

AUTOMATIC FOREIGN MATTER REMOVAL APPARATUS FOR ELECTRONIC FENCE

[0001] This application claims priority to Chinese patent application No. 201710823633.6 filed on September 13, 2017 and entitled “Automatic Foreign Matter Removal Apparatus for Electronic Fence”, the contents of which are hereby incorporated by reference in their entirety.

TECHNICAL FIELD

[0002] The disclosure belongs to the technical field of electronic fence auxiliary devices, and in particular relates to an automatic foreign matter removal apparatus for an electronic fence.

BACKGROUND

[0003] A substation is important national assets. In order to prevent electrical equipment such as transformers and distribution boxes in the substation from being damaged or stolen, and to avoid safety accidents caused by an accidental entry of people, an electronic fence is generally installed on a wall around the substation. The electronic fence is composed of multiple live power grids installed on the wall to prevent people from invading, and serves a function of blocking and determent.

[0004] Because the substation is mostly installed outdoors and an operating environment thereof is harsh, especially in windy and dusty weather and rainy and snowy weather, surfaces of the power grids are often dusty, or attached by tree branches and plastic bags, etc.. In addition, moisture on the surfaces of the power grids at low temperatures will freeze. Foreign matters on the electronic fence are easy to cause false alarms, increase the workload of inspection personnel, accelerate the aging of the power grid and shorten the service life. Therefore, inspection personnel must clean up the

foreign matters at intervals. Because the electronic fence is located at a high place, maintenance personnel need to work at height when cleaning up the foreign matters, which is laborious and has safety risks. In addition, the substation covers a large area, and cleaning around the electronic fence usually takes a long time, which increases the workload of maintenance personnel and reduces working efficiency.

SUMMARY

Technical Problem

[0005] In view of this, the disclosure aims to provide an automatic foreign matter removal apparatus for an electronic fence, which can automatically remove a foreign matter.

Technical Solution

[0006] To achieve the above object, the disclosure may adopt the following technical solutions:

[0007] An automatic foreign matter removal apparatus for an electronic fence may include a track adapted to be arranged on a wall, an inspection vehicle which is arranged on the track and movable along the track, a detection mechanism arranged on the inspection vehicle, a cleaning mechanism arranged on the inspection vehicle, a drive mechanism for driving the inspection vehicle to move along the track, and a processor arranged on the inspection vehicle.

[0008] The detection mechanism may be configured to acquire a real-time image of a power grid and send the real-time image to the processor.

[0009] The processor may be configured to compare the real-time image acquired by the detection mechanism with a preset image, and when a foreign matter is recognized, the processor may be configured to generate a stop signal and send the stop signal to the drive mechanism, and generate a foreign matter cleaning signal, and send the foreign matter cleaning signal to the cleaning mechanism.

- [0010] The drive mechanism may be configured to control, according to the stop signal, the inspection vehicle to stop moving.
- [0011] The cleaning mechanism may be configured to clean up the foreign matter according to the foreign matter cleaning signal.
- [0012] Further, the track may include two guide rails arranged in parallel, each guide rail may be adapted to be fixed on the wall, and the two guide rails are both located on one side of the power grid.
- [0013] Further, the inspection vehicle may include:
- [0014] a vehicle body;
- [0015] two driving wheels, arranged on the vehicle body, each of the driving wheels corresponding to one of the guide rails and moving along the one of the guide rails under driving of the drive mechanism; and
- [0016] two driven wheels, arranged on the vehicle body, each of the driven wheels corresponding to one of the guide rails.
- [0017] Further, the drive mechanism may include:
- [0018] a first motor, arranged on the vehicle body;
- [0019] a first controller, arranged on the vehicle body, and connected to the first motor and the processor, the first controller being configured to receive the stop signal and control, according to the stop signal, the first motor to stop;
- [0020] a transmission belt, having an end connected to an output shaft of the first motor; and
- [0021] a drive shaft, rotatably connected to the vehicle body, the two driving wheels being arranged on two ends of the drive shaft, and the other end of the transmission belt being connected to the drive shaft.
- [0022] Further, the detection mechanism may include:

