DOUBLE ~~CLOSURE~~ FOR DOUBLE-CHAMBER DIFFERENTIAL PRESSURE ~~MEASUREMENT DEVICE~~

Field of the Art

The present invention relates to measuring the flow of fluids (gas or liquid) in pipes, and particularly to flow measuring apparatus having a plate provided, with an orifice having a smaller section than the flow circulation pipe and comprising a dual chamber for removing the plate with an orifice without interrupting the flow circulation, proposing a closure system which allows establishing a completely leak-tight isolation between the two chambers of the device when the plate with an orifice is removed.

State of the Art

To measure the flow of fluids circulating through pipes, flow meter devices which are intercalated in the pipe of application are known, there being several functional implementations of said devices.

A conventional solution of the aforementioned flow meter devices includes a plate provided with an orifice having a smaller section than the fluid circulation pipe in which the flow meter device is incorporated, said orifice being concentric with the section of the pipe of application in the functional arrangement, such that the flow of the gas or fluid circulating through the pipe increases in speed as it passes through that orifice, the increase in speed creating a pressure differential that can be measured to calculate the volumetric flow of fluid according to the section of the pipe.

In this functional arrangement the sharp edge of the orifice bore of the plate of these flow meter devices experiences wear due to the friction of the circulating gas or fluid, such that the plate with an orifice must be frequently removed for inspection, or replacement. Failure to replace or repair a plate exhibiting a worn sharp edge of the orifice manifests as increased percentage uncertainty in volumetric

superimposed positions between the two chambers of the corresponding flow meter, said closure elements having respective operating controls which allow the individual movement thereof from the outside between respective open and closed positions of each of them.

The closure elements ~~consist of angular plate valves which~~ are arranged in a sliding assembly in corresponding housings, with the possibility of movement between a sealed position for sealing the passage between the two chambers of the flow meter and an offset position with respect to said passage.

A closure system is thus obtained which, when the plate with an orifice of the flow meter is removed, from the main chamber where it is normally located in the functional position into the accessory extraction chamber, by means of moving one of the closure elements to the closed position, a seal is established in the passage between the two chambers, while the movement of the other closure element to the closed position assures complete leak-tightness of the seal, completely preventing the possibility of leaks between the two chambers, such that the flow meter is applicable for high-pressure fluid conduits, with the possibility of extracting and incorporating the plate with an orifice in a completely secure manner without having to interrupt the flow of the fluid since the dual closure system completely prevents leaks. This solution also satisfies the requirement of providing double isolation for health and safety purposes.

The closure system of the invention therefore has very advantageous features for the functional capacity of the flow meters for which it is intended, its application in said flow meters acquiring its own identity and preferred character.

Description of the Drawings

Figure 1 shows an outer perspective view of a flow meter provided with the closure system object of the invention.

Figure 2 shows a perspective view of the flow meter with

plate (3) the flow increases in speed, giving rise to a pressure differential the measurement of which allows determining the volumetric flow of the fluid.

The axial conduit (2) determines a main chamber in the flow meter in which the plate (3) provided with the orifice (4) is arranged in the normal functional position, as can be seen in Figures 3 and 4, said main chamber being communicated through a passage (5) with an accessory chamber (6), which is closed by a cover (7) that can be removed to leave it open to the outside.

With respect to the passage (5) communicating the main chamber defined by the axial conduit (2) with the accessory chamber (6), a practicable sealing closure is arranged between an open position and a closed position, such that when it is necessary to extract the plate (3) in order to inspect or replace it due to the wear of the orifice (4) by friction of the fluid passing there through in the flow meter application function, said plate (3) can be extracted from the main chamber defined by the axial conduit (2) to the accessory chamber (6), as shown in Figure 5.

Once this is done, the circulated fluid is prevented from passing to said accessory chamber (6) by closing the communication passage (5) between the axial conduit (2) and the accessory chamber (6), being able to remove the cover (7) to extract the plate (3), as depicted in Figure 2, such that the plate (3) can be extracted and introduced without having to interrupt the fluid flow through the axial conduit (2).

According to the invention, there is arranged between the main chamber defined by the axial conduit (2) and the accessory chamber (6) a closure formed by two independent ~~angular plate valves~~ (8 and 9) which are included in respective housings (10 and 11) intersecting the communication passage (5) between the axial conduit (2) and the accessory chamber (6) with the possibility of movement of each of said ~~angular plate valves~~ (8 and 9) in their respective housings

(10 and 11) between a position in which they do not interfere with the aforementioned passage (5) between the axial conduit (2) and the accessory chamber (6) and a position in which they interrupt said passage (5).

