The valve having been provided with an axially displaceable annular piston serves for restricting or stopping the stream of the medium, in particular in pipelines. The valve has a closing head fixed in the medium flow by means of elements allowing the medium stream to pass, carrying the closing head, furtheron it is provided with a house being connected to the bearing element; the house is designed so as to permit the placing in of the closing head. Between the house and the bearing element there is a gap occupied by the axially displaceable annular piston. The valve is provided with means for displacing the annular piston; at least on the outer and/or inner mantle surface of the annular piston sealing elements are arranged stopping the axial stream of the medium. The aperture having been formed in the house, the bearing element or in the annular piston is leading to the space behind the annular piston.
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VALVE WITH AN AXIALLY DISPLACEABLE ANNULAR PISTON

Technical Field

The invention relates to a valve with an axially displaceable annular piston, in particular for pipelines for limiting or stopping the stream of the medium.

Background Art

From the French Patent FR-PS 234 790 an axial valve is known, the tubular closing element of which is arranged directly in the streaming medium, while to both frontal plates elastic bellows are fixed in such a manner that the system performing displacement from outside is hermetically separated from the streaming medium. By the axial displacement of the tubular closing element the annular flow-cross-section between said closing element and the regulating body having been placed into the straming medium may be decreased or increased, thus controlling the flow.

However, it became obvious that due to the restricted strength of the elastic bellows, with increased size, pressure and temperature this type of valve did not prove suitable. Besides, the bellows with a corrugated surface are staying in a direct contact with the streaming medium, as a consequence, straming losses are also increased. Since the closing element - at least in its closed position - is loaded by the force resulting from the pressure of the medium, putting in motion requires - in particular with increased pressure and size - a high-capacity drive unit, being most disadvantageous from the point
of view of material - and energy consumption. A further drawback lies in that the valve is unsuitable for automatic control and quick closing, as actuating requires external intervention.

Disclosure of Invention

The task of the invention is to develop a valve with an axially displaceable annular piston, which can be applied within the size-, pressure-, temperature and medium range required by the industry, being suitable for quick closing and control, respectively, by a local or remote intervention, or even without any external intervention; a further requirement lies in that compared to known armatures - displacement of the closing element should require less force, structural length should be less and as a result specific material consumption and streaming losses in the open position could be also diminished.

According to the invention the task set is solved in such a manner that the valve has a closing head having been arranged in the streaming medium, a bearing element being fixed in the stream by elements permitting the medium to pass, carrying the closing head, a house being connected to the bearing element and allowing the installation of the closing head, furtheron between the house and the bearing element there is a gap with an annular cross-section, in which the axially displaceable annular piston is arranged, at last there is a device for moving the annular piston and on the outer and/or inner mantle surface of the annular
piston there is a sealing element preventing the flow in axial direction.

It seems to be advantageous to form an aperture in the bearing element, or in the house or in the annular piston, which is leading to the space behind the annular piston.

A further advantage may be achieved when the moving devices having been connected to the annular piston are protected against the medium by using a pair of sealing elements enclosing the moving devices on the mantle surface of the piston.

With a preferred embodiment of the invention the moving device is mechanically connected to the annular piston in such a manner that on the outer mantle surface either an axial toothed, or a groove running perpendicularly to the axis is formed, while the moving device is engaged with said groove by means of the moving thread having been formed on the inner mantle surface, or through a motion transferring ring being connected to the annular piston being secured against rotation, or by means of a directly geared wheel, or by means of an eccentric moving pin matching to the groove of the annular piston being secured against rotation. Said moving elements are attached to the axis of the moving device or are formed as a monolithic unit therewith. The axis is clamped either in the aperture of the house or in the radially and axially acting bearing in the drive house which may be formed as an independent unit. Rotary motion is induced by a directly or indirectly connected drive unit - in case of necessity being formed in a self-closing manner for
preventing the unwanted axial displacement of
the annular piston - which is actuated manu-
ally or with a snap magnet, or by means of di-
versely driven motors, or hydraulically or pneu-
matically; the drive unit is protected against
the medium by means of a sealing element.

