 4, and Fig. 5, the nozzle seat includes a nozzle seat front part 4 and a nozzle seat rear part 5; an outer diameter of the nozzle seat front part 4 is greater than that of the nozzle seat rear part 5, thus forming a first step between the nozzle seat front part 4 and the nozzle seat rear part 5; the first step facing the nozzle seat rear part 5 is provided with a chamfer surface; the nozzle seat rear part 5 is provided with a wire passing hole matched with the wire rod; the wire passing hole constitutes the wire outlet channel 7; the nozzle seat front part 4 is provided with a first conical hole communicated with the wire outlet channel 7; the first conical hole is communicated with the first mixing cavity 1 and has an aperture that gradually increases towards the first mixing cavity 1; and the water spraying holes 3 pass through the chamfer surface and an inner wall of the first conical hole. By the arrangement of the nozzle seat of the structure, the high-pressure water flow enters

from the chamfer surface and passes through the inner wall of a first conical surface. Since the first conical hole is communicated with the first mixing cavity 1, the high-pressure water flow passing through the first conical surface can be directly sprayed to a surface of the wire rod in the first mixing cavity 1 and can drive the blasting sand in the first mixing cavity 1 to rush to the surface of the wire rod at a high speed, thus removing the scale from the surface of the wire rod.

Referring to Fig. 1, Fig. 4, and Fig. 5, the high-pressure water spraying device further includes a pressing structure, a water inlet hole 11, a water inlet joint arranged on an outer side of the water inlet hole 11, a sealing sleeve 12, and a ruby nozzle 13 mounted in the sealing sleeve 12; the pressing structure is arranged in the liquid inlet cavity 2; one end of the pressing structure resists against the first step; an end surface of the pressing structure close to the first mixing cavity 1, the chamfer surface, and the inner wall of the liquid inlet cavity 2 form the annular water inlet slot 8; the water inlet hole 11 is communicated with the annular water inlet slot 8; and the sealing sleeve 12 is mounted on one side of the water spraying holes 3 close to the chamfer surface. By the arrangement of the above high-pressure water spraying device, the water inlet pipe is connected with the water inlet joint. The high-pressure water flow enters the annular water inlet slot 8 via the water inlet hole 11. The high-pressure water flow in the annular water inlet slot 8 enters the water spraying holes 3 through the ruby nozzle 13, and is then sprayed to the surface of the wire rod in the first mixing cavity 1.

Referring to Fig. 1 and Fig. 5, the pressing structure includes a pressing sleeve 9 and a locking pressing cap 10; an outer diameter of the pressing sleeve 9 is matched with an inner diameter of the liquid inlet cavity 2; the pressing sleeve 9 and the locking pressing cap 10 are both provided with internal holes matched with the nozzle seat rear part 5; the pressing sleeve 9 is sleeved on the nozzle rear part 15, and one end of the pressing sleeve resists against the first step; and the locking pressing cap 10 is in threaded connection with the liquid inlet cavity 2, and one end of the locking pressing cap resists against the pressing sleeve 9. During assembling, the pressing sleeve 9 is sleeved on the nozzle seat rear part 5, and the nozzle seat is

then assembled to the liquid inlet cavity 2. In the process of locking the locking pressing cap 10, the locking pressing cap 10 resists against one end of the pressing sleeve 9 to achieve forward pushing, and the other end of the pressing sleeve 9 resists against the first step until the front part of the nozzle seat resists against a rear end of the first mixing cavity 1. At this time, the locking pressing cap 10 fixes the pressing sleeve 9 and the nozzle seat at the front part of the rust removal sprayer head for a wire rod, thus completing the installation.

Referring to Fig. 1 and Fig. 5, the sealing sleeve 12 is a copper material. Copper is used as the material of the sealing sleeve 12. On the one hand, during assembling, the copper is convenient for installation due to its low hardness. On the other hand, the copper material will not be rusted even if it contacts a water flow for a long time, so it is more stable and durable.

Referring to Fig. 1 and Fig. 4, the high-pressure water spraying device further includes a waterproof structure; the waterproof structure includes a waterproof slot, and a waterproof gasket mounted on the waterproof slot; and the waterproof slot includes a first waterproof slot 18 arranged on the pressing sleeve 9, a second waterproof slot 19 arranged at the nozzle seat rear part 5, and a third waterproof slot 20 arranged at the nozzle seat front part 4. By the arrangement of the above waterproof structure, the first waterproof slot 18 is arranged on the pressing sleeve 9 to prevent the high-pressure water flow from flowing out of the rear part of the rust removal sprayer head for a wire rod from the liquid inlet cavity 2; the second waterproof slot 19 is arranged at the nozzle seat rear part 5 to prevent the high-pressure water flow from flowing out of the rear part of the rust removal sprayer head for a wire rod from the inner wall of the pressing sleeve 9; and the third waterproof slot 20 is arranged at the nozzle seat front part 4 to prevent the high-pressure water flow from entering the first mixing cavity 1 from a junction between the liquid inlet cavity 2 and the first mixing cavity 1. In conclusion, by the arrangement of the waterproof structure, it can be ensured that the high-pressure water flow can only enter the first mixing cavity 1 from the water spraying holes 3, so as to be sprayed to the surface of the wire rod in the first mixing cavity 1, which

enhance the rust removal effect.

