

Valves, especially for a tubing string

The present invention relates to sleeve valves.

In particular, the present invention relates to sleeve valves which form a part of a tubing string. The valve may be of the type suitably to depend from a well packer.

In many instances it is desirable to be able to shift a sleeve valve between open and closed positions. It is also frequently desirable to shift the valve member of a sleeve valve with an operating tool which after the valve member is shifted, is released so that the positioning of the shifting tool is not critical or the shifting tool may move a further distance to perform other functions or to locate other equipment, or for other reasons it is desirable that the valve member be shifted and then released.

In the testing of wells, it is frequently desirable to be able to selectively produce the well through the tubing. In some instances, it is desirable to provide a sleeve valve, preferably depending from a packer, with ports which may be opened and closed to provide for flow from the well through the valve.

It is an aim of the present invention to provide a sleeve valve having a valve member shiftable between open and closed positions in which the shifting tool is released from the valve member automatically upon the valve member reaching either its open or closed position.

According to the present invention there is provided a sleeve valve, especially for a tubing string in a well, comprising a tubular body having a valve seat with which a tubular valve member can cooperate, the valve member being movable between open and closed positions to control flow through said valve seat, characterised in that spaced apart dog means are carried by the valve member and are resiliently biased to alternately cooperate with one of a number of spaced apart grooves provided in the body, to position the valve member alternately in an open or a closed position, said spaced dog means having confronting shoulders which are engageable by a flange on an actuator member when a dog means is retracted, to thus shift the valve member with reciprocation of the actuator member, each of said dog means releasing said actuator member as a dog means enters its cooperating groove.

In one embodiment of the present invention a shutter is provided to protect the seals in the system, which shutter is automatically operable in response to movement of the valve member.

Preferably the sleeve valve will utilise dog means in the form of latching collets, the collets being protected against damage during shifting of the valve member.

The present invention will now be further described, by way of example, with reference to the accompanying drawings in which:—

Figure 1 is a schematic illustration of a well

test installation employing a valve constructed in accordance with the present invention; and

Figure 2 is a cross-sectional view through one embodiment of a valve constructed in accordance with this invention and showing therein in cross-section an actuator tool.

In the drawings like reference numerals in both figures indicate like parts.

Referring first to Figure 1, there is shown a well having a casing 10 and standard surface equipment 11 at the top of the well. The casing and well are shown to be perforated at 12 in the region of the formation to be tested.

Within the well there is an assembly made up of a packer 14, foot valve 15, landing nipple 16, and transducer fitting 17 which are preferably run into the well and located in place in a preliminary operation as by conventional wire line techniques.

The test or production tubing 18 is shown to have a circulating valve 19, a cushion valve 21, and a seal unit 13 with the tail pipe of the seal unit in sealing engagement with the packer 14. During running of the tubing 18, the cushion valve may be utilized to support a column of fluid in the tubing which is released by opening of the cushion valve when the string engages the packer 14.

The packer 14 seals off the producing formation and the foot sleeve valve 15 controls the flow through the foot sleeve and into the tubing. The landing nipple and transducer fitting provide for locating a transducer such as a pressure sensing device within the fitting to sense the pressure in the casing and below the packer 14. With this assembly, static pressure in the formation below the packer as well as build-up pressure can be recorded or transmitted to the surface through a suitable electric line and flow can be provided through the foot sleeve valve to test the flow characteristics of the well.

During testing operation, the circulating valve 19 is normally closed. Conditions may arise, however, when it is desirable or imperative to provide for circulation between the casing-tubing annulus and the tubing. The circulating valve 19 may be quickly and readily opened to provide for such circulation.

The valve of this invention may be used in any desired setting. It was developed, however, to form a part of the testing system shown and its construction and operation will be explained in this setting. The invention, however, is not restricted to the system shown and the valve may be positioned other than in the relationship shown. For instance, it could be used as a circulating valve between the casing-tubing annulus and the bore of the tubing. It also might be positioned above the packer with suitable flow passages provided through the packer and connected to the controlled flow way through the

valve body.

