Design and Implementation of a Detachable Monitoring Biomass Boiler

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Abstract. This paper studies a removable monitoring biomass boiler, including the boiler body. One side of the boiler body is connected with a blanking pipe, the lower end of the middle part of the blanking pipe is provided with a protective cover, the side of the protective cover close to the boiler body is provided with a transparent protective plate, the protective cover is provided with a fixed block, the fixed block is provided with a camera, the transparent protective plate is arranged between the camera and the boiler body, and the shooting direction of the camera points to the boiler body. In this boiler, the camera can capture the combustion of fuel in the boiler body. The fuel is input into the boiler body through the blanking channel, which does not affect the shooting of the camera. The dust and flue gas generated during the combustion of biomass boiler will flow out through the blanking channel, and less dust and flue gas will adhere to the transparent protective plate in front of the camera, which is convenient for the camera to capture the combustion of fuel in the boiler body.

Keywords: Biomass; Boiler; Surveillance; Camera.

1. Introduction

Biomass boiler is a kind of boiler. The boiler using biomass energy as fuel is called biomass boiler. Biomass boiler has the disadvantages of uneven fuel feeding, poor feeding and blocking. Once it is not found in time, the feeding port of biomass boiler may deflagration, and more seriously, it may cause the fire suppression accident of biomass boiler. In view of the fact that the confined space at the fuel inlet of the biomass boiler in the production system cannot be monitored, but in order to ensure the stable operation of the production system, the monitoring cannot be lacked. The existing biomass boiler needs to be reconstructed on site. However, some existing manufacturers install the camera inside the biomass boiler, the camera is easy to be damaged, and the service life of the camera is not long, At the same time, the dust generated during the combustion of biomass boiler is easy to adhere to the lens of the camera or cover the shooting process of the camera, affecting the shooting process of the camera, thus affecting the combustion monitoring of biomass boiler[1].

2. Technical Design Scheme

A detachable monitoring biomass boiler comprises a boiler body 1, one side of the boiler body 1 is connected with a blanking pipe 2, the lower end of the middle part of the blanking pipe 2 is provided with a protective cover 4, the cross-sectional area of the protective cover 4 is less than the cross-sectional area of the blanking pipe 2, one side of the protective cover 4 is provided with a blanking channel arranged in the blanking pipe 2, and the side of the protective cover 4 close to the boiler body 1 is provided with a transparent protective plate 15, A fixed block 3 is arranged in the protective cover 4, a camera 5 is arranged on the fixed block 3, the transparent protective plate 15 is arranged between the camera 5 and the boiler body 1, the shooting direction of the camera 5 is parallel to the axis of the blanking pipe 2, and the shooting direction of the camera 5 points to the boiler body 1 to transmit the fuel to the boiler body 1 through the blanking pipe 2, and the fuel is burned in the boiler body 1, The camera 5 can capture the combustion of fuel in the boiler body 1. The fuel is input into the boiler body 1 through the blanking channel, which does not affect the shooting of the camera 5. The dust and flue gas with temperature generated during the combustion of biomass boiler will flow out through the blanking channel, and less dust and flue gas will adhere to the transparent protective plate 15 in front of the camera, which is convenient for the camera 5 to capture the combustion of fuel in

the boiler body 1, It does not affect the shooting process of the camera. At the same time, a protective cover 4 is set outside the camera 5 to reduce the damage to the camera 5 during the combustion of the boiler[2].

In order to facilitate the fuel to fall into the boiler body 1 smoothly in the blanking pipe 2, the upper end of the protective cover 4 is provided with a material guide plate 6 connected with the inner pipe wall of the blanking pipe 2.

In order to facilitate the dust and flue gas with temperature generated during the combustion of biomass boiler to pass through the blanking pipe 2 smoothly, the dust and flue gas with temperature usually floats upward to reduce the flow of the generated dust and flue gas in the direction of setting a transparent protective plate 15. The lower end of the guide plate 6 is connected with a deflector 7, and the protective cover 4 is set between the deflector 7 and the inner wall of the blanking pipe 2.

In order to facilitate the replacement of the camera in the protective cover 4, the position where the protective cover 4 is arranged on the blanking pipe 2 is provided with a hinged plate 8 hinged with the outer pipe wall of the blanking pipe 2, and the hinged plate 8 is fixedly connected with the fixed block 3.