The embodiment may be considered also as advan-
tageous, with which the axial displacement of
the annular piston being secured against rota-
tion is solved in such a manner that on the out-
er mantle surface a moving thread is formed.
There to a motion transferring ring with an inner
moving thread and being limited in axial direc-
tion is connected, which is formed as the rotor
of an electric motor. Rotary movement thereof is
ensured by the coil forming the stator of the
said electric motor and being arranged on the
outer surface of the house.

With another preferred embodiment sealing elements
are arranged along the outer and inner mantle sur-
face of the annular piston, which are closing the
path of the axial flow of the medium, while an
aperture formed in the house is leading to the
space behind the annular piston, serving e.g. for
the introduction of an external control medium.

The embodiment, with which one or more shoulders
are formed on the outer and/or inner mantle sur-
face of the annular piston, is most advantageous,
in particular from the point of view of control
technique. The space or spaces being confined by
the shoulder(s), the house and/or the bearing
element are closed by sealing elements. In the
house and/or in the bearing element and/or in the
annular piston one or more apertures are formed leading to said spaces; by the aid of the aperture(s) the position of the annular piston can be well influenced either by inner and/or by outer media.

The embodiment with which a spring exerting influence onto the annular piston is applied, yields a further possibility for control and displacement.

With a further preferred embodiment of the invention on the outer part of the house one or more snap magnets are arranged, under the influence of which the annular piston can be displaced axially. By using a spring and/or a control unit affecting the snapping force of the previously mentioned snap magnet, the valve is well suitable for quick closing or as a control valve, even for remote operation.

The embodiment can be considered as advantageous, with which the annular piston is axially displaced by means of an intermediate working medium in such a manner that the working cylinder storing the working medium and being provided with the apertures for the inflow and outflow thereof, is connected to the orifice confined with the sealing elements within the bearing element or the house. In the working cylinder a piston - preferably with a piston rod - is arranged for limiting and moving the working medium so, as to prevent the axial medium flow along the mantle surface by using sealing elements. The aperture leading to the space above the piston is connected either to the streaming medium, or to an
outer medium, or into the open air, or in a
previously already described manner to the
orifice in the house or the bearing element,
being closed by the sealing elements, thus
it becomes possible to influence the force
needed for the displacement of the piston or
to move the annular piston back and forth by
the aid of the working medium. Displacement
of the piston is performed by means of a mov-
ing unit, which is fixed to the working cylinder
and eventually closing the same, displacing the
piston in an axial direction and being connected
directly or indirectly thereto, in a given case
formed in a selfclosing manner as to prevent un-
wanted displacement of the annular piston, while
actuation of said moving unit is performed either
manually, or with a snap magnet, or motor driven
in different way, hydraulically or pneumatically
and which in a given case is separated from the
working cylinder by means of sealing elements.

Displacement of the annular piston can be carried
out that way too that into one or more apertures
leading into the spaces having been closed by the
sealing elements within the house and/or the bear-
ing element, an own and/or external medium is
connected. Furthermore, it becomes possible to
insert an actuating device, e.g. a pressure regu-
lator or a three-way-valve being able to change
the condition characteristics of said media; by
these measurements the annular piston can be dis-
placed till a balance between the forces acting on
its frontal surfaces is reached, or it arrives to
its open or closed position, either automatically,
or by the aid of the actuating device having been
used.
The less moving force is needed with the embodiment, where an annular piston is provided with frontal surfaces - one rear and one facing the medium - of equal size, being in contact with the inner medium of identical pressure even in the closed position.

With a preferred embodiment the bearing element is connected to the house on the entering side.

At another embodiment - also in an advantageous manner - the bearing element is connected to the house on the discharge side.

An embodiment is also possible, where the bearing element and the house are formed as a monolithic unit, in form of a valve body.

The embodiment may be considered as utmost economical, where the outer diameter of the house or the valve body is such as to be clamped between the jointing flanges by means of screws.

In a further preferred embodiment in the house or in the valve body a closed cavity is formed, through the apertures leading thereto cooling or heating of the valve becomes possible.

It may be advantageous - in particular from the point of view of streaming losses - , when in the open position the closing head, the bearing element and the house are formed with a profile which is following the stream lines of the medium, whereby said profiles are defining a constant flow-cross-section at least from the beginning of the profile being surrounded by the stream till the end thereof.