In the system shown, the valve, which would conventionally be called a foot sleeve valve, is shown to be carried by the packer 14 and to have attached to its lower end additional equipment such as the landing nipple 16 and the transducer fitting 17 which close the lower end of the assembly. Of course, other or different equipment could be depended from the sleeve valve 15.

Referring to Figure 2, the body of the sleeve valve 15 is shown to be provided by a ported collar 22 provided with threads at its upper end for attachment to packer 14 and a lower body member 23 provided at its lower end with a thread system to which the landing nipple 16 may be threadedly attached. The two piece body is conveniently made in this form to provide easy access to a recess in which the seal indicated generally at 24 may be positioned.

The body is provided with a valve seat for controlling flow through the ports 25. In the form of valve illustrated, the bore 26 through the collar 22 provides a portion of the valve seat. In the form of valve illustrated, the shutter 28 provides the remainder of the valve seat, the internal bore 27 through the shutter 28, providing said remainder of the seat. The exterior surface 29 of the shutter cooperates with the seal indicated generally at 24 to complete the seal between the body and shutter.

To provide a part of a system for alternately positioning the valve member indicated generally at 31 in open or closed positions, the lower valve body 23 is provided with spaced annular grooves 32 and 33. The cooperation of these grooves with positioning means is described hereinbelow.

The valve member 31 is cooperable with the valve seat and movable between open and closed positions to control flow through the valve seat. The valve member 31 is tubular and seals 34 and 35 are carried in grooves on the exterior of the tubular valve member. The seal 34 cooperates with the portion 26 of the valve seat to provide a seal and the seal 35 cooperates with the shutter 28 to provide a seal. These seals, together with the shutter-body seal 24 control flow through the ports 25 by permitting flow when the valve member 31 is in the position shown and preventing flow when the valve member has been moved towards the collar 22 and seal 34 is in engagement with the seat 26.

In order to provide for shifting of the valve member 31, the valve member carries spaced apart dog means which are resiliently urged in a radially outward direction relative to the tubular valve member. Dog receiving grooves 32 and 33 are positioned radially outward from the valve member as shown in the illustrative embodiment, and the dogs are resiliently urged outwardly from the position they occupy when the dogs are not in a groove. The dog means are formed by collets 36 and 37 which are integral

with the valve member 31. However, the collets can be separate from the valve member and alternative dog means can be provided. These collets are preferably machined from the same blank of material as the valve member and the resiliency of the collet legs 36a and 37a, when bent, provides the resilient means urging the dogs outwardly into engagement with the grooves 32 and 33.

Intermediate the grooves 32 and 33, the valve body is provided with a land 30 which also cooperates with the spaced collets and supports against damage when they are not in grooves 32 and 33.

The collets have confronting shoulders 36b and 37b which cooperate with a flange such as flange 38 on the actuator tool indicated generally at 39 to provide for operation of the valve. It will be apparent from the dimensional relationship of the actuator flange 38 and the internal diameter of the collets 36 and 37 that movement of the actuator tool 39 through the valve will cause it to first engage the collet which is opposite the land 30 to shift the valve member until the collet can drop into its associated groove and then the flange 38 on the actuator tool is released to permit the actuator tool to continue movement in the same direction. As the engaging surfaces of the flange 38 and collets 36 and 37 are angled and wedge the collets radially outwardly, the land 30 protects the collets against damage during shifting of the valve member 31. Of course, as the actuator tool moves in the manner explained, the other of the collets is retracted behind the actuator tool flange to position it for engagement by the actuator tool flange on reversal of the direction of movement of the actuator tool.

When the collets are biased radially inwardly by the land 30, the resiliency of the collet fingers urges the collets outwardly into the grooves with which they respectively cooperate as the collets move off the land 30.