Referring to Fig. 1 and Fig. 6, a mixing nozzle structure is further included; the mixing nozzle structure includes a mixing nozzle, and a nozzle pressing cap 16 used for mounting the mixing nozzle at the sprayer head front part; the mixing nozzle includes a nozzle front part 14 and a nozzle rear part 15; an outer diameter of the nozzle front part 14 is less than that of the nozzle rear part 15, thus forming a second step between the nozzle front part 14 and the nozzle rear part 15; the wire inlet hole is formed in the nozzle front part 14; the nozzle rear part 15 is provided with a second conical hole communicated with the wire inlet hole; and the second conical hole is communicated with the first mixing cavity 1 and has an aperture that gradually increases towards the first mixing cavity 1. By the arrangement of the mixing nozzle of the above structure, in the process that the mixed liquid of the high-pressure water flow and the blasting sand flows through the wire inlet hole from the first mixing cavity 1, the fluid section of the mixed liquid decreases dramatically. The inner wall of the second conical hole has a back-flushing effect on the mixed liquid. In this way, the mixed liquid that is back-flushed by the inner wall of the second conical hole scours the entire circumferential surface of the wire rod again, so that the effect of removing the scale from the surface of the wire rod can be enhanced.

Referring to Fig. 1 and Fig. 6, the nozzle pressing cap 16 includes a locking part and a buckling part; a locking hole matched with the nozzle rear part 15 is formed in the locking part; a buckling hole matched with the nozzle front part 14 is formed in the buckling part; and the locking part is in threaded connection with the liquid outlet cavity. When the mixing nozzle device is mounted, the nozzle pressing cap 16 is cooperatively sleeved on the mixing nozzle; the buckling hole resists against the second step; the locking part then cooperates with the liquid outlet cavity; the locking part is tightened along a direction of the first mixing cavity 1; the mixing nozzle is pushed to the position of the first mixing cavity 1 until the mixing nozzle rear part 15 resists against the front end of the first mixing cavity 1; and at this time, the locking part is locked to the liquid outlet cavity to mount the mixing nozzle on the

rust removal sprayer head for a wire rod.

Referring to Fig. 1 and Fig. 2, there are two sand inlet holes 17 which are symmetrically arranged on the sprayer head body. By the arrangement of the two symmetric sand inlet holes 17, the blasting sand simultaneously enters the first mixing cavity 1 from two sides of the sprayer head body, so that the blasting sand in the first mixing cavity 1 is distributed more uniformly, and the entire circumferential surface of the wire rod is filled with the blasting sand, thus enhancing the rust removal effect.

Referring to Fig. 2, the sand inlet structure further includes a sand inlet joint 21 which is mounted at an outer end of the sand inlet hole 17. By the arrangement of the above sand inlet structure, quick installation and removal of a sand inlet pipeline and the rust removal sprayer head for a wire rod can be achieved, and maintenance is facilitated.

Referring to Fig. 1 to Fig. 6, the working principle of the above rust removal sprayer head for the wire rod is as follows:

A wire rod that is required to be subjected to surface scale removal is subjected to rust removal inside the rust removal sprayer head for a wire rod, specifically as follows: The wire rod enters the first mixing cavity 1 from the wire inlet channel 6 and passes through the first mixing cavity 1 from the wire outlet channel 7.After the wire rod enters the first mixing cavity 1, the high-pressure water spraying device and the sand inlet structure are turned on. High-pressure water flow enters the annular water inlet slot 8 from the water inlet pipe. One end of each water spraying hole 3 is communicated with the annular water inlet slot 8, and the other end is communicated with the first mixing cavity 1. In this way, the high-pressure water flow enters the first mixing cavity 1 through the water spraying holes 3 after entering the annular water inlet slot 8. At the same time, blasting sand enters the first mixing cavity 1 from the sand inlet hole 17. After entering the first mixing cavity 1, the high-pressure water flow drives the blasting sand to move at a high speed. There are