- [0023] a bracket, having a first end fixed on the inspection vehicle; and
- [0024] a camera, rotatably connected to a second end of the bracket and connected to the processor, the camera being configured to acquire a real-time image of the power grid and send the real-time image to the processor.
- [0025] Further, the cleaning mechanism may include:
- [0026] a second motor, arranged on the inspection vehicle;
- [0027] a second controller, arranged on the inspection vehicle, and connected to the second motor and the processor, the second controller being configured to receive the foreign matter cleaning signal and control, according to the foreign matter cleaning signal, the second motor to start;
- [0028] a crank, having a first end connected to an output shaft of the second motor;
- [0029] a slider, having a first end rotatably connected to a second end of the crank and a second end provided with a through hole; and
- [0030] a brush, including a brush rod and a brush head, the brush rod including a first end hinged on the inspection vehicle, a middle portion passing through the through hole, and a second end connected to the brush head; the brush head can be in contact with the power grid.
- [0031] The brush rod can swing around a hinge point between the brush rod and the inspection vehicle, a swing direction of the brush rod is consistent with a length direction of the power grid, and the second motor and the crank are both located on a side of the brush rod, in a direction perpendicular to the swing direction of the brush rod.
- [0032] Further, the brush head may include:
- [0033] a housing, a first end of the housing being connected to the second end of the brush rod, and a second end of the housing being provided with bristles, a side wall of the second end of the housing being provided with a plurality of air holes for blowing;
- [0034] a fan, arranged in a cavity of the housing, and adapted to be connected to a

power supply; and

[0035] a heater, arranged in the cavity of the housing, horizontally projected between the fan and the air holes, and adapted to be connected to a power supply.

[0036] The fan and the heater may be both connected to the second controller.

[0037] Further, the detection mechanism may further be configured to acquire an image of the power grid after the foreign matter is cleaned up, and send the image to the processor.

[0038] The processor may further be configured to compare the image of the power grid after the foreign matter is cleaned up with a preset image, and when no foreign matter is recognized, the processor may be configured to generate a travel signal and send the travel signal to the drive mechanism, and generate a cleaning stop signal and send the cleaning stop signal to the cleaning mechanism.

[0039] The drive mechanism may be configured to receive the travel signal and control the inspection vehicle to travel forward.

[0040] The cleaning mechanism may receive the cleaning stop signal and stops cleaning the foreign matter.

[0041] Further, a surface each of the track, the inspection vehicle, the detection mechanism, the cleaning mechanism, the drive mechanism, and the processor may be provided with an insulating layer.

[0042] Further, a terminal controller may also be included. The processor may be connected to the terminal controller through a wireless signal.

Beneficial Effect of the disclosure

[0043] Due to the adoption of the above technical solution, the technical progress achieved in the disclosure is as follows.

[0044] A substation is surrounded by a wall with a power grid thereon. A track is installed on the wall and runs around the wall. An inspection vehicle can move along the

track, so it can reach anywhere on the wall. A detection mechanism, a cleaning mechanism, a drive mechanism and a processor are all arranged on the inspection vehicle. The detection mechanism is configured to detect the presence or absence of a foreign matter on the power grid. The cleaning mechanism is configured to clean up the foreign matter on the power grid. The drive mechanism is configured to drive the inspection vehicle to move.

[0045] The inspection vehicle moves along the track. The detection mechanism acquires a real-time image of the power grid and sends the real-time image to the processor. The processor compares the real-time image with a preset image. When a foreign matter is recognized, the processor generates a stop signal and sends the same to the drive mechanism. The drive mechanism controls, according to the stop signal, the inspection vehicle to stop moving. Meanwhile, the processor also generates a foreign matter cleaning signal and sends the foreign matter cleaning signal to the cleaning mechanism, and the cleaning mechanism starts to clean up the foreign matter.

[0046] The beneficial effects of the above technical solution lie in that: the automatic foreign matter removal apparatus for an electronic fence of the solution can be used to replace workers for inspection, and can automatically clean up a foreign matter when the foreign matter is found, thus saving both time and labour, reducing the workload of maintenance personnel, and improving production efficiency.

BRIEF DESCRIPTION OF THE DRAWINGS

[0047] The accompanying drawings, which constitute a part of the disclosure, are used to provide a further understanding of the disclosure, but do not constitute improper limitations to the disclosure. In the drawings:

[0048] FIG. 1 is a schematic diagram of an automatic foreign matter removal apparatus for an electronic fence according to an embodiment of the disclosure.

