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An Automatic Painting Method of Anticorrosive Coating for Large Steel Pipe and the Production Line Thereof

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(71) Applicant(s)
Yueming Shi

(72) Inventor(s)
Shi, Yueming;Xiong, Xinyong

(74) Agent / Attorney
Wrays, 56 Ord Street, West Perth, WA, 6005

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Abstract

The present invention relates a kind of automatic painting method of anticorrosive coating for large steel pipe and its production line, the method is that the steel pipe entering in turn into a degreasing and drying machine, an automatic shot-blasting machine, a preheating chamber, a spray-painting chamber, a paint-film solidifying chamber and a cooling chamber under a steel pipe feeding mechanism, being desiccated and cleaned, treated of the surface, sprayed paint after being warmed up, solidifying of the paint-film and cooled. And the production line comprises a steel pipe feeding mechanism, a degreasing and drying machine, an automatic shot-blasting machine and a preheating chamber, the automatic shot-blasting machine disposed between the degreasing and drying machine and the preheating chamber, characterized in that a spray-painting and solidify unit disposed after the preheating chamber, and the unit composed of the spray-painting chamber, the paint-film solidifying chamber and the cooling chamber disposed in turn and in line; wherein a spray-painting machine which sprays paint with anticorrosive coating on the surface of the steel pipe is disposed in the spray-painting chamber, and a hot-air circulating system is disposed in the paint-film solidifying chamber. In this present invention, the steel pipe is operated continuingly and automatically on one production line, the efficiency of the painting is very high, the quality of painting is very good and the environmental pollution also can be avoid.

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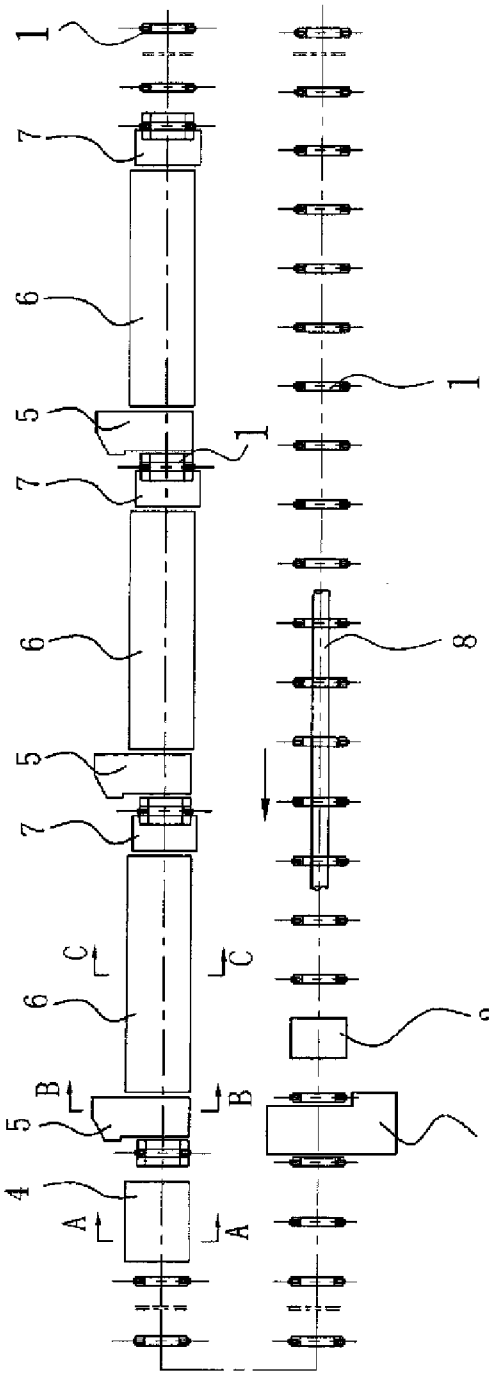

Fig. 1

P/00/011 28/5/91
Regulation 3.2

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COMPLETE SPECIFICATION

STANDARD PATENT

Name of Applicant: Yueming Shi

Actual Inventor Yueming Shi

Address for service is: WRAYS
Ground Floor, 56 Ord Street
West Perth WA 6005

Attorney code: WR

Invention Title: "An Automatic Painting Method of Anticorrosive Coating for Large Steel Pipe and the Production Line Thereof"

The following statement is a full description of this invention, including the best method of performing it known to me:-

"An Automatic Painting Method of Anticorrosive Coating for Large Steel Pipe & the Production Line Thereof"

Field of the Invention

The present invention relates to an anticorrosive treating method for steel pipe and the production line thereof, especially to a kind of automatic painting method of anticorrosive coating for large steel pipe and the production line thereof.