The embodiment is also to be considered as advantageous, with the closing head being fixed to the bear-
ing element, to the immersed part thereof, is solid, however a hollow closing head, eventually formed as a shell is also possible.

With a further preferred embodiment of the invention the closing head is made of a material with sealing properties, e.g. of rubber, a synthetic material, etc. If required, a metal reinforcing element may be inserted.

First of all, from the point of view of maintenance it is most advantageous to fix a valve seat into the closing head and/or the annular piston.

In accordance with the invention operational safety of the valve can be increased by protecting the sealing elements with an elastic bellow or a stripper ring.

With a most economical embodiment of the invention the surfaces coming into contact with chemically aggressive or erosive media are provided with a coating being resistant of the same, so e.g. with chrome, nickel, elastomer, a synthetic material, PTFE, enamel, etc.

The application of the valves according to the invention - compared to the known valves for solving the same tasks - yields the following advantages:

- The valves may be achieved within the industrially required dimensional, temperature -, pressure - and medium ranges.
- the valves are particularly economical in the range of large dimensions and high pressure, since their critical elements have an annular cross-section subjected to inner or outer pressure, accordingly material requirement is less, simul-
taneously the closing elements are relieved from internal pressure and can be manufactured without flanges;

- In comparison to traditional valves, in the open position stream losses are advantageous.

- Disregarding some special embodiments, e.g. the butterfly valve, structural length may be less than with the known solutions, accordingly material requirement is also less; traditional valves can be replaced, i.e. in certain field or application the valves according to the invention may be used as typified armatures.

- Beside the usual possibility of manual closing, the valve is well suitable for performing control tasks and for quick closing, automatically or with a remote controlled intervention, as a consequence, automatization and resulting decrease of the number of operators becomes possible.

**Brief Description of Drawings**

The invention will be described in detail with the aid of preferred embodiments, illustrated purely by way of example in the drawings, in which:

- Figure 1a is showing the valve having been provided with the manually actuated hydraulic moving system,
- Figure 1b illustrates the valve with the manually actuated mechanic moving system,
- Figure 2a is showing the valve which can be connected to any system by means of a threaded bond and the annular piston with the sealing elements affecting both mantle surfaces,
Figure 2b presents the valve which can be actuated by means of the snap magnets.

Figure 3a is showing the valve with which the moving system is formed as an electromotor.

Figure 3b illustrates the valve having been provided with a mechanical moving system.

Figure 4a is showing a two-way valve to be actuated by means of a snap magnet and being provided with a hydraulic moving system.

Figure 4b is an embodiment with which the pressure ratio is automatically regulated.

Figure 5a illustrates a valve allowing to flow the medium, the pressure of which is surpassing the pressure of the medium on the discharge side.

Figure 5b is showing a valve, which allows to pass a medium, the pressure of which does not depend on the pressure of the medium on the discharge side.

Figure 6 is presenting a valve being suitable for performing the tasks of heat power engineering and having been provided with a manually actuated excentric moving pin in the moving system.

25 Best Mode of Carrying out the Invention

With the embodiment to be seen in figure 1a the bearing element 2 is connected to the house 3 by means of a threaded bond on the discharge side; the outer diameter of said house is such as to be clamped between the jointing flanges 31 by means of screws. The solid closing head 1 having been arranged in the streaming medium is attached to the bearing element 2 with the longitudinal ribs by means of the screw 48. The bearing element 2 and the house
3 are formed so that there is an axial gap with an annular cross-section inbetween. This is taking up the annular piston 5, which - in its open position - is entirely occupying the gap 4. In the said position the elements are defining a profile, in so far as, in downstream, the flow-cross-section is continuously decreasing quite to the end of the bearing element 2 which is immersed in the medium, therefrom - by inserting a diffuser tract - the cross-section is steadily increasing till reaching the original cross-section. The annular piston 5 is closing on its smallest diameter onto the closing head 1, the sealing element 7 thereof is also here effective, while in the space behind, the aperture 11 ensures inflow and outflow of the medium. The outer part of the annular piston 5 is formed with a shoulder, the space before the shoulder is closed by the sealing elements 8 and 21. The medium from the working-cylinder 53 arrives through the aperture 22 into the said space, the working medium is put into motion by the piston 50 and the sealing element 51 having been arranged on the mantle surface thereof. Putting into motion is performed in such a manner that the piston rod 52 being attached to the piston 50 is displaced axially by the displacing spindle 55 which is connected on its opposite side to the bearing 58, by means of the hand-wheel 59 and the displacing thread having been formed in a self-closing manner in the drive house 56 respectively on the displacing spindle 55.