Therefore, when the plate (3) is in the accessory chamber (6), the seal of said passage (5) is established by means of the movement of the first ~~angular plate valve~~ (8) in its housing (10) to the position in which it interrupts the passage (5) between the axial conduit (2) and the accessory chamber (6), as depicted in Figure 6; and a second seal complementary to the seal established by the ~~angular plate valve~~ (8) is established by means of the movement of the second ~~angular plate valve~~ (9) in its housing (11) to the respective position in which it interrupts the passage (5), which determines a completely leak-tight closure which completely prevents any leak of the fluid circulating through the axial conduit (2) towards the accessory chamber (6).

That leak-tightness provided by the dual closure of this system of the invention between the axial conduit (2) and the accessory chamber (6) allows securely extracting and incorporating the plate (3) of the flow meter without interrupting the fluid circulation, even in applications for high-pressure fluid conduits, or in environments where double isolation is a requirement on Health and Safety grounds.

The ~~angular plate valves~~ (8 and 9) of the closure system of the passage (5) communicated with the main chamber defined by the axial conduit (2) and the accessory chamber (6) have respective controls (12 and 13) located on the outside of the flow meter, such that by actuating said controls (12 and 13) the aforementioned ~~angular plate valves~~ (8 and 9) of the closure system can move between their respective sealed and open positions for sealing and opening the passage (5) when necessary.

CLAIMS

1.- Double isolation for double chamber differential pressure meter for sealing a communication passage (5) between an axial fluid circulation conduit (2) which fluid is to be measured and an accessory chamber (6), there being arranged in the axial conduit (2) a plate (3) provided with an orifice (4) having a smaller section than said axial conduit (2) which can be extracted into the accessory chamber (6) to be removed without interrupting the flow of the fluid through the axial conduit (2), characterized in that in relation to the communication passage (5) there is arranged between the axial conduit (2) and the accessory chamber (6) a closure formed by two independent ~~angular plate valves~~ (8 and 9) which are included in respective housings (10 and 11) intersecting the passage (5) with the possibility of movement of each of said ~~angular plate valves~~ (8 and 9) in their respective housings (10 and 11) between a position in which they do not interfere with the aforementioned passage (5) and a position in which they interrupt said passage (5), establishing a dual closure between both ~~angular plate valves~~ (8 and 9) which determines a leak-tight seal for that passage (5).

2.- Double isolation for double chamber differential pressure meter according to claim 1, characterized in that the ~~angular plate valves~~ (8 and 9) have respective controls (12 and 13) located on the outside by means of which the movement of said ~~angular plate valves~~ (8 and 9) between their respective sealed and open positions for sealing and opening the passage (5) can be actuated.

DOUBLE ISOLATION FOR DOUBLE CHAMBER DIFFERENTIAL PRESSURE METER

Field of the Art

The present invention relates to measuring the flow of fluids (gas or liquid) in pipes, and particularly to flow measuring apparatus having a plate provided, with an orifice having a smaller section than the flow circulation pipe and comprising a dual chamber for removing the plate with an orifice without interrupting the flow circulation, proposing a closure system which allows establishing a completely leak-tight isolation between the two chambers of the device when the plate with an orifice is removed.

State of the Art

To measure the flow of fluids circulating through pipes, flow meter devices which are intercalated in the pipe of application are known, there being several functional implementations of said devices.

A conventional solution of the aforementioned flow meter devices includes a plate provided with an orifice having a smaller section than the fluid circulation pipe in which the flow meter device is incorporated, said orifice being concentric with the section of the pipe of application in the functional arrangement, such that the flow of the gas or fluid circulating through the pipe increases in speed as it passes through that orifice, the increase in speed creating a pressure differential that can be measured to calculate the volumetric flow of fluid according to the section of the pipe.

In this functional arrangement the sharp edge of the orifice bore of the plate of these flow meter devices experiences wear due to the friction of the circulating gas or fluid, such that the plate with an orifice must be frequently removed for inspection, or replacement. Failure to replace or repair a plate exhibiting a worn sharp edge of the orifice manifests as increased percentage uncertainty in volumetric

superimposed positions between the two chambers of the corresponding flow meter, said closure elements having respective operating controls which allow the individual movement thereof from the outside between respective open and closed positions of each of them.

The two independent closure elements are arranged in a sliding assembly in corresponding housings, with the possibility of movement between a sealed position for sealing the passage between the two chambers of the flow meter and an offset position with respect to said passage.

A closure system is thus obtained which, when the plate with an orifice of the flow meter is removed, from the main chamber where it is normally located in the functional position into the accessory extraction chamber, by means of moving one of the closure elements to the closed position, a seal is established in the passage between the two chambers, while the movement of the other closure element to the closed position assures complete leak-tightness of the seal, completely preventing the possibility of leaks between the two chambers, such that the flow meter is applicable for high-pressure fluid conduits, with the possibility of extracting and incorporating the plate with an orifice in a completely secure manner without having to interrupt the flow of the fluid since the dual closure system completely prevents leaks. This solution also satisfies the requirement of providing double isolation for health and safety purposes.