In order to facilitate the connection and locking between the hinged plate 8 and the blanking pipe 2 and prevent non staff from damaging the camera, one end of the hinged plate 8 is hinged with the blanking pipe 2, and the other end of the hinged plate 8 is connected with the blanking pipe 2 through a locking piece 9. The locking piece 9 includes an extension 10 connected with the hinged plate 8, and the outer pipe wall of the blanking pipe 2 is provided with a groove 11 matched and clamped with the extension 10.

In order to facilitate the staff to remind others in the process of taking and replacing the camera, so that others will not start the boiler at this stage, the locking part 9 is provided with a connection switch; The connection switch comprises a first conductive contact 12 arranged at the end of the extension 10, and a second conductive contact 13 matched with the first conductive contact 12 is arranged in the groove 11; A display lamp 14 is arranged on the outer pipe wall of the blanking pipe 2, a power connection seat is arranged on the boiler body 1, the power connection seat is connected to the mains power, and the power connection seat, the connection switch and the display lamp 14 are connected in series. When a worker is replacing the camera, the first conductive contact 12 does not contact the second conductive contact 13, so that the connection switch is disconnected, and the display lamp 14 does not light up, It is convenient to inform people that it is not convenient to start the boiler at this time[3].

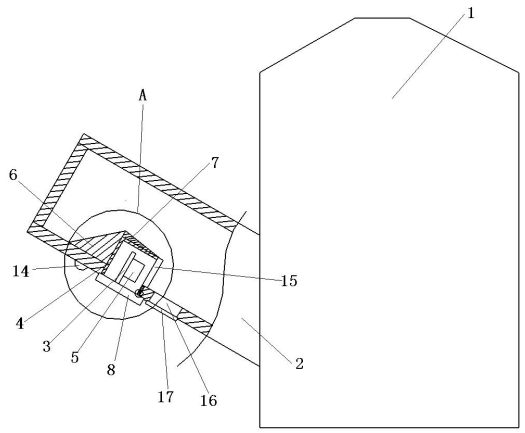


Fig 1. Structural diagram of an embodiment of a biomass boiler with detachable monitoring

Boiler body 1, blanking pipe 2, fixing block 3, protective cover 4, camera 5, guide plate 6, guide plate 7, hinged plate 8, locking part 9, protruding part 10, groove 11, first conductive contact 12, second conductive contact 13, display lamp 14, transparent protective plate 15, cleaning window 16 and hinged door 17.

3. Working Principle

The fuel burns in the boiler body 1. At the same time, the camera 5 can capture the combustion of the fuel in the boiler body 1. The fuel is input into the boiler body 1 through the blanking channel, which does not affect the shooting of the camera 5. The ash and flue gas with temperature generated during the combustion of the biomass boiler will flow out through the blanking channel, and less dust and flue gas will adhere to the transparent protective plate 15 in front of the camera, It is convenient for the camera 5 to shoot the combustion of fuel in the boiler body 1, which does not affect the shooting process of the camera. At the same time, a protective cover 4 is set outside the camera 5 to reduce the damage to the camera 5 during the combustion process of the boiler[4].

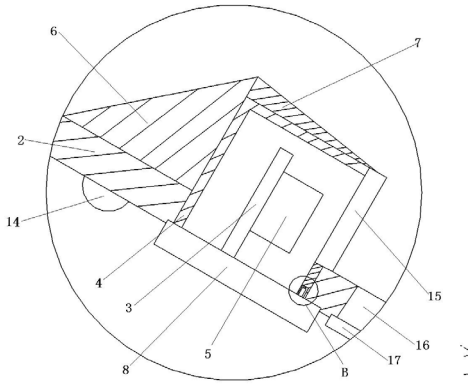


Fig 2. Is the enlarged structural diagram at a in Figure 1

In order to facilitate the staff to remind others in the process of taking and replacing the camera, so that others will not start the boiler at this stage, a connection switch is set on the locking part 9; The connection switch comprises a first conductive contact 12 arranged at the end of the extension 10, and a second conductive contact 13 matched with the first conductive contact 12 is arranged in the groove 11; The outer pipe wall of the blanking pipe 2 is provided with a display lamp 14 and a protection resistance. The boiler body 1 is provided with a power connection base, which is connected with the mains power, and the power connection base, the connection switch and the protection resistance are connected in series. The two ends of the connection switch are connected with the display lamp 14 in parallel. When a worker is replacing the camera, the first conductive contact 12 does not contact with the second conductive contact 13, so that the connection switch is disconnected, At this time, the display light 14 is on, which reminds people that it is not convenient to start the boiler at this time, and the camera is being replaced[5].

