

Development and Application of Special Tools for Removing Gas Inlet Plug

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Abstract

In order to reduce the damage to the plug itself caused by disassembly, and prevent the hidden danger caused by open fire, make it more convenient for maintenance personnel to disassemble the plug of the pipeline and improve the maintenance efficiency of the gas pipeline, a new tool for disassembling the plug is made. Through the rocker device, According to the interaction method of sleeve linkage end, processing transmission shaft and reducer output end, the disassembly force is increased, and the possible injury to employees during disassembly is also prevented. The experiment proves that this special tool for removing the gas inlet plug is more efficient and cost-effective than the traditional method. This special tool for removing the plug of gas inlet pipe can make the maintenance work of gas inlet end go smoothly when removing the plug of gas inlet pipe. Achieve the desired effect.

Keywords

Pipeline; Gas Into Account; Remove the Plug; Reducer; Rocker Device.

1. Quotation

It is understood that most gas pipelines are made of structural steel or stainless steel, and the diameter of gas pipelines is very large. Plug sealing structure It can be seen that the plug structures (including thread, cutting groove and R surface) within the inner end face of the plug nut are all immersed in the environment of sulfur-containing natural gas medium. In addition, the lower temperature of the root of the external plug causes the water in the feed gas to condense there, Make this part in a harsh corrosive environment. Due to the erosion of high temperature and the accumulation of oil, it is very likely that the plug will be difficult to disassemble.

Plug is used at the end of the pipeline to prevent the leakage of the pipeline and play a sealing role. Most of the existing plugs used in gas transmission pipelines have traditional design, which is inconvenient to disassemble and transport. In addition, when leakage occurs when the plug sealing structure is used, in order to achieve the sealing effect, on-site operation usually adopts re-fastening. however The re-tightening process will introduce a larger pre-tightening force, which will lead to an increase in stress at the root of the plug, and even overload. The stress on the root of the plug increases. Because the maintenance of the gas supply pipeline involves the disassembly of the plug, it is difficult to disassemble the plug due to corrosion and other reasons after many years of use. It is difficult to disassemble the plug only by a wrench or pipe pliers. If the wrench or pipe tongs are assisted by a casing, it may lead to loosening of other threaded joints of the pipeline, water leakage and air leakage, or distortion of the pipeline, which may lead to accidents and potential safety hazards, thus increasing the workload; If it can't be disassembled, open flame is used to heat the plug, so that the pipe will expand after being heated. Generally, the plug can be removed. However, open flame heating may

also ignite surrounding combustibles, wall insulation and other secondary accidents, and it is forbidden to use open flame for oil and gas pipelines. Sometimes the plug can't be removed by open fire, and even if it will bring some difficulties to the construction, the pipeline can only be cut off, resulting in some water supply and gas supply systems failing to operate normally. It seriously affects the transportation of urban water supply and gas supply pipelines and the implementation of pipeline maintenance, making it more difficult for pipeline maintenance staff. At present, there is no ideal method.

2. Research Content of Tools

In order to reduce the damage to the plug itself caused by disassembly, and prevent the potential safety hazard caused by open fire, make it more convenient for maintenance personnel to disassemble the pipe plug, and improve the maintenance efficiency of the gas pipeline, a new type of plug disassembly tool is made, which is required to enable employees to save time and labor when disassembling the inlet pipe plug, and it is small in size, complete in tools, easy to operate and light in weight. Low price, no open fire, and no safety accidents during operation. Its principle is to increase the dismantling force, and at the same time, to prevent possible injuries to employees in the process of dismantling. This design enables the maintenance of the gas inlet end to proceed smoothly.

3. Improvements Made in View of Market Research

3.1 For the Production Cost

At present, torque wrenches, hydraulic wrenches and pneumatic wrenches on the market are expensive, and the strength of ordinary wrenches is not enough. The NRV050-60 manual worm gear reducer (Figure 1) is selected. This reducer is light in weight, is a practical reducer, and is the fusion of domestic advanced technologies. The shell is cast by aluminum alloy, its outstanding features are light weight, superior strength, exquisite appearance, high heat dissipation performance, long service life, and noiseless movement. At the same time, it is extremely simple to connect with the motor, so it is a kind of practical transmission equipment. It can be directly connected with ordinary motors, stepless speed changers and flanged electromagnetic clutch brake sets, is suitable for all-round installation, and has relatively large output torque. The work is stable and reliable. Can play a role in safety protection. The transmission ratio is 60 (transmission ratio $i = \text{motor output revolution } \omega_a \div \text{reducer output revolution } \omega_b$), and the output torque is $123\text{N}\cdot\text{M}$ (reducer torque $= 9550 \times \text{motor power} \div \text{motor power input revolution} \times \text{speed ratio} \times \text{service coefficient}$), which is larger than ordinary wrenches, compact and light in size. The cost of the whole set of tools is about 1200 yuan, which is close to the price of electric wrenches. Compared with torque wrenches and hydraulic or pneumatic wrenches, its power transmission ratio is 60, which is much larger than the acting force of ordinary wrenches. It is not only cheap, but also can save time and labor.