a plurality of water spraying holes 3 which are distributed along the circumferential direction, so that the entire circumferential surface of the wire rod is full of the water-sand mixed liquid that moves at the high seed, and the scale on the entire surface of the wire rod can be completely removed. The water-sand mixed liquid uniformly mixed in the first mixing cavity 1 flows out at a high speed from the second mixing cavity. The outer side of the wire rod and the inner wall of the wire inlet channel 6 constitute the second mixing cavity, so that the entire surface of the wire rod is full of the uniform mixed liquid of the high-speed water flow and the blasting sand. Furthermore, the flowing direction of the mixed liquid and the direction where the wire rod enters the rust removal sprayer head for a wire rod are opposite, so that rust removal pretreatment is performed on the surface of the wire rod before the wire rod enters the first mixing cavity 1. In this way, after the wire rod subjected to the rust removal pretreatment enters the first mixing cavity 1 for further rust removal treatment, it can be ensured that the scale on the surface of the wire rod is completely removed.

The preferred implementations of the present invention are described above, but the implementations of the present invention are not limited by the above-mentioned content, and any other changes, modifications, substitutions, combinations, and simplifications that are made without departing from the spirit essence and principle of the present invention shall all be equivalent replacement methods, which all fall within the protection scope of the present invention.

CLAIMS

1. A rust removal sprayer head for a wire rod, characterized by comprising a sprayer head body, a high-pressure water spraying device, and a sand inlet structure, wherein a first mixing cavity is arranged in the sprayer head body; the sand inlet structure comprises a sand inlet hole communicated with the first mixing cavity; the high-pressure water spraying device comprises a nozzle seat arranged in the sprayer head body; a plurality of water spraying holes distributed in a circumferential direction are formed in the nozzle seat; one end of each water spraying hole is communicated with the first mixing cavity, and the other end is communicated with an annular water inlet slot; the annular water inlet slot is communicated with a water inlet pipe; one end of the first mixing cavity is provided with a wire inlet channel having an outer diameter less than that of the mixing cavity, and the other end is provided with a wire outlet channel; a diameter of the wire inlet channel is greater than that of the wire rod; an annular second mixing cavity is formed between the outer side of the wire rod and an inner wall of the wire inlet channel; and a diameter of the wire outlet channel is matched with that of the wire rod.

2. The rust removal sprayer head for the wire rod according to claim 1, characterized in that the sprayer head body comprises a sprayer head front part, and a sprayer head rear part used for mounting the high-pressure water spraying device; the rear part of the sprayer head body is provided with a liquid inlet cavity communicated with the first mixing cavity; and an aperture of the liquid inlet cavity is greater than that of the first mixing cavity.

3. The rust removal sprayer head for the wire rod according to claim 2, characterized in that the nozzle seat comprises a nozzle seat front part and a nozzle seat rear part; an outer diameter of the nozzle seat front part is greater than that of the nozzle seat rear part, thus forming a first step between the nozzle seat front part and the nozzle seat rear part; the first step facing the nozzle seat rear part is provided with a chamfer surface; the nozzle seat rear part is provided with a wire passing hole matched with the wire rod; the wire passing hole constitutes the wire

outlet channel; the nozzle seat front part is provided with a first conical hole communicated with the wire outlet channel; the first conical hole is communicated with the first mixing cavity and has an aperture that gradually increases towards the first mixing cavity; and the water spraying holes pass through the chamfer surface and an inner wall of the first conical hole.

4. The rust removal sprayer head for the wire rod according to claim 3, characterized in that the high-pressure water spraying device further comprises a pressing structure, a water inlet hole, a water inlet joint arranged on an outer side of the water inlet hole, a sealing sleeve, and a ruby nozzle mounted in the sealing sleeve; the pressing structure is arranged in the liquid inlet cavity; one end of the pressing structure resists against the first step; an end surface of the pressing structure close to the first mixing cavity, the chamfer surface, and the inner wall of the liquid inlet cavity form the annular water inlet slot; the water inlet hole is communicated with the annular water inlet slot; and the sealing sleeve is mounted on one side of the water spraying holes close to the chamfer surface.

5. The rust removal sprayer head for the wire rod according to claim 4, characterized in that the pressing structure comprises a pressing sleeve and a locking pressing cap; an outer diameter of the pressing sleeve is matched with an inner diameter of the liquid inlet cavity; the pressing sleeve and the locking pressing cap are both provided with internal holes matched with the nozzle seat rear part; the pressing sleeve is sleeved on the nozzle rear part, and one end of the pressing sleeve resists against the first step; and the locking pressing cap is in threaded connection with the liquid inlet cavity, and one end of the locking pressing cap resists against the pressing sleeve.

6. The rust removal sprayer head for the wire rod according to claim 4, characterized in that the sealing sleeve is a copper material.