Easy displacement of the piston 50 is ensured by the arrangement, in so far as the inner medium is led into the space lying above the piston 50 via the aperture 54 having been formed in the drive house 56, while outflow is prevented by the aid of the sealing
elements 57. The displacement of the annular piston 5 and proper closing are promoted by the spring 28.

With the embodiment shown in Figure 1b inner design and connection to the system are similar to those having been described in connection with Figure 1a. However, with this embodiment the annular piston 6 with the security element 14 inhibiting rotation, as well with the self-closing moving thread on the outer surface thereof is displaced by means of the attached moving ring 15, which is provided with a bevel gearing on its outer mantle surface. Displacement is performed in such a manner that a geared axis 43 is connected to the bevel gearing of the ring 15 and the axis 43 is axially clamped in the 46 drive house - which again is fixed in the aperture 18 - by means of the bearing 58. Outflow of the medium is prevented by means of the sealing elements 57. By rotating the hand-wheel 47 the annular piston 6 can be displaced, the more, with a slight force, since the force resulting from the static pressure of the medium does not affect in an axial direction, not even in a close position. This can be achieved by the closure on the smallest diameter, by the sealing element 7 having been arranged on the same diameter and by the medium being introduced into the space behind through the aperture 11.

With the embodiment to be seen in Figure 2a, on the inflow side the task of the house and the bearing element is performed by the monolithic valvebody 30. On the discharge side, installing of the solid closing head 13 being connected via a thread to the valve body 30 may be achieved by the insert 17 having been fixed to the valve body 30 with a threaded bond. In this case too, the profiles being in contact with...
the flow are defining a narrowed flow cross-
section. Connection to the different systems is
ensured partly with the outer thread 30a of the
valve body 30, partly by the inner 17a thread of
the insert 17. The annular piston 33 is closing
with its smallest diameter onto the closing head
13, on the outer and inner mantle surface the
sealing elements 7 and 8 are to be found. Into the
gap 4 having been closed in such a manner e.g.
control medium is led through the aperture 9, in
such a manner it can be achieved that the pressure
of the system cannot be less than that of the
control medium, in case of a pressure drop the
system is automatically closed. By changing the
pressure of the control medium the valve can be
closed and opened, respectively.

With the embodiment shown in Figure 2b inner de-
sign, connection and closing diameter are identi-
cal with those according to Figure 2a. In case of
this solution the sealing element 7 having been
arranged on the inner mantle surface and the medium
being introduced through the aperture 11 behind the
annular piston 26 - being displaceable under the in-
fuence of the magnetic force - are ensuring load
relief against the static pressure of the medium.

Accordingly, the resulting low requirement of dis-
placing force enables quick closing by means of the
snap magnets 27 or fine-regulation by using a regu-
lating unit 29 influencing its relative field
strength.

With the embodiment according to Figure 3a the bear-
ing element 60 is fixed to the flanged house 32 by
means of screws 61 on the discharge side, where the
medium is leaving the system. Fluid mechanical design is identical with that having been specified in connection with Figure 1a with the difference that in this case decrease of the cross-section is stronger, while enlargement is formed partly in the jointing flange 36. The annular piston 45 is closing with its smallest diameter onto the solid closing head 62 having been provided with the valve seat 64. Load relief against the static pressure of the medium is solved in the previously described manner. The annular piston 45 being provided with a self-closing moving-thread on the outer mantle surface is protected against a rotary movement by means of the securing element 63. The annular piston 45 is displaced by the aid of the motion-transmitting ring 66 being attached to the piston by means of an internal moving thread and being formed as a rotor of an electromotor and being fixed in the axial direction by means of the insert element 65 in such a manner that on the outer part of the house 32 a coil .49 - having been formed as the stator of the electric motor - is arranged. This arrangement is well suitable for remote actuation, it ensures quick closing.

With the embodiment to be seen in Figure 3b inner and outer design are in compliance with those according to Figure 3a.