[0049] FIG. 2 is a working flowchart of an automatic foreign matter removal apparatus for an electronic fence according to an embodiment of the disclosure.

[0050] FIG. 3 is a schematic diagram of a drive mechanism according to an embodiment of the disclosure.

[0051] FIG. 4 is a schematic diagram of a driving wheel and a guide rail according to an embodiment of the disclosure.

[0052] FIG. 5 is a side view of a cleaning mechanism according to an embodiment of the disclosure.

[0053] FIG. 6 is a schematic diagram of a brush head according to an embodiment of the disclosure.

[0054] FIG. 7 is another working flowchart of an automatic foreign matter removal apparatus for an electronic fence according to an embodiment of the disclosure.

[0055] List of the reference signs:

[0056] 10-track; 11-guide rail; 20-inspection vehicle; 21-driving wheel; 22-driven wheel; 23-vehicle body; 30-detection mechanism; 31-bracket; 32-camera; 40-cleaning mechanism; 41-second motor; 42-crank; 43-slider; 44-brush; 441-brush rod; 442-brush head; 4421-housing; 4422-bristle; 4423-air hole; 4424-fan; 4425-heater; 50-drive mechanism; 51-first motor; 52-transmission belt; 53-drive shaft.

DETAILED DESCRIPTION

[0057] In order to make the purposes, technical solutions and advantages of the disclosure clearer, the disclosure will be further described in detail below with reference to the accompanying drawings and embodiments. The specific exemplary embodiments and descriptions described herein are only used to explain the disclosure, and are not used to limit the disclosure.

[0058] The present embodiment provides an automatic foreign matter removal apparatus for an electronic fence. As shown in FIG. 1, the automatic foreign matter removal apparatus for an electronic fence includes a track 10 adapted to be arranged on a

wall, an inspection vehicle 20 arranged on the track 10 and movable along the track 10, a detection mechanism 30 arranged on the inspection vehicle 20, a cleaning mechanism 40 arranged on the inspection vehicle 20, a drive mechanism 50 for driving the inspection vehicle 20 to move along the track 10, and a processor arranged on the inspection vehicle 20. As shown in connection with FIG. 2, the detection mechanism 30 is configured to acquire a real-time image of a power grid and send the real-time image to the processor. The processor is configured to compare the real-time image acquired by the detection mechanism 30 with a preset image, and when a foreign matter is recognized in the real-time image, the processor is configured to generate a stop signal and send the stop signal to the drive mechanism 50, and generate a foreign matter cleaning signal and send the foreign matter cleaning signal to the cleaning mechanism 40. The drive mechanism 50 is configured to control, according to the stop signal, the inspection vehicle 20 to stop moving. The cleaning mechanism 40 is configured to clean up the foreign matter according to the foreign matter cleaning signal. A substation is surrounded by a wall with a power grid thereon. The track 10 is installed on the wall and runs around a full circumference of the wall. The inspection vehicle 20 can move along the track 10, so it can reach anywhere on the wall.

[0059] In the process of comparing the real-time image of the power grid with the preset image, the processor uses an image recognition technology. The image recognition technology refers to recognizing an object in images to recognize targets with various features. The technology is based on main features of the images. For example, the letter A has a protruding tip, an upper part of the letter P has a closed circle, and the center of the letter Y has an acute angle. The core of this technology is an image recognition model. That is, a memory mode of an image, also called as a template, is first established. When a target is recognized, an overall map of the target is established according to the main features of the target. When the map is completely consistent with the template, the target is recognized. For example, a template for the letter A is established, and its map is established according to the size, orientation and shape of the recognized target. When the map is completely consistent with the template of the letter A, the target may be recognized as the letter A.

[0060] In this embodiment, an image of a foreign matter, such as a tree branch, a

plastic bag, a balloon, and an ice, which is common on the power grid is first input into the processor to establish a template. When the inspection vehicle 20 travels, the detection mechanism 30 acquires a real-time image of the power grid and sends the real-time image to the processor. The processor recognizes a target in the image and forms an overall map of the target according to the main features of the target. When the overall map is completely consistent with a preset template, the target may be recognized. For example, a map of the target may be established according to the size, shape and color of the target. If the map is completely consistent with the template branch, the target may be recognized as a branch. At this time, the processor generates a stop signal and sends the stop signal to the drive mechanism 50, and the drive mechanism 50 controls the inspection vehicle 20 to stop moving forward. In addition, the processor also generates a foreign matter cleaning signal and sends the foreign matter cleaning signal to the cleaning mechanism 40, and the cleaning mechanism 40 starts to clean up the foreign matter.