Background

The following discussion of the background to the invention is intended to facilitate an understanding of the present invention. However, it should be appreciated that the discussion is not an acknowledgement or admission that any of the material referred to was published, known or part of the common general knowledge of the person skilled in the art in any jurisdiction as at the priority date of the application.

Large steel pipes are usually 0.5m~2.4m in diameter, 12m~ 90m in length, and are made of steel. In recent years, with the rapid development of China's national economy, an increasing number of large steel pipes have been used in harbors and docks, marine engineering and municipal engineering. In order to effectively control the corrosion of large steel pipes, to extend the using life of large steel pipes, and to ensure the safe operation of infrastructure, the surface of large steel pipes should be treated with preservatives. The most commonly used anticorrosion treatment is to apply an anticorrosive paint on the surface of the steel pipe. At present, there are mainly three methods of applying the anticorrosive paint on the surface of the large steel pipe at domestic and at foreign countries, that is, manual painting, fusion bonded epoxy (FBE) and three-layer polyethylene (3LPE).

Wherein, the method of the manual painting is mainly painting with solvent paint on the large steel pipe, that is, firstly shot-blasting for the steel pipe by hand or in mechanic, secondly applying the paint on the surface of the steel pipe through

roll coating by hand or spray-painting. For the above-mentioned manual painting, the steel pipe can be treated with anticorrosive paint, but this method has some disadvantages list as follows:

(1) As the content of the organic solvent in the paint is relatively high, a lot of organic solvent will volatilized during the drying process of the coating, which will not only pollute the environment, but also result in a poor working environment, it may increase the intensity of human labor and cause the human's health problems.

(2) At the same time, as the large steel pipe cannot roll in situ during manual painting, furthermore, the viscosity of the chosen paint cannot be too high, usually the content of organic solvent in the paint can reach 15% or more, this will lead paint-film to sag after painting, resulting in the upper-thin-and-lower-thick uneven phenomenon, which greatly reduces the overall anticorrosion performance of the coating on the steel pipe.

(3) The manual painting for the large steel pipe is normally applied in open indoor or outdoor environment, as a result of the limit of the operation environment and weather conditions, the time for painting operation should be depend on whether. So the quality, progress and efficiency of the painting operation to the large steel pipe cannot be guaranteed; at the same time, after applying the paint, the solidifying of the coating is completed in the natural environment, it should use a long solidifying time, along with occupy large operation site.

While, the fusion bonded epoxy is automatically completed the mechanical assembly line. When the large steel pipe is spirally rolling forward in the drive system, after removing the rust on the surface of the steel pipe through shot-blasting machine, the steel pipe will be heated to a certain temperature through a medium-frequency induction, and then epoxy resin powder will be quickly painted onto the surface of the steel pipe through the electrostatic spray. The epoxy powder melts down becoming a paint-film immediately after touching the steel pipe with high-temperature and attaches to the surface of the steel pipe. Finally, the coating is rapidly solidified by quick water-cooling.

Compared with the manual painting, in the fusion bonded epoxy, the degree of automation is obviously increased, and the painting and solidifying of the coating will not be effected by the surrounding environment and the weather, as a result, the human labor is decreased and the efficiency is relatively high. However, as a single coating system, it is rarely applied in the foreign country, it is mainly because in the coating process, the temperature changes too much, while the steel pipe and the coating have a different coefficient of expansion, so that the coating on the steel pipe has high internal stress, therefore, the coating will be easily damaged under the external force, and after the coating is damaged, it is very difficult to repair at the construction site through the same method.

While, the three-layer polyethylene is mainly used in the anticorrosive coating for the buried steel pipe. The length of the steel pipe treated with this method is almost only about 10 meters, and this method cannot be applied for longer steel pipe. Therefore three-layer polyethylene cannot be applied in the anticorrosive coating for the large steel pipe, and this three-layer polyethylene is rarely seen in harbors and docks, marine engineering and municipal engineering.