Figure 1. Model diagram of reducer

3.2 For Device Improvement

Because the vertical distance between the gas inlet pipe and the surrounding obstacles is not enough, and manual disassembly is very difficult, the rocker device with simple operation (Figure 2) is adopted. Just fix the device on the inlet pipe and shake the operating rod. The specific principle is to process the transmission shaft according to the sleeve linkage end specification, and meet the output end specification of the reducer. According to the fact that the common wrench exerts force on the screw plug on both sides, To solve the problem of easy damage caused by plug, in order to ensure uniform stress, three sleeve specifications of 26mm, 28mm and 30mm are processed in combination with the specifications of square tenon of plug, and the specifications of linkage end should be consistent with the transmission shaft; Machining the fixed sleeve with the dimensions of $\phi \Phi 89\text{mm}$ and $\phi \Phi 108\text{mm}$. (The size of the casing is determined according to the common inlet, and the common inlet is DN40, DN50 and DN80). One end of the casing is cut according to the overall size of the inlet pipe tee. Four grooves are cut at the other end; According to the specifications of the reducer, process the box and install the reducer in the box; Two steel plates are welded under the box for clamping in the groove of the fixed sleeve, and the whole device is finished. What is important is that this tool can operate vertically and output power in the horizontal direction. The gas pipeline with narrow space can be disassembled and used, so the applicability is extremely strong.

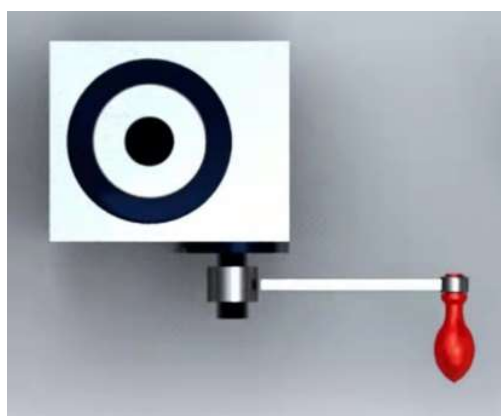


Figure 2. Rocker device

3.3 For Potential Safety Hazards

Due to the special environment in the gas pipeline, it is forbidden to Fire occurs, so you can't use open fire for heating. According to the different models of the reducer, the force acting on the plug of this device is increased by dozens of times, which can save wrench sleeve, open fire heating and other ways. There is no fire hazard in the whole operation process, and the safety is extremely high. This tool uses a reducer (purchased from the market) as a power tool, Steel pipes of different specifications are used as fixing brackets, which can easily remove the screw plug. In addition, the fulcrum of this tool is the tee under the screw plug, and other parts of the pipeline are basically stress-free, which can eliminate the looseness of the pipeline and other threaded joints.

3.4 For Labor Intensity

At present, the commonly used methods for removing the plug of gas inlet need more tools, which will not only cause inconvenience for maintenance personnel to carry, but also make it troublesome to purchase separately. The whole set of tools of this device can be put in a toolbox (Figure 3), including the main box, transmission shaft, fixing sleeve, operating rod, and equipped with a variety of operating heads matching the specifications of the plug square tenon, with a total weight of less than 15Kg (Table 1). It is very convenient to carry, which not only improves the disassembly efficiency and safety factor in the disassembly process, but also reduces the labor intensity of operators.



Figure 3. Device diagram

Table 1. Weight Parameters

Main body box	9.5kg
transmission shaft	2.3kg
Fixed sleeve	0.92kg
function lever	0.9kg
Operation head	0.75kg
other	0.5kg ³
gross weight	14.87kg

4. Market Evaluation

During the maintenance of No.67 Tongzenan, ZengHeping District, the whole tool installation process took 2-3 minutes, so it was easy to remove the plug of the inlet pipe within 1 minute. The tool has been used in more than 200 places, such as No.888-12 and No.888-16 Shengli South Street (Kyushu Bay Jinghui Community), Changqing Bay Community in Di Chin, No.61 Changde Street, Yuanyang Heping House Community, etc., all of which have shown good results.

5. Conclusion

In recent years, after the attention has been paid to the safety of gas, correspondingly, the requirements for the special tools for removing the household plug are getting higher and higher. This special tool for dismantling the gas inlet plug replaces the traditional maintenance tools in the past, which not only improves the dismantling efficiency and the safety factor in the dismantling process, but also reduces the labor intensity of operators. It also reduces the implementation of various production measures caused by the environment, and provides strong support for the control of production costs. After using the special tool for removing the gas inlet plug, because of its simple operation and convenient disassembly, the damage to the plug itself caused by disassembly is reduced, the maintenance efficiency of the gas inlet plug is improved, the flexibility of the gas inlet switch is ensured, the labor intensity of operators to remove the plug is also reduced, and the service life of the gas inlet plug and plug is prolonged. In the future, We will continue to promote the tools in the scope, track and improve the shortcomings of the tools in time, and strive to promote them in a larger scope and achieve good economic benefits.

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