[0061] This embodiment imitates a process of manual inspection. During the inspection, a person walks along the wall and scans the power grid with eyes. When a foreign matter is found, the person stops walking and takes clean-up actions. In this embodiment, the inspection vehicle 20 is equivalent to a leg, for moving around the wall. The cleaning mechanism 40 is equivalent to a hand, for cleaning up foreign matters. The detection mechanism 30 is equivalent to eyes, for observing the real-time image of the power grid. The processor is equivalent to a brain, for comparatively analyzing the real-time image with a cognitive memory, and sending an instruction to the inspection vehicle 20 and the cleaning mechanism 40. Therefore, the automatic foreign matter removal apparatus for an electronic fence in this embodiment can replace workers for inspecting and cleaning up a foreign matter.

[0062] Specifically, as shown in FIG. 3, the track 10 includes two guide rails 11 arranged in parallel, each guide rail 11 is adapted to be fixed on the wall, and the two guide rails 11 are both located on one side of the power grid. Wheels of the inspection vehicle 20 are in direct contact with the guide rails 11, and the two guide rails 11 are provided to facilitate a more stable support of the inspection vehicle 20. The two guide rails 11 are located on one side of the power grid, so the inspection vehicle 20 is also

located on one side of the power grid to prevent the guide rails 11 or the inspection vehicle 20 from intersecting and colliding with the power grid.

[0063] Specifically, as shown in connection with FIG. 3, the inspection vehicle 20 includes a vehicle body 23, two driving wheels 21 and two driven wheels 22. The two driving wheels 21 are arranged on the vehicle body 23, and each of the driving wheels 21 corresponds to one of the guide rails 11 and moves along the guide rail 11 under driving of the drive mechanism 50. The two driven wheels 22 are arranged on the vehicle body 23, and each of the driven wheels 23 corresponds to one of the guide rails 11. There are two driving wheels 21 and two driven wheels 22, and one driving wheel 21 and one driven wheel 22 are connected to each of the guide rails 11 to facilitate a more stable support of the vehicle body 23.

[0064] As shown in connection with FIG. 4, each of the driving wheels 21 and each of the driven wheels 22 include an inner wheel and an outer wheel, the inner wheel is in contact with a corresponding guide rail 11, the outer wheel is located inside the inner wheel, and a diameter of the outer wheel is larger than a diameter of the inner wheel, thereby ensuring that the driving wheel 21 and the driven wheel 22 moves forward along the guide rails 11 and preventing the driving wheel 21 and the driven wheel 22 from leaving the guide rails 11.

[0065] Specifically, as shown in connection with FIG. 3, the drive mechanism 50 includes a first motor 51, a first controller, a transmission belt 52 and a drive shaft 53. The first motor 51 is arranged on the vehicle body 23. The first controller is arranged on the vehicle body 23, and connected to the first motor 51 and the processor. The first controller is configured to receive the stop signal and control, according to the stop signal, the first motor 51 to stop. One end of the transmission belt 52 is connected to an output shaft of the first motor 51. The drive shaft 53 is rotatably connected to the vehicle body 23, and the two driving wheels 21 are arranged on two ends of the drive shaft 53. The other end of the transmission belt 52 is connected to the drive shaft 53.

[0066] When the inspection vehicle 20 travels, the first motor 51 runs. When a foreign matter is found, the processor generates a stop signal and sends the stop signal to the first controller. The first controller receives the stop signal and controls the first motor 51 to

stop, thereby driving the transmission belt 52 to stop rotating, so that the drive shaft 53 stops rotating. The two driving wheels 21 are respectively arranged at two ends of the drive shaft 53, so the drive shaft 53 drives the driving wheels 21 to stop rotating, and finally the vehicle body 23 stops moving forward.