A shutter 28 is provided in an annular space between the valve member and the body, to protect the seals 34 and 35 as the valve member is shifted between open and closed positions. This annular space has two different diameter regions as shown at 41 and 42 to cooperate with shutter lugs 43 carried in ports 44 in the shutter and the groove 45 in the valve member 31. When the shutter lugs are in engagement with the region 41, they also reside in the groove 45 in the valve member and the shutter moves with the valve member. When the lugs are opposite the region 42, they move out of the groove 45 in the valve member and the valve member is free to move without moving the shutter at the same time. The shutter is limited in movement by the shoulder provided between the different diameter regions 41 and 42 and by the stop 46 in the ported collar 22. The shutter 28 is of course ancillary to the basic valve and can be omitted if so desired.

In use, the foot sleeve valve is carried by the

packer 14 and the packer and the sleeve valve and associated equipment therebelow are run into the well as with a wire line and the packer is set in position as shown in Figure 1. Preferably, a seal unit 13 is carried in the tubing which has an actuator therein to which the operator shown at 39 in Figure 2 is attached so that manipulation of the actuator in the seal unit 13 will move the operator 39 vertically in the well and effect opening and closing of the foot sleeve valve 15.

The foot sleeve valve will normally be closed and the actuator 39 positioned with its actuating flange 38 above the collet 37 as viewed in Figure 2, with the valve member 31 in its upper or closed position and the collet 36 residing in groove 32. As the position of the actuator is not critical, it may be in any position above the shoulder 37b of collet 37 with the collet 36 in the groove 32. Movement of the actuator downward as viewed in Figure 2 moves the flange 38 into engagement with the shoulder 37b on collet 37. Continued movement of the actuator begins movement of the valve member downwardly as viewed in Figure 2. At this time, the shutter lug 43 is in engagement with the bore region 42 and the groove 45 will be spaced above the shutter lug. With the shutter held in the closed position, the valve member moves into the shutter until the seal 34 has passed over the abutment 46 and the seal 34 resides within the protection of the shutter 28. At this time, the groove 45 moves behind the lug 43 and the lug falls into the groove and the shutter moves with the valve member. The valve member continues to move downwardly as viewed in Figure 2 until the collet 37 snaps into the groove 33 in the valve body and in so doing releases the actuator flange 38 thus permitting the flange to continue movement downwardly without effect on the valve member 31. The valve is now in the fully open position and flow can take place through the ports 25. When it is desired to close the valve, the seal unit 13 is operated to raise the actuator and move the flange 38 up into engagement with the collet 36 which is now held in a tensioned radially inward position by the land 30. The flange 38 engages the shoulder 36b of collet 36 and moves the system upwardly as viewed in Figure 2. After the shutter has moved into engagement with stop 46, the valve member continues movement upwardly as the lug 43 is released to move the seal 34 over seat 26 and positively block flow through the valve. As the collet 36 moves into the groove 32, the actuating flange 38 is released and the actuator may continue upward movement. At this time, the collet 37 is held in its retracted position by the land 30 and is in position to be engaged by the actuator flange 38 if the actuator is again moved downwardly. It will be appreciated that the actuator is free to move upwardly after the valve is fully closed and thus the relationship of the actuator flange and the collets again is not critical.

It will be appreciated that the valve may be opened and closed as many times as desired merely by reciprocating the actuator 39.

The frictional engagement of the parts will normally prevent overrun of the valve member upon release of the flange 38. To insure against upward overrun the upwardly looking face of collet 36 is square and engages a flat downwardly looking shoulder in groove 32. Downward overrun is prevented by interengageable shoulders on the valve member and shutter 28 and body 23. If desired, overrun could be prevented in other ways such as a square shoulder looking upwardly in groove 33 (as viewed in the drawings) to cooperate with collet 37.

The foregoing disclosure and description of the invention are illustrative and explanatory thereof, and various changes in the size, shape and materials, as well as in the details of the illustrated construction, may be made within the scope of the appended claims without departing from the present invention.