Displacement of the annular piston 16 being relieved in the known manner and being provided with the valve seat 40 on its closing diameter was solved in such a manner that along the outer mantle surface an axial toothed was formed, which is engaged with the displacing system via the gear 44 being fixed to the axis 43. The toothed elements are protected by means of the sealing elements 8 and 12 against the inner medium.
The valve according to Figure 4a essentially complies with the description relating to Figure 1a, however, with this embodiment both ends are elongated. The solid closing head 67 is made of a sealing material, e.g. of rubber, or a synthetic material, etc. with a metal reinforcing element 37 in the inside thereof, which is fixed to the bearing element 68 by means of a thread. The annular piston 69 is formed with an inner and outer shoulder, while the spaces before and behind the shoulders are closed with the sealing elements 7, 8, 21, 25. The space of the working-cylinder 53 lying under the piston 50 is connected via the aperture 22, the space above the piston 50 via the apertures 54, 9 with the spaces before and behind of the shoulders. In such a manner the annular piston 69 can be displaced in two directions by displacing the piston 50. Putting into motion is performed by moving the ring 71 having been fixed onto the piston rod 70, by means of the snap magnet 27 against the spring 72. By using the regulating unit 29, the annular piston 69 can be brought in any optional position.

With the embodiment being illustrated in Figure 4b, the inner design corresponds to the design being specified in connection with Figure 4a. With this embodiment, on the inner surface of the annular piston 73 a further shoulder was formed, the space before the shoulder is closed with the sealing element 23, while the aperture 24 leads to the outer free space. The space before the other outer shoulder is connected via the aperture 74 with the entering medium. The space having been closed with the rear front-surface of the same size, as the outer shoulders - is connected to the discharged medium via the aperture 10. The streaming medium arrives to the space behind the inner shoulder through the aperture 11.
By this measurements it can be achieved that the ratio of the charge - and discharge pressure should equal to the ratio of the frontal surfaces behind the outer shoulders and the shoulder being in contact with the entering medium. The pressure ratio is adjusted automatically without any external intervention.

In Figure 5a an embodiment is shown, with which the bearing element 75 is connected to the house 76 on the entering side, as a consequence, the pulse-forces resulting from the medium stream may be avoided. The sealing element 7 is arranged on the smallest diameter of the annular piston 77, said sealing element is protected by the bellows 41. The medium arrives via the aperture 78 to the space behind the annular piston 77. By the spring 28 it can be ensured that the valve will open only then, if the pressure of the medium on the entering side is so much higher than the pressure prevailing after the annular piston, that the differential pressure affecting the frontal surface of the staggered formation is overcoming the force of the spring 28.

With the embodiment according to Figure 6 the bearing element 82 is fixed on the entering side to the house 83 being clamped between the flanges not illustrated here; in the inside of the house a closed cavity 34 being provided with the apertures 35 is formed, accordingly heating or cooling becomes possible. The annular piston 19 is closing on its smallest diameter with the valve seat 39 having been clamped between the bearing element 82 and the hollow closing head 84 being fixed to the bearing element with a threaded bond. The sealing element 7 being also arranged on the same diameter is protected against damages by means of the stripper.
rings 42. The cross-section being considerably narrowing on the entering side is continuously increased after the closing diameter and is reaching its original size.

5 The annular piston 19 - being relieved and protected with the securing element 85 against a rotary motion - is provided with a groove running perpendicularly to the axis on its outer mantle surface, into which the excentric moving pin 20 of the axis 86 is engaged.

10 The axis 86 is axially clamped by means of the bearing 58 to be found in the drive house 92, which again is fixed in the aperture 87 of the house 83. When rotating the handwheel 59, the motion transferring ring 90 secured against rotation can be axially displaced by means of the moving thread on the axis 89, whereas said axis is fixed to the hand-wheel 59 and clamped axially with the bearing 88. As a consequence of this displacement the intermediate element 91 being fixed to the axis 89 rotates the axis 86, whereby the excentrically located moving pin 20 thereof is displacing the annular piston 19 in the axial direction. Outflow of the medium is prevented by the sealing elements 57.
Claims:

1. Valve with an axially displacing annular piston, in particular for pipelines for limiting or stopping the medium flow, characterized in that it has a closing head (1) having been arranged in the streaming medium, a bearing element (2) being fixed in the stream by elements permitting the medium to pass, carrying the closing head (1), a house (3) being connected to the bearing element (2) and allowing the placing in of the closing head (1), furtheron between the house (3) and the bearing element (2) there is a gap (4) with an annular cross-section, in which the axially displaceable annular piston (5) is arranged, at last there is a device for moving the annular piston (5) and on the outer and/or inner mantle surface of the annular piston (5) there is a sealing element (7 or 8) preventing the flow in axial direction.