[0067] As an embodiment, as shown in FIG. 1, the detection mechanism 30 includes a bracket 31 and a camera 32. A first end of the bracket 31 is fixed on the inspection vehicle 20. The camera 32 is rotatably connected to a second end of the bracket 31 and is connected to the processor, and the camera 32 is configured to acquire a real-time image of the power grid and send the real-time image to the processor. Preferably, the first end of the bracket 31 is fixed on the vehicle body 23, and the second end of the bracket is connected to the camera 32. The camera 32 and the bracket 31 are rotatably connected, therefore an angle of the camera 32 may be adjusted according to a relative height and angle between the power grid and the camera 32, so that an angle of view of the camera 32 is larger and captured images are clearer. The camera 32 is connected to the processor, and transmits the real-time image of the power grid to the processor.

[0068] As an embodiment, as shown in FIG. 5, the cleaning mechanism 40 includes a second motor 41, a second controller, a crank 42, a slider 43 and a brush 44. The second motor 41 is arranged on the inspection vehicle 20. The second controller is arranged on the inspection vehicle 20, and connected to the second motor 41 and the processor. The second controller is configured to receive the foreign matter cleaning signal and control, according to the foreign matter cleaning signal, the second motor 41 to start. A first end of the crank 42 is connected to an output shaft of the second motor 41. A first end of the slider 43 is rotatably connected to a second end of the crank 42, and a second end of the slider 43 is provided with a through hole. The brush 44 includes a brush rod 441 and a brush head 442. The brush rod 441 has a first end hinged on the inspection vehicle 20, a middle portion passing through the through hole, and a second end connected to the brush head 442. The brush head 442 can be in contact with the power grid. The brush rod 441 can swing around a hinge point between the brush rod 441 and the inspection vehicle 20, and a swing direction of the brush rod is consistent with a length direction of the power grid. In a direction perpendicular to the swing direction of the brush rod 441, the second motor 41 and the crank 42 are both located on a side of the brush rod 441.

[0069] When a foreign matter is found, the processor generates a foreign matter cleaning signal and sends the foreign matter cleaning signal to the second controller. The second controller receives the foreign matter cleaning signal and controls the second motor 41 to start. The second motor 41 drives the crank 42 to rotate, the crank 42 drives the slider 43 to rotate, and the slider 43 drives the brush rod 441 to swing around the hinge point. The second end of the brush rod 441 is connected to the brush head 442, and the brush head 442 is in contact with the power grid, so the brush rod 441 drives the brush head 442 to sweep the power grid. The brush rod 441 swings back and forth along the length direction of the power grid. In a direction perpendicular to the swing direction, the second motor 41 and the crank 42 are located on the side of the brush rod 441 to prevent the brush rod 441 from intersecting and colliding with the second motor 41 or the crank 42 during swinging.

[0070] Specifically, as shown in FIG. 6, the brush head 442 includes a housing 4421, a fan 4424 and a heater 4425. A first end of the housing 4421 is connected to the second end of the brush rod 441, and a second end of the housing 4421 is provided with bristles 4422. A side wall of the second end of the housing 4421 is provided with a plurality of air holes 4423 for blowing. The fan 4424 is arranged in a cavity of the housing 4421, and adapted to be connected to a power supply. The heater 4425 is arranged in the cavity of the housing 4421, is horizontally projected between the fan 4424 and the air holes 4423, and is adapted to be connected to the power supply. The fan 4424 and the heater 4425 are both connected to the second controller.

[0071] The fan 4424 is configured to blow air, and an air flow is blown out from the air holes 4423 to purge dust and foreign matters on the surface of the power grid. The bristles 4422 are configured to sweep dust and foreign matters. The combination of purging and sweeping enhances the cleaning effect. The heater 4425 is located between the fan and the air holes. The blown air is heated by the heater and then blown out from the air holes 4423 to dry moisture on the surface of the power grid or clean up frost, fog or ice attached on the surface of the power grid. The fan 4424 and the heater 4425 are both connected to the second controller, so the second controller can control the start and stop of the fan 4424 and the heater 4425.