At present, some production lines for the large steel pipe are disclosed in such as the subject of Chinese Publication No.: CN1673604A, CN1672809A, and CN1122772C. A primer with a tape winding or PE as a coating material is disclosed in these documents. However an automatic coating production line which uses high solid-content paint is rarely reported.

Summary of the Invention

Throughout this specification and claims, unless the context requires otherwise, the word "comprise" or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated integer or group of integers but not the exclusion of any other integer or group of integers.

According to one aspect the invention resides in an automatic painting method of anticorrosive coating for large steel pipe comprising :

Step 1, placing the steel pipe on a pipe feeding mechanism, starting the pipe feeding mechanism, the steel pipe firstly passing a degreasing and drying machine to remove the grease and the water on the surface of the steel pipe;

Step 2, after being removed the grease and the water the steel pipe entering into an automatic shot-blasting machine, to remove the rust coating and the oxide coating on the surface of the steel pipe and make the surface of the steel pipe match the cleanness and roughness requirement before being sprayed paint;

Step 3, the steel pipe entering into a preheating chamber which heats the steel pipe to a first temperature, which is between the value of the solidify temperature of the chosen paint reducing 40°C and the value of the solidify temperature of the chosen paint reducing 20°C;

Step 4, after being heated the steel pipe entering into a spray-painting chamber, a spray-paint machine spray-painting the paint with a second temperature on the surface of the steel pipe, the second temperature is between the value of the solidify temperature of the chosen paint reducing 40°C and the value of the solidify temperature of the chosen paint reducing 20°C;

Step 5, the steel pipe with coating entering into a paint-film solidifying chamber, a hot-air circulating system disposed in the paint-film solidifying chamber providing hot-air to heat the steel pipe to the solidify temperature of the chosen paint;

Step 6, the steel pipe entering into a cooling chamber to be cooled rapidly;

Step 7, if the cooled steel pipe need to be painted with multiple layers of coating, the steel pipe entering into next unit of spray-painting and solidify which is composed of the spray-painting chamber, the paint-film solidifying chamber and the cooling chamber in turn, repeating step 4, step 5, and step 6 till finishing all layers of coating.

In the method of the present invention, both the value of the first temperature in the preheating chamber which is a warm-up temperature of the steel pipe and

the value of the second temperature which the spraying paint has, are according to the solidify temperature of the chosen paint. Therefore, the steel pipe and the coating can be heated synchronously, it can quick the solidifying of the paint-film and can reduce the time of solidifying of the coating in large degree.

According to a preferred feature of the invention and in order to further reduce the environmental pollution produced by the volatilization of the solvent in the paint, and to reduce the number of the pinhole of the paint-film, the content of the solvent in the paint can be less than 10%.

Preferably, the hot-air is circularly heated the paint-film solidifying chamber. It will make the cost lower, make the operation safe, and improve the environment for the solidifying of coating.

Preferably, the spray-painting machine can be a high-pressure airless spray-painting machine, the time used from the paint entering into the high-pressure airless spray-painting machine to the paint being sprayed out is limited in 3 minutes. Under the high-pressure airless spray-painting machine, the temperature of spaying paint, the time at which the curing agent and paint mixed together, and the time between the heating of the paint and the spraying paint can be easy controlled.

According to another aspect the invention resides in a production line of automatic painting anticorrosive coating for large steel pipe, comprising a feeding mechanism which makes the steel pipe revolve and move horizontally along the axis of the steel pipe, a degreasing and drying machine which removes the grease and the water on the surface of the steel pipe, an automatic shot-blasting machine which removes the rust coating and the oxide coating on the surface of the steel pipe, and a preheating chamber which warms the steel pipe up, the automatic shot-blasting machine disposed between the degreasing and drying machine and the preheating chamber, characterized in:

a spray-painting and solidify unit disposed after the preheating chamber, and the unit composed of the spray-painting chamber, the paint-film solidifying chamber and the cooling chamber disposed in turn and in line;

wherein a spray-painting machine which sprays paint with anticorrosive coating on the surface of the steel pipe is disposed in the spray-painting chamber, and a hot-air circulating system is disposed in the paint-film solidifying chamber.

In the present invention, the spray-painting and solidify unit makes the painting, the solidifying and the cooling of the coating all in mechanical automation, instead of the traditional method of manual painting, solidifying and cooling under natural environment. This unit also improves the efficiency of painting, especially the time the solidifying of the paint-film needed is reduced in large degree, it only costs 20 minutes in the present invention, while it costs 24 hours in the traditional method. The efficiency is increased in more than 10 times. Furthermore, the adverse effect of the natural environment to the solidifying and the cooling of the paint-film can be avoided, and the capability of impact resistance can be improved too. At the same time, the environment pollution and the harm to the operator of the volatilization of the solvent are also avoided.