7. The rust removal sprayer head for the wire rod according to claim 5, characterized in that the high-pressure water spraying device further comprises a

waterproof structure; the waterproof structure comprises a waterproof slot, and a waterproof gasket mounted on the waterproof slot; and the waterproof slot comprises a first waterproof slot arranged on the pressing sleeve, a second waterproof slot arranged at the nozzle seat rear part, and a third waterproof slot arranged at the nozzle seat front part.

8. The rust removal sprayer head for the wire rod according to claim 2, characterized by further comprising a mixing nozzle structure; the mixing nozzle structure comprises a mixing nozzle, and a nozzle pressing cap used for mounting the mixing nozzle at the sprayer head front part; the mixing nozzle comprises a nozzle front part and a nozzle rear part; an outer diameter of the nozzle front part is less than that of the nozzle rear part, thus forming a second step between the nozzle front part and the nozzle rear part; the wire inlet hole is formed in the nozzle front part; the nozzle rear part is provided with a second conical hole communicated with the wire inlet hole; and the second conical hole is communicated with the first mixing cavity and has an aperture that gradually increases towards the first mixing cavity.

9. The rust removal sprayer head for the wire rod according to claim 8, characterized in that the nozzle pressing cap comprises a locking part and a buckling part; a locking hole matched with the nozzle rear part is formed in the locking part; a buckling hole matched with the nozzle front part is formed in the buckling part; and the locking part is in threaded connection with the liquid outlet cavity.

10. The rust removal sprayer head for the wire rod according to claim 1, characterized in that there are two sand inlet holes which are symmetrically formed in the sprayer head body.

ANSPRÜCHE

1. Entrostungsdüse für Draht, dadurch gekennzeichnet, dass sie einen Düsenkörper, eine Hochdruckwassersprühvorrichtung und eine Sandzuführstruktur umfasst; wobei in der Düsenkörper eine erste Mischkammer angeordnet ist; wobei die Sandzuführstruktur ein Sandzuführsloch umfasst, das mit der ersten Mischkammer verbunden ist; wobei die Hochdruckwassersprühvorrichtung einen Düsensitz umfasst, der in den Düsenkörper angeordnet ist, wobei der Düsensitz mit einer Vielzahl von Wassersprühlöchern versehen ist, die in einer Umfangsrichtung verteilt sind, wobei ein Ende dieser Wassersprühlöchern mit der ersten Mischkammer verbunden ist und das andere Ende mit einer ringförmigen Wassereinlassnut verbunden ist, wobei die ringförmige Wassereinlassnut mit einem Wassereinlassrohr verbunden ist; wobei ein Ende der ersten Mischkammer mit einem Drahteinlasskanal mit einem Außendurchmesser, der kleiner als der Außendurchmesser der Mischkammer ist, wobei das andere Ende der ersten Mischkammer mit einem Drahtauslasskanal versehen ist, wobei der Drahteinlasskanal einen Durchmesser hat, der größer als der Durchmesser des Drahtes ist, wodurch eine ringförmige zweite Mischkammer zwischen der Außenseite des Drahtes und der Innenwand des Drahteinlasskanal gebildet wird; und wobei der Drahtauslasskanal hat einen Durchmesser, der dem des Drahtes entspricht.

2. Entrostungsdüse für Draht nach Anspruch 1, dadurch gekennzeichnet, dass der Düsenkörper einen vorderen Teil der Düse und einen hinteren Teil der Düse zum Anbringen der Hochdruckwassersprühvorrichtung umfasst, wobei an der Rückseite des Düsenkörpers eine Flüssigkeitseinlasskammer angeordnet ist, der mit dem ersten Mischkammer verbunden ist, wobei die Flüssigkeitseinlasskammer einen Durchmesser aufweist, der größer als den Durchmesser des ersten Flüssigkeitseinlasskammer ist.

3. Entrostungsdüse für Draht nach Anspruch 2, dadurch gekennzeichnet, dass der Düsensitz einen vorderen Teil des Düsensitzes und einen hinteren Teil des Düsensitzes umfasst, wobei der vordere Teil des Düsensitzes einen größeren Außendurchmesser als der Außendurchmesser des hinteren Teils des Düsensitzes aufweist, um eine erste Stufe zwischen dem vorderen Teil des

Düsensitzes und dem hinteren Teil des Düsensitzes zu bilden, wobei die erste Stufe mit einer abgeschrägten Oberfläche in Richtung des hinteren Teils des Düsensitzes versehen ist; Wobei der Düsensitz an der Rückseite mit einem Drahtloch versehen ist, das zu dem Draht passt, wobei das Drahtloch den Drahtauslasskanal bildet, wobei der Düsensitz an der Vorderseite mit einem ersten konischen Loch versehen ist, das mit dem Drahtauslasskanal verbunden ist, wobei das erste konische Loch mit der ersten Mischkammer verbunden ist und einen zunehmend größeren Durchmesser in Richtung der ersten Mischkammer aufweist, wobei das Wassersprühloch durch die abgeschrägte Oberfläche und die Innenwand des ersten konischen Lochs verläuft.