[0072] As an embodiment, as shown in FIG. 7, the detection mechanism 30 is further configured to acquire an image of the power grid after the foreign matter is cleaned up, and send the image to the processor. The processor is further configured to compare the image of the power grid after the foreign matter is cleaned up with a preset image, and when no foreign matter is recognized, the processor is configured to generate a travel signal and send the travel signal to the drive mechanism 50, and generate a cleaning stop signal and send the cleaning stop signal to the cleaning mechanism 40. The drive mechanism 50 is configured to receive the travel signal and control the inspection vehicle 20 to travel forward. The cleaning mechanism 40 receives the cleaning stop signal and stops cleaning the foreign matter.

[0073] After the foreign matter is cleaned up, the detection mechanism 30 acquires an image of the power grid again and sends the image to the processor. The processor compares the image of the power grid after the foreign matter is cleaned up with a preset image. If a foreign matter is still recognized, the processor continuously generates a stop signal and sends the stop signal to the drive mechanism 50, the drive mechanism 50 controls, according to the stop signal, the inspection vehicle to stop moving; and the processor also generates a foreign matter cleaning signal and sends the foreign matter cleaning signal to the cleaning mechanism 40, and the cleaning mechanism 40 continuously cleans up the foreign matter. If no foreign matter is recognized, the processor generates a travel signal and sends the travel signal to the drive mechanism 50, the drive mechanism 50 controls, according to the travel signal, the inspection vehicle 20 to travel forward; and the processor also generates a cleaning stop signal and sends the cleaning stop signal to the cleaning mechanism 40, and the cleaning mechanism 40 receives the cleaning stop signal and stops cleaning up the foreign matter.

[0074] Preferably, the camera 32 acquires an image of the power grid and sends the image to the processor, and the processor compares the image of the power grid after the foreign matter is cleaned up with a preset image. If the foreign matter is still recognized, the processor continuously generates a stop signal and sends the stop signal to the first controller, and the first controller receives the stop signal and controls the first motor to stop; and the processor also generates a foreign matter cleaning signal and sends the foreign matter cleaning signal to the second controller, and the second controller receives

the foreign matter cleaning signal and controls the second motor to keep starting. If no foreign matter is recognized, the processor generates a travel signal and sends the travel signal to the first controller, and the first controller receives the travel signal and controls the first motor to run; and the processor also generates a cleaning stop signal and sends the cleaning stop signal to the second controller, and the second controller receives the cleaning stop signal and controls the second motor to stop.

[0075] Preferably, a surface of each of the track 10, the inspection vehicle 20, the detection mechanism 30, the cleaning mechanism 40, the drive mechanism 50, and the processor is provided with an insulating layer to prevent touching the power grid and causing a false alarm signal.

[0076] As an embodiment, the foreign matter removal apparatus for an electronic fence further includes a terminal controller. The processor is connected to the terminal controller through a wireless signal to perform a data interactive transmission. The management personnel can view the real-time image acquired by the detection mechanism 30 through the terminal controller, can control the processor to generate the stop signal, the foreign matter cleaning signal, the travel signal, or the cleaning stop signal, and can send instructions to the drive mechanism 50 and the cleaning mechanism 40 respectively.

[0077] The foreign matter removal apparatus for an electronic fence of the solution can be used to replace workers for inspection, and can automatically clean up a foreign matter when the foreign matter is found, thus saving both time and labour, reducing the workload of maintenance personnel, and improving production efficiency.

[0078] The above description is only the preferred embodiment of the disclosure and is not intended to limit the disclosure. Any modifications, equivalent replacements, improvements and the like made within the spirit and principle of the disclosure shall fall within the scope of protection of the disclosure.

CLAIMS

1. An automatic foreign matter removal apparatus for an electronic fence, comprising: a track adapted to be arranged on a wall, an inspection vehicle which is arranged on the track and movable along the track, a detection mechanism arranged on the inspection vehicle, a cleaning mechanism arranged on the inspection vehicle, a drive mechanism for driving the inspection vehicle to move along the track, and a processor arranged on the inspection vehicle, wherein

the detection mechanism is configured to acquire a real-time image of a power grid and send the real-time image to the processor;

the processor is configured to compare the real-time image acquired by the detection mechanism with a preset image, when a foreign matter is recognized in the real-time image, the processor is configured to generate a stop signal and send the stop signal to the drive mechanism, and generate a foreign matter cleaning signal and send the foreign matter cleaning signal to the cleaning mechanism;

the drive mechanism is configured to control, according to the stop signal, the inspection vehicle to stop moving; and

the cleaning mechanism is configured to clean up the foreign matter according to the foreign matter cleaning signal.