Preferably, the pipe feeding mechanism includes multiple wheel groups disposed in distant and in same height, each wheel group is composed of two wheels disposed in parallel and rotatable in same direction, and the distance of two adjacent wheel groups should be large to make the steel pipe cover at least two wheel groups at the same time when being transmitted. Of course, the pipe feeding mechanism can be other existing art.

Preferably, the spray-painting and solidify unit only has two wheel groups which respectively disposed before the spray-painting chamber and after the cooling chamber. Therefore, in the process of the applying the paint to the steel pipe, the solidifying of the coating and the cooling of the coating, the portion of the steel pipe which is coating will not contact the wheel, then the paint-film will not be damaged due to the conglutination of the coating and the feeding mechanism.

Preferably, two nozzles are disposed at the two sides of the bottom of the steel pipe in the preheating chamber leaning toward the steel pipe, and the nozzles are communicated with the source of hot air. The heating speed of this method is high, and the equipment required and the source of heating is easy to be found.

Preferably, the spray-painting machine is a high-pressure airless spray-painting machine which is coupled with an automatic paint heating mechanism. The automatic paint heating mechanism can be disposed at the entrance of the high-pressure airless spray-painting machine, also can be disposed at the middle of the high-pressure airless spray-painting machine, that is between the pump of the high-pressure airless spray-painting machine and the passage of the paint spraying. It is utilizing the characteristic of the high-pressure airless spray-painting machine, the paint can spray in fog after being heated. As a result, the content of the solvent in the paint can be reduced in large degree, so as to quick the solidifying of the paint-film.

Preferably, multiple spray-painting and solidify units can be disposed according to the number of the coating, when there is three layers of coating on the surface of the steel pipe, three spray-painting and solidify units are respectively disposed in turn and in line. It is especially designed for the process of painting which normally needs primer painting, middle painting, and surface painting these three painting steps.

Compared with the prior art, in this present invention, the automatic painting method of anticorrosive coating for large steel pipe and its production line, treat the steel pipe continuingly and automatically in one production line, such as desiccating and cleaning, surface treatment, warming up, painting and other procedure. The present invention combines the techniques of warming up of the steel pipe and the high-pressure airless spray-painting, which can make the large steep pipe be treated continuingly and automatically.

So that, compared with the traditional hand worked painting, the human labor intensity can be significantly reduced, and the production efficiency can be

improved (improved more than 10 times). And the content of the solvent in the paint can be reduced to less than 10% from the traditional 40% to 60%, the volatilization of organic solvent can be reduced by 4 to 6 times, thus the environment pollution caused by the volatile organic solvent reducing can be reduced, and the energy consumption can be saved, the adverse effects to the coating quality due to the operation environment of painting can be minimized.

And compared with the method of fused epoxy powder coating, the capability of impact resistance of the coating is improved in large degree, it can stably meet or exceed the requirements of GB (50kg•cm).

Therefore, in the present invention, the working time is greatly reduced, the production costs is lower, and the quality of anticorrosive coating and the capability of anticorrosion of the large steel pipe can be ensured. In actual trials, the unexpected technical result will be achieved. It is worthwhile to popularize and apply to the existing the large steel pipe.

The invention will be more fully understood in the light of the following description of one specific embodiment.

Brief Description of the Drawings

The description is made with reference to the accompanying drawings of which:

FIG.1 is a flow chart of the production line in accordance with an exemplary embodiment of the present invention.

FIG.2 is the sectional view of A-A way of FIG.1.

FIG.3 is the sectional view of B-B way of FIG.1.

FIG.4 is the sectional view of C-C way of FIG.1.

Detailed Description of the Preferred Embodiment

It is the first object of the embodiment of the present invention to provide an automatic painting method of anticorrosive coating for large steel pipe, which uses high solid-content paint, and has high efficiency of the painting and lower environmental pollution, at the same time, the coating has good capability of impact resistance.

A second object of the embodiment of the present invention is to provide a production line for automatic painting of anticorrosive coating on the large steel pipe, which uses high solid-content paint, and has high efficiency of the painting and lower environmental pollution, at the same time, the coating has good capability of impact resistance.