4. Entrostungsdüse für Draht nach Anspruch 3, dadurch gekennzeichnet, dass die Hochdruckwassersprühvorrichtung ferner eine Kompressionsstruktur, ein Wassereinlassloch, ein an der Außenseite des Wassereinlasslochs vorgesehenes Wassereinlassverbindungsstück, eine Dichtungshülse und eine in der Dichtungshülse angebrachte Rubindüse umfasst; wobei die Kompressionsstruktur in der Flüssigkeitseinlasskammer vorgesehen ist, wobei ein Ende der Kompressionsstruktur an der ersten Stufe anliegt und die nahe der ersten Mischkammer liegende Endfläche der Kompressionsstruktur und die abgeschrägte Oberfläche und die Innenwand der Flüssigkeitseinlasskammer die ringförmigen Wassereinlassnut bilden, wobei das Wassereinlassloch mit der ringförmigen Einlassnut verbunden ist; und wobei die Dichtungshülse an der nahe der abgeschrägten Oberfläche leigenden Seite des Wassersprühlochs angebracht ist.

5. Entrostungsdüse für Draht nach Anspruch 4, dadurch gekennzeichnet, dass die Kompressionsstruktur eine Kompressionshülse und eine Verriegelungsdruckkappe umfasst, wobei die Kompressionshülse einen Außendurchmesser aufweist, der an den Innendurchmesser der Flüssigkeitseinlasskammer angepasst ist, wobei die Kompressionshülse und die Verriegelungsdruckkappe beide Innenlöcher aufweisen, die an das hinteren Teil des Düsensitzes angepasst sind, wobei die Kompressionshülse auf das hinteren Teil des Düsensitzes aufgesetzt ist und ein Ende der Kompressionshülse an der ersten Stufe anliegt; wobei die Verriegelungsdruckkappe mit der Flüssigkeitseinlasskammer durch ein Gewinde verbunden ist und ein Ende der Verriegelungsdruckkappe an der Kompressionshülse anliegt.

6. Entrostungsdüse für Draht nach Anspruch 4, dadurch gekennzeichnet, dass die Dichtungshülse aus Kupfer besteht.

7. Entrostungsdüse für Draht nach Anspruch 5, dadurch gekennzeichnet, dass die Hochdruckwassersprühvorrichtung ferner eine Abdichtungsstruktur umfasst, wobei die Abdichtungsstruktur eine wasserdichte Nut und eine an der wasserdichte Nut angebrachte wasserdichte Scheibe umfasst; wobei die wasserdichte Nut eine erste wasserdichte Nut, die an einer Kompressionshülse vorgesehen ist, eine zweite wasserdichte Nut, die an dem hinteren Teil des Düsensitzes vorgesehen ist, und eine dritte wasserdichte Nut, die an dem vorderen Teil des Düsensitzes vorgesehen ist, umfasst.

8. Entrostungsdüse für Draht nach Anspruch 2, dadurch gekennzeichnet, dass sie ferner eine Mischdüsenstruktur umfasst, wobei die Mischdüsenstruktur eine Mischdüse und eine Düsendruckkappe zum Anbringen der Mischdüse an dem vorderen Teil der Düse umfasst; wobei die Mischdüse einen vorderen Düsenabschnitt und einen hinteren Düsenabschnitt umfasst, wobei der vordere Düsenabschnitt einen Außendurchmesser aufweist, der kleiner ist als der Außendurchmesser des hinteren Düsenabschnitts, so dass eine zweite Stufe zwischen dem vorderen Düsenabschnitt und dem hinteren Düsenabschnitt gebildet wird; wobei das Drahtloch in dem vorderen Düsenabschnitt vorgesehen ist; wobei der hinteren Düsenabschnitt mit einem zweiten konischen Loch versehen ist, das mit dem Drahtloch verbunden ist, wobei das zweite konische Loch mit der ersten Mischkammer verbunden ist und einen zunehmend größeren Durchmesser in Richtung der ersten Mischkammer aufweist.

9. Entrostungsdüse für Draht nach Anspruch 8, dadurch gekennzeichnet, dass die Düsendruckkappe einen Verriegelungsabschnitt und einen Klemmabschnitt umfasst, wobei in der Verriegelungsabschnitt ein Verriegelungsloch angeordnet ist, das zum hinteren Teil der Düse passt, wobei in dem Klemmabschnitt ein Klemmloch angeordnet ist, das zum vorderen Teil der Düse passt, wobei der Verriegelungsabschnitt mit der Flüssigkeitseinlasskammer durch ein Gewinde verbunden ist.