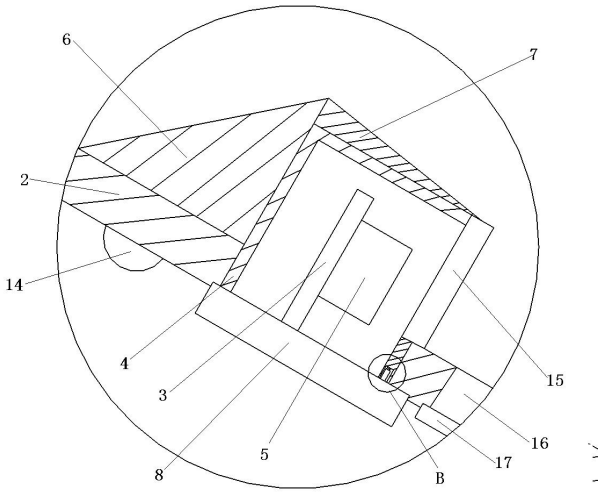


Fig 3. Is an enlarged structural diagram at B in Fig. 2

In order to facilitate the treatment of smoke and dust adhered to the transparent protective plate 15 and reduce the shooting process affecting the shooting process of the camera, the pipe wall of the blanking pipe 2 on one side of the transparent protective plate 15 is provided with a cleaning window 16, and the cleaning window 16 is connected with a hinged door 17. People clean the transparent protective plate 15 by opening the hinged door 17 and passing the cleaning parts through the cleaning window 16.

4. Conclusion

Compared with the prior art, the advantages of this design are:

1. The boiler is equipped with protective cover, transparent protective plate, camera and blanking pipe. The shooting direction of the camera is parallel to the axis of the blanking pipe, and the shooting direction of the camera points to the boiler body. The fuel is transmitted to the boiler body through the blanking pipe, and the fuel is burned in the boiler body. At the same time, the camera can capture the combustion of fuel in the boiler body, and the fuel is input into the boiler body through the blanking channel, It does not affect the shooting of the camera. The dust and flue gas generated during the combustion of the biomass boiler will flow out through the blanking channel, and less dust and flue gas will adhere to the transparent protective plate in front of the camera, which is convenient for the camera to shoot the combustion of fuel in the boiler body, which does not greatly affect the shooting process of the camera. At the same time, a protective cover is set outside the camera to reduce the damage to the camera during the combustion of the boiler.

2. The boiler is equipped with a guide plate and a guide plate. The guide plate is convenient for the fuel to fall into the boiler body smoothly in the blanking pipe. The guide plate is convenient for the dust and flue gas generated during the combustion of biomass boiler to pass through the blanking pipe smoothly, so as to reduce the flow of dust and flue gas to the direction provided with transparent protective plate.

3. The boiler is equipped with locking parts, protruding parts, grooves, first conductive contacts, second conductive contacts and display lights, so that the staff can remind others during the process of taking and replacing the camera, so that others will not start the boiler at this stage, and the locking parts are equipped with connecting switches; The connection switch comprises a first conductive contact arranged at the end of the extension, and a second conductive contact matched with the first conductive contact is arranged in the groove; A display lamp and a protection resistor are arranged on the outer pipe wall of the blanking pipe, a power connection base is arranged on the boiler body, the power connection base is connected to the mains power, the power connection base, the connection switch and the protection resistor are connected in series, and the two ends of the connection switch are connected with a display lamp in parallel. When a staff is replacing the camera, the first conductive contact does not contact with the second conductive contact, so that the connection switch is disconnected, and the display lamp is on at this time, The display light is on to remind people that it is not convenient to start the boiler at this time, and the camera is being replaced at this time.

4. The boiler is equipped with hinged plates, locking parts, protruding parts and grooves. In order to facilitate the removal and replacement of the camera in the protective cover, facilitate the connection and locking between the hinged plate and the blanking pipe, and prevent non staff from damaging the camera.

Acknowledgments

Supported by the scientific research project of Anhui Provincial Department of Education (KJ2021 A1512, KJ2021A1515).

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