To enable a further understanding of the innovative and technological content of the embodiment of the invention herein, refer to the detailed description of the embodiment invention and the accompanying drawings below:

FIG.1 to FIG.4 shows an embodiment of the present invention.

[1] As shown in FIG.1, in this embodiment, the production line for automatic painting of anticorrosive coating on the large steel pipe comprises a steel pipe feeding mechanism 1, a degreasing and drying machine 2, an automatic shot-blasting machine 3, a preheating chamber 4, and a spray-painting and solidify unit which is composed of a spray-painting chamber 5, a paint-film solidifying chamber 6 and a cooling chamber 7. In this embodiment, the steel pipe 8 needs be coated with three layers of coating, so, three spray-painting and solidify units are respectively disposed in turn and in line, that is, a first spray-painting and solidify unit, a second spray-painting and solidify unit, and a third spray-painting and solidify unit.

[2] Wherein the steel pipe feeding mechanism 1 comprises multiple wheel groups disposed in distant and in same height, each wheel group is composed of two wheels disposed in parallel and rotatable in same direction, the line joined with

the axis of each wheel in each wheel group is slantwise relatively with the horizon, so as to make the steel pipe 8 spirally roll forward on wheels. Moreover, the distance of two adjacent wheel groups should be large to make the steel pipe 8 cover at least two wheel groups at the same time when being transmitted. The spray-painting and solidify unit has two wheel groups which respectively disposed before the spray-painting chamber 5 and after the cooling chamber 7.

[3] The degreasing and drying machine 2 uses a diesel burner for gas boiler or uses other existing equipment. The automatic shot-blasting machine 3 uses common equipment. In the preheating chamber 4, two nozzles are disposed at the two sides of the bottom of the steel pipe 8 leaning toward the steel pipe 8, as shown in FIG.2. And the nozzles are communicated with the source of hot air, the nozzles spray hot air slantways from the two sides below of the steel pipe 8 to heating the steel pipe 8.

[4] A high-pressure airless spray-painting machine 9 is disposed in each spray-painting chamber 5, the nozzle of the high-pressure airless spray-painting machine 9 is disposed at the upper of the steel pipe 8 leaning toward the steel pipe 8, as shown in FIG.3. The entrance for painting of the high-pressure airless spray-painting machine 9 is coupled with the exit of an automatic paint heating mechanism which is a common automatic paint heating mechanism. A hot-air circulating system which uses common technology is disposed in each paint-film solidifying chamber 6. In this embodiment, the cooling chamber 7 uses natural wind to cool down, air-condition can be used if needed.

[5] In this embodiment, three layers of coating should be painted on the steel pipe 8, that is, primer painting uses epoxy resin as paint, the content of the solvent in the paint is about 8%, the solidifying temperature is 90±10℃. The middle painting uses epoxy resin as paint, the content of the solvent in the paint is about 6%, the solidifying temperature is 90±10℃. The surface painting uses epoxy resin as paint, the content of the solvent in the paint is about 1%, the solidifying temperature is 90±10℃.

[6] Under the production line for automatic painting of anticorrosive coating on

the large steel pipe, the automatic painting method of anticorrosive coating for large steel pipe is list as below:

Step 1, placing a steel pipe 8 for coating with 1.8m in diameter and 60m in length on the pipe feeding mechanism 1 through a lifter, starting the pipe feeding mechanism 1, two wheels in each wheel group roll in same direction to make the steel pipe 8 spirally roll forward between the wheel groups; when the firstly steel pipe 8 passes the degreasing and drying machine 2, the fire caused by the diesel burner sprays to the surface of steel pipe 8, to remove the grease and the water on the surface of the steel pipe 8.

Step 2, after being removed the grease and the water the steel pipe 8 entering into the automatic shot-blasting machine 3, to remove the rust coating and the oxide coating on the surface of the steel pipe 8 and make the surface of the steel pipe 8 match the cleanness and roughness requirement before being spray-painted.

Step 3, the steel pipe 8 entering into the preheating chamber 4, as shown in FIG.2, two nozzles spray the hot air to the steel pipe 8 from the two sides of below of the steel pipe 8, heating the steel pipe 8 to a first temperature which is 50-70°C, then the steel pipe 8 is transmitted to the spray-painting chamber 5.