10. Entrostungsdüse für Draht nach Anspruch 1, dadurch gekennzeichnet, dass zwei

Sandzuführsloch vorhanden sind, wobei die beiden Sandzuführsloch symmetrisch am Düsenkörper vorgesehen sind.

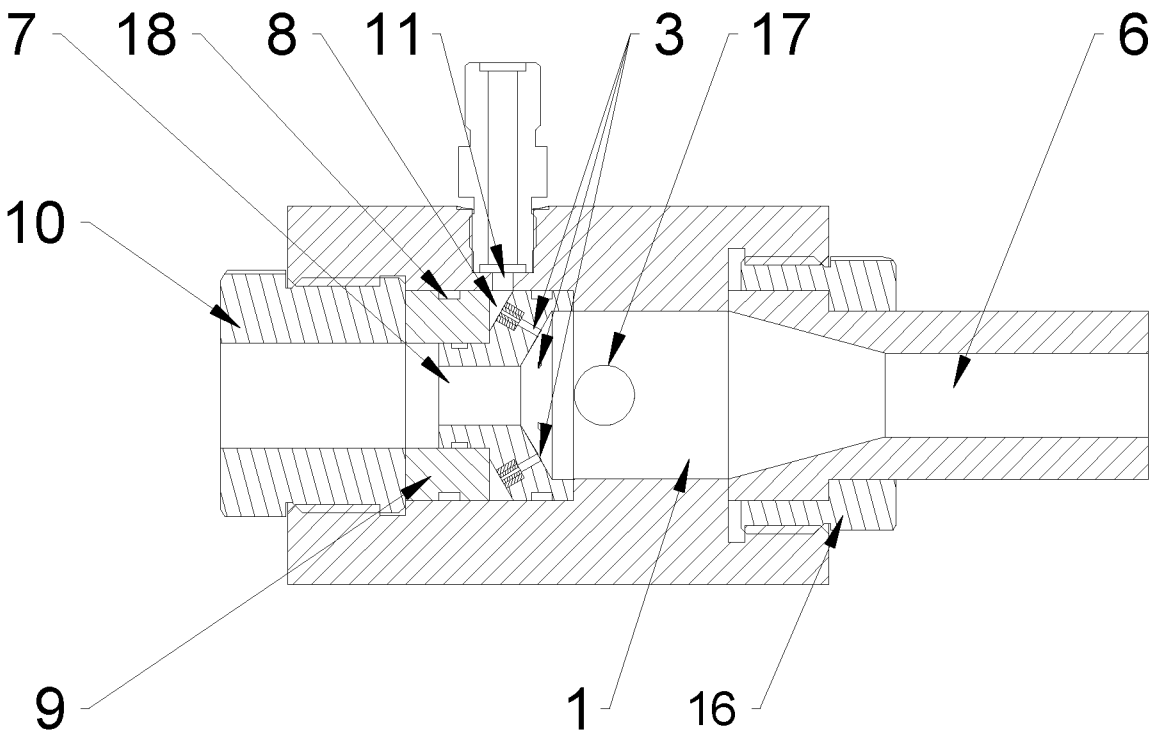

Fig. 1

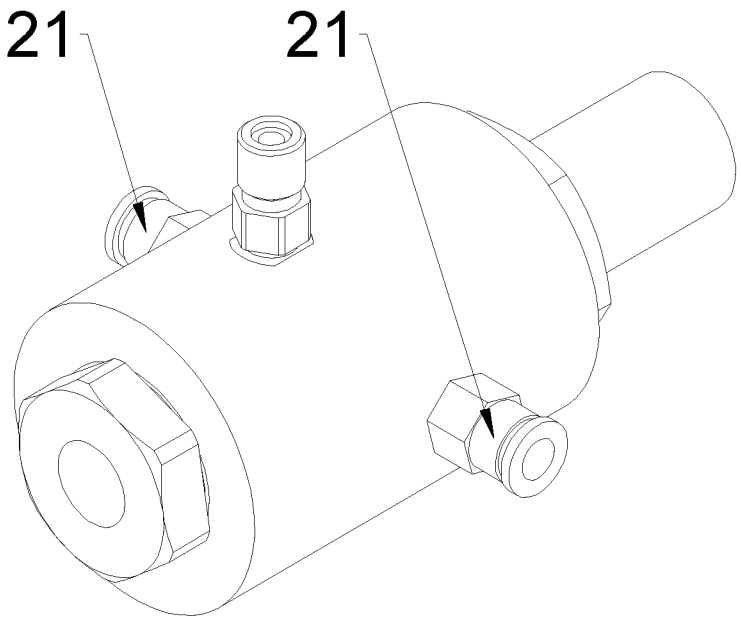

Fig. 2

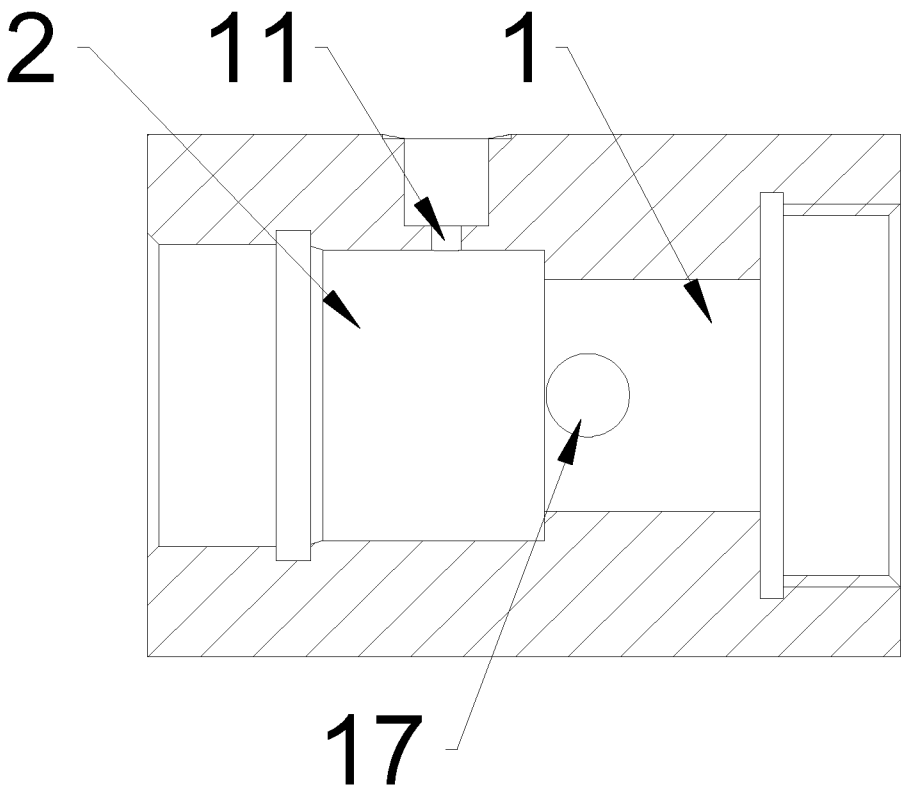