Claims

1. A sleeve valve (15), especially for a tubing string in a well, comprising a tubular body (22, 23) having a valve seat (26) with which a tubular valve member (31) can cooperate, the valve member (31) being movable between open and closed positions to control flow through said valve seat (26), characterised in that spaced apart dog means (36, 37) are carried by the valve member (31) and are resiliently biased to alternately cooperate with one of a number of spaced apart grooves (32, 33) provided in the body (23), to position the valve member (31) alternately in an open or a closed position, said spaced dog means (36, 37) having confronting shoulders (36b, 37b) which are engageable by a flange (38) on an actuator member (39) when a dog means (36, 37) is retracted, to thus shift the valve member (31) with reciprocation of the actuator member (39), each of said dog means (36, 37) releasing said actuator member (39) as a dog means (36, 37) enters its cooperating groove (32, 33).

2. A sleeve valve as claimed in claim 1, characterised in that both said dog means are provided by collets (36, 37).

3. A sleeve valve as claimed in claim 1 or 2, characterised in that seal means (34, 35) are provided on the exterior of the valve member (31), and a valve shutter (28) is provided around the valve member (31), cooperating lugs (43) and shoulder means (44, 45) being provided on the body (23), shutter (28) and valve member (31), latching the shutter (28) to the body (23) as the valve member (31) moves towards the open position until the seal means (34, 35) is within the shutter (28) and then latching the shutter (28) to the valve member (31) and said lug (43) and shoulder means (44, 45) also latching the shutter (28) to the valve member (31) as it moves towards the closed position until the



packer 14 and the packer and the sleeve valve and associated equipment therebelow are run into the well as with a wire line and the packer is set in position as shown in Figure 1. Preferably, a seal unit 13 is carried in the tubing which has an actuator therein to which the operator shown at 39 in Figure 2 is attached so that manipulation of the actuator in the seal unit 13 will move the operator 39 vertically in the well and effect opening and closing of the foot sleeve valve 15.

The foot sleeve valve will normally be closed and the actuator 39 positioned with its actuating flange 38 above the collet 37 as viewed in Figure 2, with the valve member 31 in its upper or closed position and the collet 36 residing in groove 32. As the position of the actuator is not critical, it may be in any position above the shoulder 37b of collet 37 with the collet 36 in the groove 32. Movement of the actuator downward as viewed in Figure 2 moves the flange 38 into engagement with the shoulder 37b on collet 37. Continued movement of the actuator begins movement of the valve member downwardly as viewed in Figure 2. At this time, the shutter lug 43 is in engagement with the bore region 42 and the groove 45 will be spaced above the shutter lug. With the shutter held in the closed position, the valve member moves into the shutter until the seal 34 has passed over the abutment 46 and the seal 34 resides within the protection of the shutter 28. At this time, the groove 45 moves behind the lug 43 and the lug falls into the groove and the shutter moves with the valve member. The valve member continues to move downwardly as viewed in Figure 2 until the collet 37 snaps into the groove 33 in the valve body and in so doing releases the actuator flange 38 thus permitting the flange to continue movement downwardly without effect on the valve member 31. The valve is now in the fully open position and flow can take place through the ports 25. When it is desired to close the valve, the seal unit 13 is operated to raise the actuator and move the flange 38 up into engagement with the collet 36 which is now held in a tensioned radially inward position by the land 30. The flange 38 engages the shoulder 36b of collet 36 and moves the system upwardly as viewed in Figure 2. After the shutter has moved into engagement with stop 46, the valve member continues movement upwardly as the lug 43 is released to move the seal 34 over seat 26 and positively block flow through the valve. As the collet 36 moves into the groove 32, the actuating flange 38 is released and the actuator may continue upward movement. At this time, the collet 37 is held in its retracted position by the land 30 and is in position to be engaged by the actuator flange 38 if the actuator is again moved downwardly. It will be appreciated that the actuator is free to move upwardly after the valve is fully closed and thus the relationship of the actuator flange and the collets again is not critical.