Step 4, an automatic heating mechanism heat the paint to a second temperature which is 50-70°C, and the paint is transported to the high-pressure airless spray-painting machine 9, the paint is mixed together with a curing agent, the mixture in fog is sprayed form the upper of the steel pipe 8 to the surface of the steel pipe 8, as shown in FIG.3. The time used from the paint entering into the high-pressure airless spray-painting machine to the paint being sprayed out is controlled in 3 minutes.

Step 5, the steel pipe with primer coating entering into the paint-film solidifying chamber 6, a hot-air circulating system disposed in the paint-film solidifying chamber 6 providing hot air, as shown in FIG.4. The hot air heats the steel pipe 8 with primer coating from two sides of the steel pipe 8, heating the steel pipe 8 to

the temperature of 90±10°C, that is to quick the solidifying of the paint-film of the primer painting, and the hot-air circulating system can take the volatilized solvent from the primer painting.

Step 6, the steel pipe 8 entering into the cooling chamber 7, the natural wind blows from the two sides of the steep pipe 8 to the steep pipe 8 to be cooled the steep pipe 8 soon.

As two wheel groups are respectively disposed before the spray-painting chamber 5 and after the cooling chamber7, in the process from the applying the primer paint to the solidifying of the coating and the cooling of the coating, the portion of the steel pipe 8 with coating will not contact the wheel, therefore the paint-film will not be damaged due to the conglutination of the coating and the feeding mechanism.

Step 7, the steel pipe 8 with cooled primer painting enters into the second unit of spray-painting and solidify and the third unit of spray-painting and solidify in turn, repeating step 4, step 5, and step 6. Wherein in the second unit of spray-painting and solidify, after the middle paint is heated to 50-70°C by the automatic heating machine in the spray-painting chamber 5, the middle paint enters into the high-pressure airless spray-painting machine 9, and the temperature of the paint-film solidifying chamber is 90±10°C. In the third unit of spray-painting and solidify, the temperature of the surface paint which enters into the high-pressure airless spray-painting machine 9 is 50-70°C, and the temperature of the paint-film solidifying chamber is 90±10°C.

Then, the painting process of the large steel pipe 8 is finished.

In this embodiment, the portion that not related is same as existing technology.

Under the above-mentioned production line, when the large steel pipe 8 is coated with three layers of coating, for each coating, it only costs 20 minutes from painting to finishing cooling after being solidified. Therefore, it only costs 1 hour to complete three layers of coating. The time of operation is reduced in

large degree, and the efficiency of manufacture is improved, moreover, the painting quality of the coating is improved too, due to the automatic operation in whole procedure.

The present invention is not to be limited in scope by the specific embodiment described herein. The embodiment is intended for the purpose of exemplification only. Functionally equivalent products, formulations and methods are clearly within the scope of the invention as described herein.

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Claims

The claims defining the invention are as follows:

1. An automatic painting method of anticorrosive coating for large steel pipe comprising :

Step 1, placing the steel pipe on a pipe feeding mechanism, starting the pipe feeding mechanism, the steel pipe firstly passing a degreasing and drying machine to remove the grease and the water on the surface of the steel pipe;

Step 2, after being removed the grease and the water the steel pipe entering into an automatic shot-blasting machine, to remove the rust coating and the oxide coating on the surface of the steel pipe and make the surface of the steel pipe match the cleanness and roughness requirement before being spray-painted;

Step 3, the steel pipe entering into a preheating chamber which heats the steel pipe to a first temperature, which is between the value of the solidify temperature of the chosen paint reducing 40°C and the value of the solidify temperature of the chosen paint reducing 20°C;

Step 4, after being heated the steel pipe entering into a spray-painting chamber, a spray-paint machine spray-painting the paint with a second temperature on the surface of the steel pipe, the second temperature is between the value of the solidify temperature of the chosen paint reducing 40°C and the value of the solidify temperature of the chosen paint reducing 20°C;

Step 5, the steel pipe with coating entering into a paint-film solidifying chamber, a hot-air circulating system disposed in the paint-film solidifying chamber providing hot air to heat the steel pipe to the solidify temperature of the chosen paint;

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Step 6, the steel pipe entering into a cooling chamber to be cooled rapidly;

Step 7, if the cooled steel pipe need to be painted with multiple layers of coating, the steel pipe entering into next unit of spray-painting and solidify which is composed of the spray-painting chamber, the paint-film solidifying chamber and the cooling chamber in turn, repeating step 4, step 5, and step 6 till finishing all layers of coating.