Fig. 3

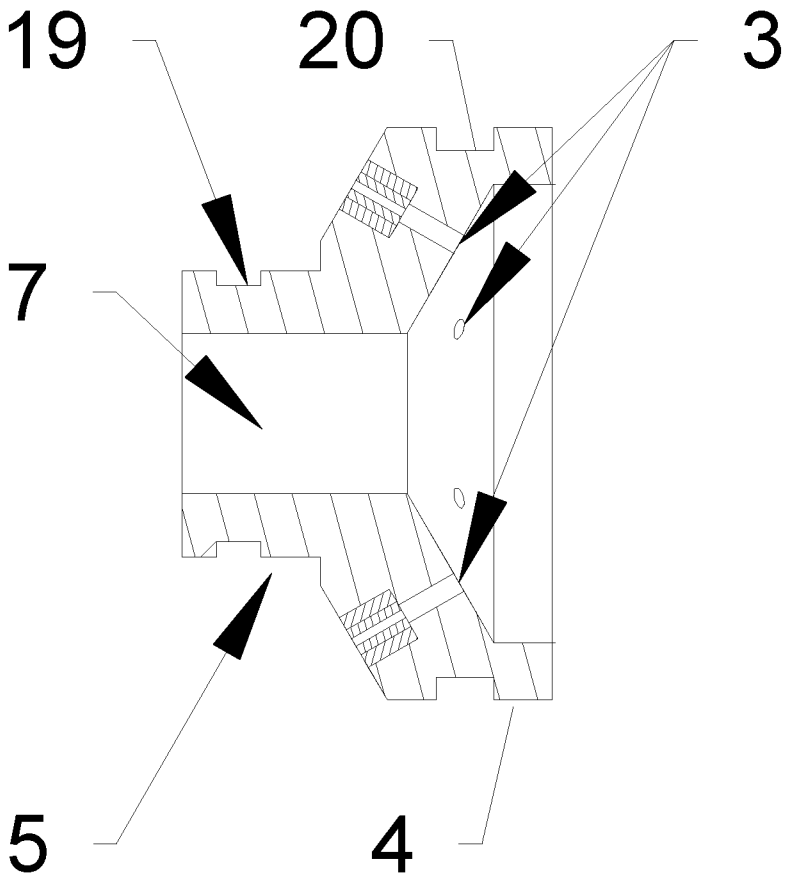

Fig. 4

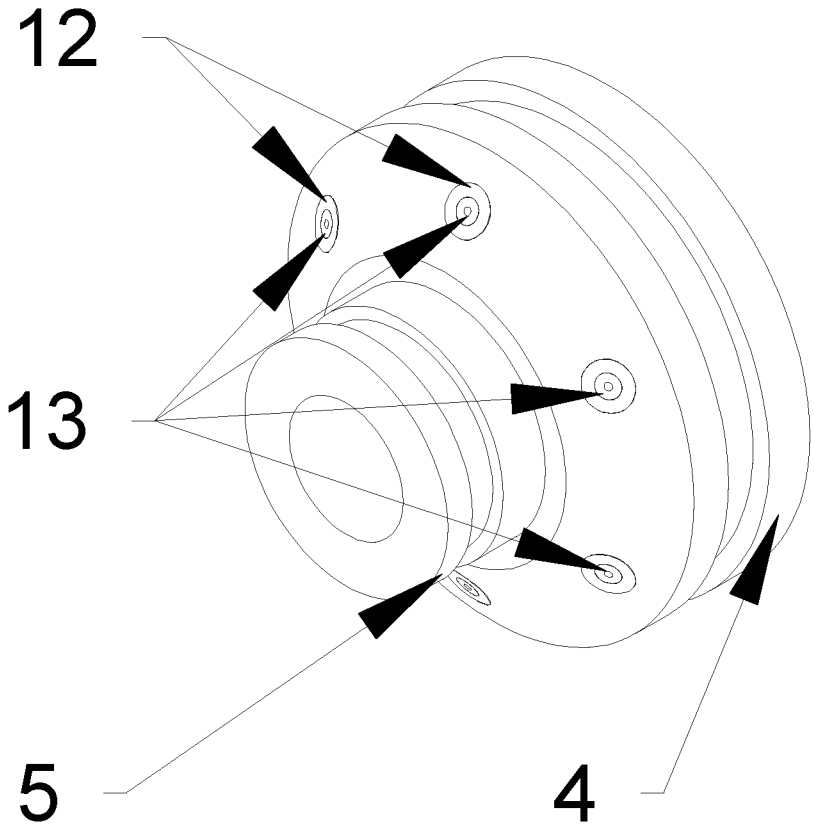

Fig. 5

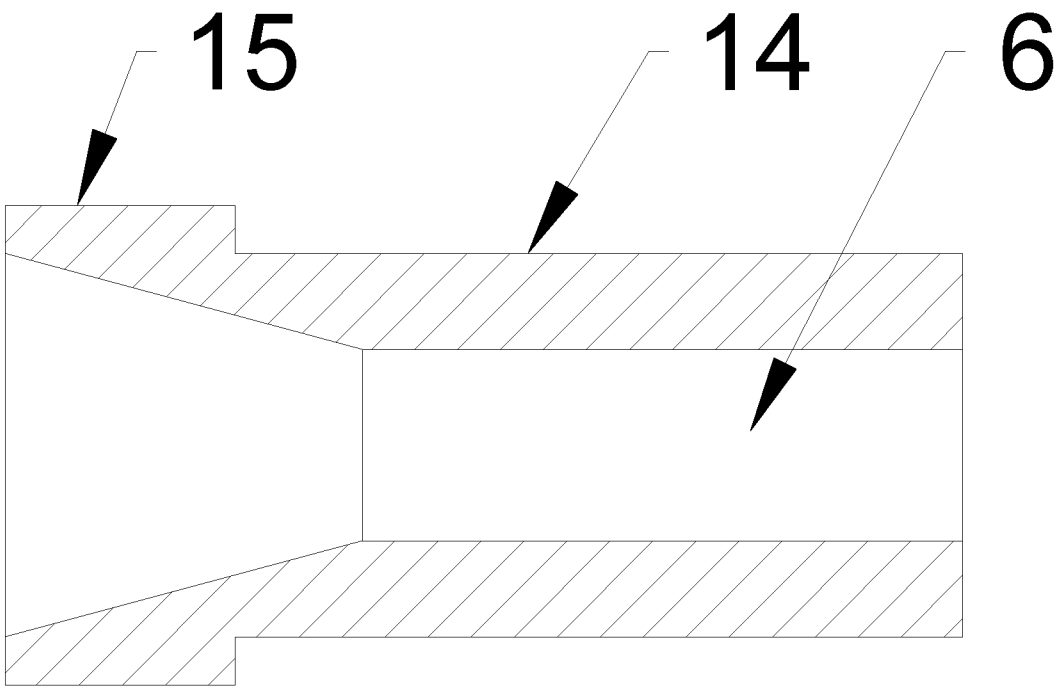

Fig. 6