2. Valve as claimed in claim 1, characterized in that either in the bearing element (2) or in the house (3), or in the annular piston (5) there is an aperture (10, 9) discharging into the space behind the annular piston (5).

3. Valve as claimed in claim 1 or 2, characterized in that it is provided with sealing elements (8, 12) for separating the mechanically connected moving device from the medium.

4. Valve as claimed in any of the claims 1 to 3, characterized in that it has an annular piston (6) being secured against rotation and having been provided with a moving thread on the outer mantle surface, furtheron there is a moving device with the attached moving ring (15) for the displacement of the annular piston (6), at last
in the house (3) an aperture (18) is formed ensuring the attachment of the moving device.

5. Valve as claimed in any of the claims 1 to 3, characterized in that the annular piston (16) is formed with an axial toothing on the outer mantle surface, furtheron in the house (32) an aperture is provided allowing the connection between the moving device and the annular piston.

6. Valve as claimed in any of the claims 1 to 3, characterized in that the annular piston (19) contained therein is secured against rotation and on the surface of the outer mantle thereof there is a groove running perpendicularly to the axial direction, the moving device is engaged with said groove by means of an eccentric moving pin (20) and in the house (83) an aperture (87) has been provided ensuring the attachment of said moving device.

7. Valve as claimed in claim 1, characterized in that it has an axis (43 or 86) for the transmission of the rotary motion, and thereon - fixed to the same or having been formed thereon - there is a gear (44) or a moving pin (20) being engaged either with the annular piston (16) or to the moving ring (15), the axis (43 or 86) is axially clamped by the bearing (58), whereas the bearing itself is fixed in the drive house (46 or 92) being either fixed in the aperture (18, 87) of the house (3, 83) or formed as an independent element, furtheron there is a sealing element (57) stopping the outflow of the medium, furtheron there is a driving unit transmitting the rotary motion to the axis (43 or 86) and being connected directly or indirectly thereto, in case of necessity said drive unit is formed so as to prevent the axial displacement of the
annular piston (16 or 19) in a self-closing manner, while actuation of the drive unit is performed manually, or by a snap magnet or a differently driven motor or hydraulics.

8. Valve as claimed in any of the claims 1 to 3, characterized in that is has an annular piston (45) being secured against rotation, on the outer mantle surface of which there is a moving thread, furtheron there is a motion transmitting ring (66) formed as the rotor of an electric motor and on the inner mantle surface thereof a moving thread - being engaged with the annular piston (45) - is to be found, at last on the outer part of the house (32) there is a coil (49) representing the stator of the electric motor.

9. Valve as claimed in claim 1, characterized in that along the outer and inner mantle surface of the annular piston (33) there is a sealing element (8, 7) arranged closing the path of the axial flow of the medium, furtheron in the house (3) or in the valve body (30) an aperture (9) is to be found which is leading to the space behind the annular piston (33).

10. Valve as claimed in claim 1, characterized in that on the outer and/or inner mantle surface of the annular piston (5, 69, 73, 79) one or more shoulders are formed and there is a house (3, 76) allowing the installation and displacement thereof, furtheron the house (3, 76) and the bearing element (2, 68) also contained, as well as the shoulder(s) are confining one or more spaces which are sealed by the sealing elements (7, 8, 21, 23, 25), besides in the house and/or in the bearing element and/or in the annular piston an aperture (9, 10, 11, 22, 24, 79, 81) is provided for leading into said spaces.
11. Valve as claimed in claim 9 or 10, characterized in that it has a spring (28) acting on the annular piston (5, 77, 79).