It will be appreciated that the valve may be opened and closed as many times as desired merely by reciprocating the actuator 39.

The frictional engagement of the parts will normally prevent overrun of the valve member upon release of the flange 38. To insure against upward overrun the upwardly looking face of collet 36 is square and engages a flat downwardly looking shoulder in groove 32. Downward overrun is prevented by interengageable shoulders on the valve member and shutter 28 and body 23. If desired, overrun could be prevented in other ways such as a square shoulder looking upwardly in groove 33 (as viewed in the drawings) to cooperate with collet 37.

The foregoing disclosure and description of the invention are illustrative and explanatory thereof, and various changes in the size, shape and materials, as well as in the details of the illustrated construction, may be made within the scope of the appended claims without departing from the present invention.

Claims

1. A sleeve valve (15), especially for a tubing string in a well, comprising a tubular body (22, 23) having a valve seat (26) with which a tubular valve member (31) can cooperate, the valve member (31) being movable between open and closed positions to control flow through said valve seat (26), characterised in that spaced apart dog means (36, 37) are carried by the valve member (31) and are resiliently biased to alternately cooperate with one of a number of spaced apart grooves (32, 33) provided in the body (23), to position the valve member (31) alternately in an open or a closed position, said spaced dog means (36, 37) having confronting shoulders (36b, 37b) which are engageable by a flange (38) on an actuator member (39) when a dog means (36, 37) is retracted, to thus shift the valve member (31) with reciprocation of the actuator member (39), each of said dog means (36, 37) releasing said actuator member (39) as a dog means (36, 37) enters its cooperating groove (32, 33).

2. A sleeve valve as claimed in claim 1, characterised in that both said dog means are provided by collets (36, 37).

3. A sleeve valve as claimed in claim 1 or 2, characterised in that seal means (34, 35) are provided on the exterior of the valve member (31), and a valve shutter (28) is provided around the valve member (31), cooperating lugs (43) and shoulder means (44, 45) being provided on the body (23), shutter (28) and valve member (31), latching the shutter (28) to the body (23) as the valve member (31) moves towards the open position until the seal means (34, 35) is within the shutter (28) and then latching the shutter (28) to the valve member (31) and said lug (43) and shoulder means (44, 45) also latching the shutter (28) to the valve member (31) as it moves towards the closed position until the



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shutter (28) is closed and then latching the shutter (28) to the body (23).

4. A sleeve valve as claimed in claim 1, characterised in that both dog means (36, 37) are integral parts of the valve member (31).

5. A sleeve valve according to one of the preceding claims characterised in that the body (22, 23) comprises a collar (22) and a lower body member (23), the collar (22) having a valve seat (26) located therein and ports (25) extending through the wall thereof, that the tubular valve member (31) is arranged in said body (22, 23) to cooperate with said valve (26) to close said ports (25).

6. A sleeve valve according to one of the preceding claims, characterised in that the lower body member (23) has a land (30) between adjacent grooves (32, 33) serving to vary the lateral position of the dog means (36, 37) which are biased into engagement with the land (30) or grooves (32, 33) said spaced dog means (36, 37) having confronting shoulders (36b, 37b) which are engageable by a flange (38) on said actuator member (39) when the dog means (36, 37) engages said land (30), to thus shift the valve member (31) with reciprocation of the actuator member (39), each of said dog means (36, 37) releasing said actuator member (39) as a dog means (36, 37) leaves the land (30) and enters its cooperating grooves (32, 33).