The closure system of the invention therefore has very advantageous features for the functional capacity of the flow meters for which it is intended, its application in said flow meters acquiring its own identity and preferred character.

Description of the Drawings

Figure 1 shows an outer perspective view of a flow meter provided with the closure system object of the invention.

Figure 2 shows a perspective view of the flow meter with

plate (3) the flow increases in speed, giving rise to a pressure differential the measurement of which allows determining the volumetric flow of the fluid.

The axial conduit (2) determines a main chamber in the flow meter in which the plate (3) provided with the orifice (4) is arranged in the normal functional position, as can be seen in Figures 3 and 4, said main chamber being communicated through a passage (5) with an accessory chamber (6), which is closed by a cover (7) that can be removed to leave it open to the outside.

With respect to the passage (5) communicating the main chamber defined by the axial conduit (2) with the accessory chamber (6), a practicable sealing closure is arranged between an open position and a closed position, such that when it is necessary to extract the plate (3) in order to inspect or replace it due to the wear of the orifice (4) by friction of the fluid passing there through in the flow meter application function, said plate (3) can be extracted from the main chamber defined by the axial conduit (2) to the accessory chamber (6), as shown in Figure 5.

Once this is done, the circulated fluid is prevented from passing to said accessory chamber (6) by closing the communication passage (5) between the axial conduit (2) and the accessory chamber (6), being able to remove the cover (7) to extract the plate (3), as depicted in Figure 2, such that the plate (3) can be extracted and introduced without having to interrupt the fluid flow through the axial conduit (2).

According to the invention, there is arranged between the main chamber defined by the axial conduit (2) and the accessory chamber (6) a closure formed by two independent closure elements (8 and 9) which are included in respective housings (10 and 11) intersecting the communication passage (5) between the axial conduit (2) and the accessory chamber (6) with the possibility of movement of each of said closure elements (8 and 9) in their respective housings

(10 and 11) between a position in which they do not interfere with the aforementioned passage (5) between the axial conduit (2) and the accessory chamber (6) and a position in which they interrupt said passage (5).

Therefore, when the plate (3) is in the accessory chamber (6), the seal of said passage (5) is established by means of the movement of the first closure element (8) in its housing (10) to the position in which it interrupts the passage (5) between the axial conduit (2) and the accessory chamber (6), as depicted in Figure 6; and a second seal complementary to the seal established by the first closure element (8) is established by means of the movement of the second closure element (9) in its housing (11) to the respective position in which it interrupts the passage (5), which determines a completely leak-tight closure which completely prevents any leak of the fluid circulating through the axial conduit (2) towards the accessory chamber (6).

That leak-tightness provided by the dual closure of this system of the invention between the axial conduit (2) and the accessory chamber (6) allows securely extracting and incorporating the plate (3) of the flow meter without interrupting the fluid circulation, even in applications for high-pressure fluid conduits, or in environments where double isolation is a requirement on Health and Safety grounds.

The closure elements (8 and 9) of the closure system of the passage (5) communicated with the main chamber defined by the axial conduit (2) and the accessory chamber (6) have respective controls (12 and 13) located on the outside of the flow meter, such that by actuating said controls (12 and 13) the aforementioned closure elements (8 and 9) of the closure system can move between their respective sealed and open positions for sealing and opening the passage (5) when necessary.

CLAIMS

1.- Double isolation for double chamber differential pressure meter for sealing a communication passage (5) between an axial fluid circulation conduit (2) which fluid is to be measured and an accessory chamber (6), there being arranged in the axial conduit (2) a plate (3) provided with an orifice (4) having a smaller section than said axial conduit (2) which can be extracted into the accessory chamber (6) to be removed without interrupting the flow of the fluid through the axial conduit (2), characterized in that in relation to the communication passage (5) there is arranged between the axial conduit (2) and the accessory chamber (6) a closure formed by two independent closure elements (8 and 9) which are included in respective housings (10 and 11) intersecting the passage (5) with the possibility of movement of each of said closure elements (8 and 9) in their respective housings (10 and 11) between a position in which they do not interfere with the aforementioned passage (5) and a position in which they interrupt said passage (5), establishing a dual closure between both closure elements (8 and 9) which determines a leak-tight seal for that passage (5).

2.- Double isolation for double chamber differential pressure meter according to claim 1, characterized in that the closure elements (8 and 9) have respective controls (12 and 13) located on the outside by means of which the movement of said closure elements (8 and 9) between their respective sealed and open positions for sealing and opening the passage (5) can be actuated.