12. Valve as claimed in claim 9 or 10, characterized in that it has an annular piston (26) to be displaced by means of a magnet and on the outer part of the house one or more snap magnets (27) are arranged which in a given case are provided with a regulating unit (29) for influencing the snapping force.

13. Valve as claimed in any of the claims 9 to 12, characterized in that the working cylinder (53) is connected to the opening (22) leading to the space of the house (3) being closed by the sealing elements (8, 21), in said working cylinder a piston (50) having been provided with the piston rod (52, 70) is led and on the mantle surface thereof a sealing element (51) is arranged, furtheron it has an aperture (54) leading from the space above the piston (50) either to the flowing medium, or into the outer medium or into the free air or to the space being closed by the sealing elements, furtheron there is a moving unit, which is fixed to the working cylinder (53) and eventually closing the same, displacing the piston (50) axially and being connected directly or indirectly thereto, in a given case formed in a self-closing manner as to prevent the unwanted displacement of the annular piston (5, 69), while actuation of said moving unit is performed either manually, or with a snap magnet (27), or a motor being driven in different ways, or hydraulically or pneumatically and which in a given case is separated from the working cylinder (53) by means of the sealing element (57).
14. Valve as claimed in any of the claims 9 to 12, characterized in that in the house and in the bearing element in one or more of the apertures (9, 10, 11, 22, 24, 74, 81) leading into the spaces having been closed by the sealing elements an own and/or external medium - connection, in a given case an actuating device, e.g. a pressure-regulator or a three-way valve, etc. being able to change the state characteristics of said media is arranged.

15. Valve as claimed in claim 1, characterized in that it has an annular piston (6, 16, 19, 26, 45) having been provided with frontal surfaces - one rear and one facing the medium - of equal size and being in contact with the inner medium.

16. Valve as claimed in claim 1, characterized in that the bearing element (75, 80, 82) thereof is connected to the house (76, 83) on the entering side.

17. Valve as claimed in claim 1, characterized in that the bearing element (2, 60, 68) thereof is connected to the house (3, 32) on the discharge side.

18. Valve as claimed in claim 16 or 17, characterized in that the valve body (30) is formed as a monolithic element.

19. Valve as claimed in any of the claims 16 to 18, characterized in that it has a house (3, 83) or a valve body (30) which can be clamped between the jointing flanges (31).

20. Valve as claimed in claim 16 or 17, characterized in that either in the house (83) or in the valve body a closed cavity (34) with the joining aperture (35) is formed.

21. Valve as claimed in claim 1, characterized in that the elements being in contact
with the streaming medium in their open position are
formed with a profile which can be followed by the
stream lines having been formed in the streaming
medium, furtheron the flow cross-section — begin-
ing from the profile surrounded by the streaming
medium up to the end thereof — is constant or de-
creasing in downstream.

22. Valve as claimed in claim 1, charac-
terized in that to the bearing element
(2, 60, 68, 82) or the valve body (30), to the part
being arranged in the medium, a solid closing head
(1, 13, 62, 67) or a hollow closing head (84) is
attached.

23. Valve as claimed in claim 22, charac-
terized in that in the closing head (67) made
of a material with sealing properties a metal re-
inforcing element (37) is arranged.

24. Valve as claimed in claim 22, charac-
terized in that into the closing head (62, 84)
and/or into the annular piston (16) a valve seat
(38, 39, 40, 64) is fastened.

25. Valve as claimed in claim 1, charac-
terized in that the sealing element (7) is pro-
tected by means of a bellow (41) made of an elastic
material or a stripper ring (42).

26. Valve as claimed in claim 1, charac-
terized in that on the surfaces being in con-
tact with chemically aggressive or erosive media a
coating being resistant to said influences is applied,
e.g. chrome, nickel, elastomer, a synthetic material,
PTFE, email, etc.
# INTERNATIONAL SEARCH REPORT