Patentansprüche

1. Buchsenventil (15), insbesondere für einen Rohrstrang in einem Bohrloch, mit einem rohrförmigen Körper (22, 23), der einen Ventilsitz (26) hat, mit welchem ein rohrförmiges Ventilelement (31) zusammenwirken kann, wobei das Ventilelement (31) zwischen Offen- und Schließstellungen bewegbar ist, um den Strom durch den Ventilsitz (26) zu steuern, dadurch gekennzeichnet, daß von dem Ventilelement (31) im Abstand angeordnete Mitnehmereinrichtungen (36, 37) getragen werden und elastisch vorgespannt sind, so daß sie abwechselnd mit einer Nut aus einer Anzahl von im Abstand angeordneten, in dem Körper (23) vorgesehenen Nuten (32, 33) zusammenwirken, um das Ventilelement (31) abwechselnd in einer Offenstellung oder einer Schließstellung zu positionieren, wobei die Mitnehmereinrichtungen (36, 37) gegenüberliegende Schultern (36b, 37b) aufweisen, die durch einen Flansch (38) auf einem Betätigungsteil (39) in Eingriff bringbar sind, wenn eine Mitnehmereinrichtung (36, 37) zurückgezogen wird, um so das Ventilelement (31) bei einer Hin- und Herbewegung des Betätigungsteils (39) zu verschieben, und wobei jede Mitnehmereinrichtung (36, 37) das Betätigungsteil (39) freigibt, wenn eine Mitnehmereinrichtung (36, 37) in seine für das Zusammenwirken vorgesehene Nut (32, 33) eintritt.

2. Buchsenventil nach Anspruch 1, dadurch

gekennzeichnet, daß beide Mitnehmereinrichtungen von Klemmhülsen (36, 37) gebildet werden.

3. Buchsenventil nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß an der Außenseite des Ventilelements (31) Dichtungseinrichtungen (34, 35) vorgesehen sind, daß um das Ventilelement (31) herum ein Ventilverschluß (28) vorgesehen ist, daß zusammenwirkende Ansätze (43) und Schultereinrichtungen (44, 45) an dem Körper (23), dem Verschluß (28) und dem Ventilelement (31) vorgesehen sind, die den Verschluß (28) am Körper (23) arretieren, wenn das Ventilelement (31) sich zur Offenstellung bewegt, bis sich die Dichtungseinrichtung (34, 35) in dem Verschluß (28) befindet, und dann der Verschluß (28) an dem Ventilelement (31) arretiert wird und der Ansatz (43) und die Schultereinrichtung (44, 45) den Verschluß (28) ebenfalls am Arretierelement (31) arretieren, wenn es sich in die Schließstellung bewegt, bis der Verschluß (28) geschlossen ist, wonach der Verschluß (28) am Körper (23) arretiert wird.

4. Buchsenventil nach Anspruch 1, dadurch gekennzeichnet, daß beide Mitnehmereinrichtungen (36, 37) einstückige Teile des Ventilelements (31) sind.

5. Buchsenventil nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß der Körper (22, 23) einen Bund (22) und ein unteres Körperelement (23) aufweist, wobei der Bund (22) einen in ihm positionierten Ventilsitz (26) und Öffnungen (25) aufweist, die sich durch seine Wand erstrecken, und daß das rohrförmige Ventilelement (31) in den Körper (22, 23) für ein Zusammenwirken mit dem Ventil (26) angeordnet ist, um die Öffnungen (25) zu schließen.

6. Buchsenventil nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß das untere Körperelement (23) einen Steg (30) zwischen benachbarten Nuten (32, 33) aufweist, der dazu dient, die seitliche Position der Mitnehmereinrichtungen (36, 37) zu variieren, die in die Eingriffsstellung mit dem Steg (30) oder den Nuten (32, 33) vorgespannt sind, wobei die im Abstand angeordneten Mitnehmereinrichtungen (36, 37) einander zugewandte Schultern (36b, 37b) aufweisen, an denen ein Flansch (38) an dem Betätigungsteil (39) angreifen kann, wenn die Mitnehmereinrichtungen (36, 37) am Steg (30) angreifen und so das Ventilelement (31) bei einer Hin- und Herbewegung des Betätigungsteils (39) verschieben, und wobei die Mitnehmereinrichtungen (36, 37) das Betätigungsteil (39) freigeben, wenn eine Mitnehmereinrichtung (36, 37) den Steg (30) verläßt und in seine mit ihm zusammenwirkende Nut (32, 33) eintritt.