2. The automatic painting method of claim 1, wherein the content of the solvent in the paint is less than 10%.

3. The automatic painting method of claim 2, wherein the circulated hot-air is in the paint-film solidifying chamber.

4. The automatic painting method of claim 2 or 3 wherein the spray-painting machine is a high-pressure airless spray-painting machine, the time used from the paint entering into the high-pressure airless spray-painting machine to the paint being sprayed out is limited to 3 minutes.

5. A production line for automatic painting of anticorrosive coating on the large steel pipe, comprising a feeding mechanism which makes the steel pipe revolve and move horizontally along the axis of the steel pipe, a degreasing and drying machine which removes the grease and the water on the surface of the steel pipe, an automatic shot-blasting machine which removes the rust coating and the oxide coating on the surface of the steel pipe, and a preheating chamber which warms the steel pipe up, the automatic shot-blasting machine disposed between the degreasing and drying machine and the preheating chamber, characterized in:

a spray-painting and solidify unit afterlocated after the preheating chamber, and the unit composed of the spray-painting chamber, the paint-film solidifying chamber and the cooling chamber disposed in turn and in line;

wherein a spray-painting machine which sprays paint with anticorrosive coating on the surface of the steel pipe is disposed in the spray-painting chamber, and a hot-air circulating system is disposed in the paint-film solidifying chamber.

6. The production line of claim 5, wherein the pipe feeding mechanism includes multiple wheel groups disposed in distant and in same height, each wheel group is composed of two wheels disposed in parallel and rotatable in same direction, and the distance of two adjacent wheel groups should be large to make the steel pipe cover at least two wheel groups at the same time when being transmitted.

7. The production line of claim 5 or 6, wherein the spray-painting and solidify unit only has two wheel groups which respectively disposed before the spray-painting chamber and after the cooling chamber.

8. The production line of any one of claims 5 to 7, wherein two nozzles are disposed at the two sides of the bottom of the steel pipe in the preheating chamber leaning toward the steel pipe, and the nozzles are communicated with the source of hot air.

9. The production line of any one of claims 5 to 8, wherein the spray-painting machine is a high-pressure airless spray-painting machine which is coupled with an automatic paint heating mechanism.

10. The production line of any one of claims 5 to 9, wherein three spray-painting and solidify units are respectively disposed in turn and in line.

11. An automatic painting method of anticorrosive coating for large steel pipe substantially as herein described.

12. A production line for automatic painting of anticorrosive coating on the large steel pipe substantially as herein described.

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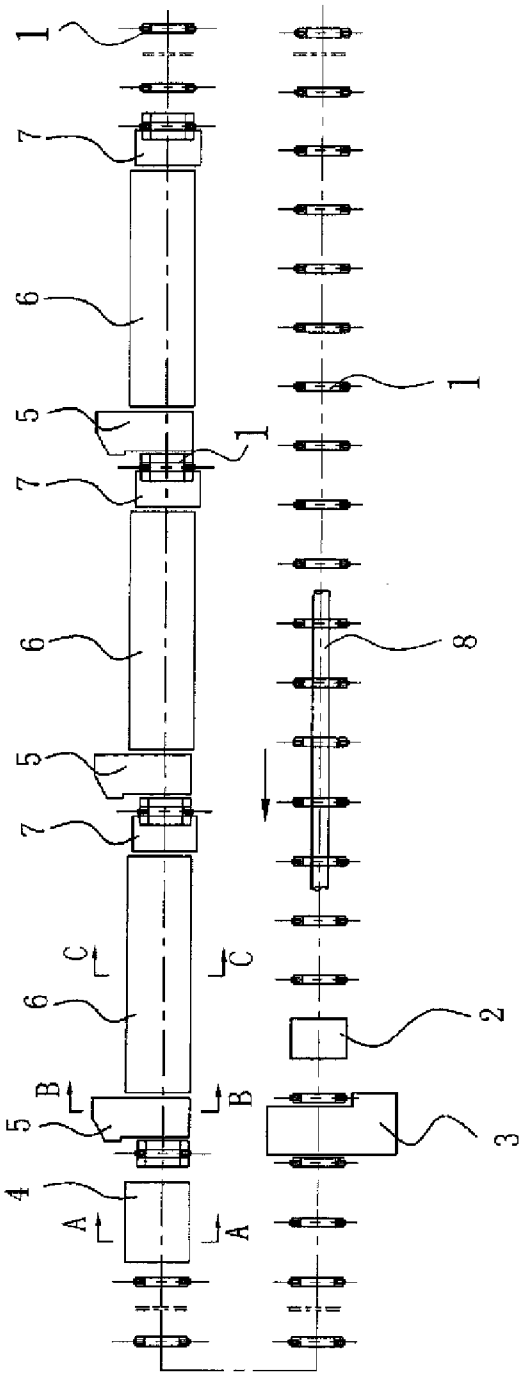