**International Application No:** PCT/HU82/00015

## I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all)

According to International Patent Classification (IPC) or to both National Classification and IPC

| IPC | F16K1/12; F16X 3/22 |

## II. FIELDS SEARCHED

Minimum Documentation Searched

<table>
<thead>
<tr>
<th>Classification System</th>
<th>Classification Symbols</th>
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<tr>
<td>IPC F16K1/12, 31/02, 04, 12, 53, 3/22</td>
<td>US 137-219, 222; 251-30, 57, 24</td>
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<td>AU 147J.4</td>
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Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched

| IPC F16K1/12, 31/02, 04, 12, 53, 3/22 | US 137-219, 222; 251-30, 57, 24 |
| IPC F16K1/12, 31/02, 04, 12, 53, 3/22 | GB 135V.427 |
| IPC F16K1/12, 31/02, 04, 12, 53, 3/22 | CH 962 |
| IPC F16K1/12, 31/02, 04, 12, 53, 3/22 | FR G9V1 |
| IPC F16K1/12, 31/02, 04, 12, 53, 3/22 | AU 147J.4 |

## III. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of Document, 14 with indication, where appropriate, of the relevant passages 17</th>
<th>Relevant to Claim No. 14</th>
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<tbody>
<tr>
<td>X</td>
<td>SU,A,277475(V.A.Falin et al)27 October 1970 (27.10.70)</td>
<td>1,3,10,17,19,22-24</td>
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<tr>
<td>X</td>
<td>FE,A,225552(Marcoux Bernard Hector) 18 July 1975 (18.07.75)</td>
<td>1,3,9,10,14,15,22,24</td>
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<tr>
<td>A</td>
<td>FR,A,225552(Marcoux Bernard Hector) 18 July 1975 (18.07.75)</td>
<td>4,6</td>
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<tr>
<td>X</td>
<td>US,A,4137933(TRW Inc)06 February 1979(06.02)</td>
<td>79)</td>
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<td>Y</td>
<td>US,A,4206902(Vapor Corporation)10 June 1980 (10.06.80), see column 2 lines 60-55,</td>
<td>11,16,21,22</td>
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<td>column 2 lines 3-20, column 3 lines 5-20</td>
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<tr>
<td>Y</td>
<td>SU,A,458995(Mashinenfabrik Mokveld) 07 March 1975 (07.03.75), see column 2 lines 20-25,</td>
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<td>column 3 lines 5</td>
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<tr>
<td>Y</td>
<td>SU,A,357402(P.M.Vaisburd)30 November 1972 (30.11.72), see column 2 lines 5-10</td>
<td>12</td>
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<tr>
<td>Y</td>
<td>SU,A,300700(V.I.Khaliksoo and R.I.Kariler) 17 June 1971(17.06.71) see column 2 lines 29-30,</td>
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<td></td>
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<td>Y</td>
<td>SU,A,3554763(Frank A.Lucardie) 20 October 1970 (20.10.70), see column 3 lines 65-70</td>
<td>25</td>
</tr>
<tr>
<td>Y</td>
<td>US,A,2133985(Audley D.Gaston)25 October 1938 (25.10.38), see column 2 lines 40-45</td>
<td>18</td>
</tr>
<tr>
<td>A</td>
<td>US,A,4112965(Klinger A G)12 September 1978 (12.09.78), column 4 lines 7-10</td>
<td>20</td>
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</tbody>
</table>

* Special categories of cited documents: 14

- **A** document defining the general state of the art which is not considered to be of particular relevance
- **E** earlier document but published on or after the international filing date
- **L** document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- **O** document referring to an oral disclosure, use, exhibition or other means
- **P** document published prior to the international filing date but later than the priority date claimed
- **T** later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- **X** document of particular relevance; the claimed invention cannot be considered to be a novel or cannot be considered to involve an inventive step
- **Y** document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- **Z** document member of the same patent family

## IV. CERTIFICATION

Date of the Actual Completion of the International Search 8

17 June 1982 (17.06.82)

Date of Mailing of this International Search Report 9

03 August 1982 (03.08.82)

International Searching Authority 1

ISA/SU

Signature of Authorized Officer 9

(N. Shepelev)

Form PCT/ISA/210 (second sheet) (October 1981)
V. OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNGEARCHABLE

This international search report has not been established in respect of certain claims under Article 17(1)(c) for the following reasons:

1. Claim numbers ______ because they relate to subject matter not required to be searched by this Authority, namely:

2. Claim numbers ______, because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

VI. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This international Searching Authority found multiple inventions in this international application as follows:

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

Remark on Protest
☐ The additional search fees were accompanied by applicant’s protest.
☐ No protest accompanied the payment of additional search fees.