Revendications

1. Vanne à fourreau (15), spécialement pour train de tubes de forage dans un puits, com-



prenant un corps tubulaire (22, 23) présentant un siège (26) avec lequel peut coopérer un obturateur tubulaire (31), cet obturateur (31) étant mobile entre des positions d'ouverture et de fermeture pour commander l'écoulement à travers le siège (26), caractérisée par le fait que l'obturateur (31) porte des cliquets espacés (36, 37) qui sont repoussés élastiquement pour coopérer tour à tour avec l'une de plusieurs gorges espacées (32, 33) prévues dans le corps (23), pour amener l'obturateur (31) alternativement dans une position d'ouverture ou une position de fermeture, ces cliquets espacés (36, 37) présentant des épaulements en regard (36b, 37b) avec lesquels une bride (38) d'un élément de manoeuvre (39) peut venir en prise quand un cliquet (36, 37) est rétracté, pour ainsi déplacer l'obturateur (31) par va-et-vient de l'élément de manoeuvre (39), chacun des cliquets (36, 37) libérant l'élément de manoeuvre (39) quand un cliquet (36, 37) entre dans la gorge (32, 33) qui lui est associée.

2. Vanne à fourreau selon la revendication 1, caractérisée par le fait que les deux cliquets sont formés par des collets (36, 37).

3. Vanne à fourreau selon l'une des revendications 1 et 2, caractérisée par le fait que des moyens d'étanchéité (34, 35) sont prévus à l'extérieur de l'obturateur (31) et qu'un volet (28) est prévu autour de l'obturateur (31), des ergots (43) et des épaulements (44, 45) coopérants étant prévus sur le corps (23), le volet (28) et l'obturateur (31), verrouillant le volet (28) au corps (23) quand l'obturateur (31) se déplace vers sa position d'ouverture jusqu'à ce que les moyens d'étanchéité (34, 35) soient à l'intérieur du volet (28) et verrouillant ensuite le volet

(28) à l'obturateur (31), et l'ergot (43) et les épaulements (44, 45) verrouillant aussi le volet (28) à l'obturateur (31) quand celui-ci se déplace vers sa position de fermeture jusqu'à ce que le volet (28) soit fermé et verrouillant ensuite le volet (28) au corps (23).

4. Vanne à fourreau selon la revendication 1, caractérisée par le fait que les deux cliquets (36, 37) font corps avec l'obturateur (31).

5. Vanne à fourreau selon l'une des revendications 1 à 4, caractérisée par le fait que le corps (22, 23) comprend un collet (22) et une partie inférieure (23), le collet (22) présentant un siège (26) à l'intérieur et des orifices (25) traversant sa paroi, et que l'obturateur tubulaire (31) est placé dans ce corps (22, 23) de façon à coopérer avec le siège (26) pour fermer les orifices (25).

6. Vanne à fourreau selon l'une des revendications 1 à 5, caractérisée par le fait que la partie inférieure (23) du corps présente une paroi intermédiaire (30) entre des gorges voisines (32, 33), lesquels servent à faire varier la position latérale des cliquets (36, 37), qui sont poussés en prise avec la paroi (30) ou les gorges (32, 33), les cliquets espacés (36, 37) présentant des épaulements en regard (36b, 37b) avec lesquels une bride (38) de l'élément de manoeuvre (39) peut venir en prise quand ils sont en prise avec la paroi (30), pour ainsi déplacer l'obturateur (31) par va-et-vient de l'élément de manoeuvre (39), chacun des cliquets (36, 37) libérant l'élément de manoeuvre (39) quand un cliquet (36, 37) quitte la paroi (30) et entre dans la gorge (32, 33) qui lui est associée.

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