Fig. 1

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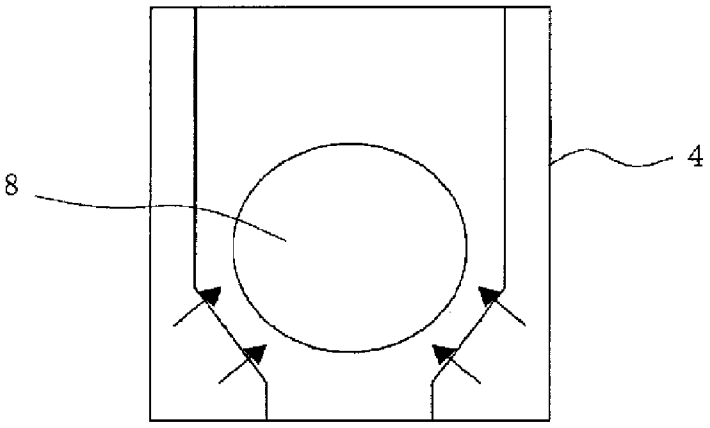

Fig. 2

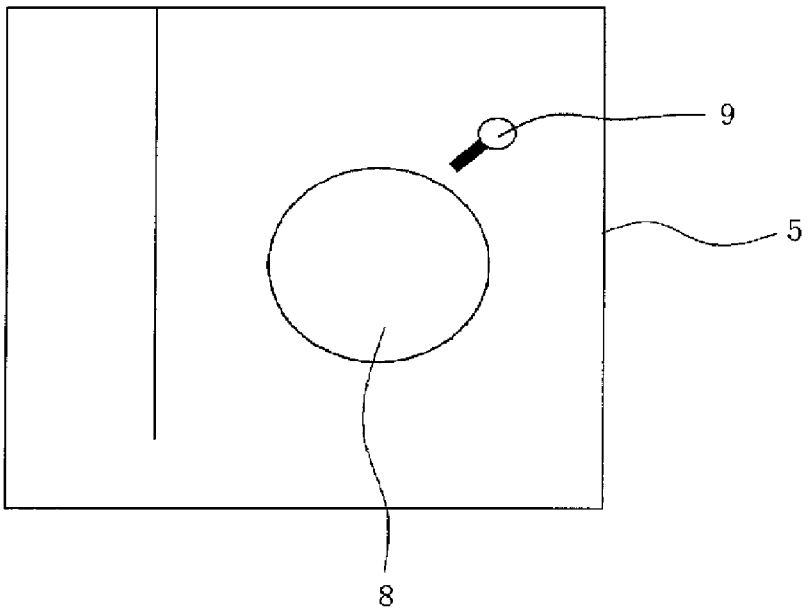

Fig. 3

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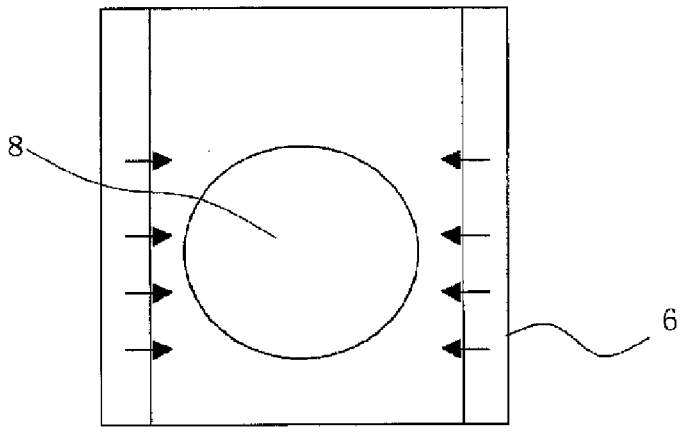

Fig. 4