2. The automatic foreign matter removal apparatus for an electronic fence according to claim 1, wherein the track comprises two guide rails arranged in parallel, each guide rail being adapted to be fixed on the wall, and both the two guide rails being located on one side of the power grid.

3. The automatic foreign matter removal apparatus for an electronic fence according to claim 2, wherein the inspection vehicle comprises:

a vehicle body;

two driving wheels arranged on the vehicle body, each of the driving wheels corresponding to one of the guide rails and moving along the one of the guide rails under the

driving of the drive mechanism; and

two driven wheels arranged on the vehicle body, each of the driven wheels corresponding to one of the guide rails.

4. The automatic foreign matter removal apparatus for an electronic fence according to claim 3, wherein the drive mechanism comprises:

a first motor arranged on the vehicle body;

a first controller arranged on the vehicle body and connected to the first motor and the processor, the first controller being configured to receive the stop signal and control, according to the stop signal, the first motor to stop;

a transmission belt, one end of the transmission belt being connected to an output shaft of the first motor; and

a drive shaft rotatably connected to the vehicle body, the two driving wheels being arranged on two ends of the drive shaft, and the other end of the transmission belt being connected to the drive shaft.

5. The automatic foreign matter removal apparatus for an electronic fence according to claim 1, wherein the detection mechanism comprises:

a bracket, a first end of the bracket being fixed on the inspection vehicle; and

a camera rotatably connected to a second end of the bracket and connected to the processor, the camera being configured to acquire a real-time image of the power grid and send the real-time image to the processor.

6. The automatic foreign matter removal apparatus for an electronic fence according to claim 1, wherein the cleaning mechanism comprises:

a second motor arranged on the inspection vehicle;

a second controller arranged on the inspection vehicle and connected to the second motor and the processor, the second controller being configured to receive the foreign matter cleaning signal and control, according to the foreign matter cleaning signal, the second motor to start;

a crank, a first end of the crank being connected to an output shaft of the second motor;

a slider, a first end of the slider being rotatably connected to a second end of the crank and a second end of the slider being provided with a through hole; and

a brush comprising a brush rod and a brush head, the brush rod comprising a first end hinged on the inspection vehicle, a middle portion passing through the through hole, and a second end connected to the brush head, and the brush head being able to be in contact with the power grid, wherein

the brush rod is able to swing around a hinge point between the brush rod and the inspection vehicle, a swing direction of the brush rod being consistent with a length direction of the power grid, and the second motor and the crank are both located on a side of the brush rod, in a direction perpendicular to the swing direction of the brush rod.

7. The automatic foreign matter removal apparatus for an electronic fence according to claim 6, wherein the brush head comprises:

a housing, a first end of the housing being connected to the second end of the brush rod and a second end of the housing being provided with bristles, a side wall of the second end of the housing being provided with a plurality of air holes for blowing;

a fan arranged in a cavity of the housing and adapted to be connected to a power supply; and

a heater arranged in the cavity of the housing, horizontally projected between the fan and the air holes, and adapted to be connected to a power supply, wherein

the fan and the heater are both connected to the second controller.

8. The automatic foreign matter removal apparatus for an electronic fence according to any one of claims 1 to 7, wherein the detection mechanism is further configured to acquire an image of the power grid after the foreign matter is cleaned up, and send the image to the processor;

the processor is further configured to compare the image of the power grid after the foreign matter is cleaned up with a preset image, and when no foreign matter is recognized, the processor is configured to generate a travel signal and send the travel signal to the drive

mechanism, and generate a cleaning stop signal and send the cleaning stop signal to the cleaning mechanism;

the drive mechanism is configured to receive the travel signal and control the inspection vehicle to travel forward, and

the cleaning mechanism receives the cleaning stop signal and stops cleaning the foreign matter.

9. The automatic foreign matter removal apparatus for an electronic fence according to any one of claims 1 to 7, wherein a surface of each of the track, the inspection vehicle, the detection mechanism, the cleaning mechanism, the drive mechanism, and the processor is provided with an insulating layer.

10. The automatic foreign matter removal apparatus for an electronic fence according to any one of claims 1 to 7, further comprising a terminal controller, the processor being connected to the terminal controller through a wireless signal.