

**Actuating device for actuating valves**

The present invention relates to an actuating device for actuating valves having a spindle, wherein the  
5 actuating device is formed as a hand wheel having a locking element and a preferably electric feedback device.

In pipeline construction, valves are used to regulate  
10 flow rates of various media. Valves which are formed with hand wheels as actuating devices must be protected against unauthorized actuation by means of locking elements.

15 On the basis of this prior art, it is an object of the invention to specify an actuating device which operates as reliably as possible and can be produced as simply as possible.

20 This object is achieved by an actuating device for actuating valves having a spindle, wherein the actuating device is formed as a hand wheel having a locking element and an electric feedback device, characterized in that the locking element is formed in  
25 one piece and is arranged integrally in the hand wheel.

Preferred developments of the invention are given in the dependent claims.

30 It is advantageous if the valve cannot be actuated by unauthorized persons. This is achieved by a one-piece locking element being arranged integrally in the hand wheel in a manner interacting with the spindle. The locking element is formed to fix the axial and radial  
35 positions of the hand wheel with respect to the spindle. The locking element has at least one resilient finger, formed perpendicularly to the spindle axis, to fix the axial position of the hand wheel with respect to the spindle, and has a slide, formed parallel to the

spindle axis, to fix the radial position of the hand wheel with respect to the spindle.

An exemplary embodiment is described with reference to  
5 the figures, in which:

Figure 1 shows a perspective view of a valve having the actuating device according to the invention,

10 Figure 2 shows a perspective view of the actuating device formed as a hand wheel,

Figure 3 shows a perspective view of the locking element and of the upper housing part of the valve in a  
15 first end position of the locking element,

Figure 4 shows a perspective view of the locking element and of the upper housing part of the valve in a  
20 second end position of the locking element,

Figure 5 shows a perspective view of the locking element and of the spindle of the valve in the first  
end position,

25 Figure 6 shows a perspective view of the locking element and of the spindle of the valve in the second  
end position,

Figure 7 shows a perspective view of an electric  
30 feedback device and

Figure 8 shows a view of the electric feedback device of Figure 7.

35 Figure 1 illustrates a valve 1, for example a diaphragm valve, in perspective. The valve 1 consists of an upper housing part 2, a mating lower housing part 3, an actuating member, illustrated here as a hand wheel 4

having a locking element 32, an extension 15 of a spindle 5 and an electric feedback device 6. The lower housing part 3 has three openings, of which only one pipe coupling 7 can be seen in Figure 1.

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Figure 2 illustrates the hand wheel 4 in perspective. The hand wheel 4 has a radially formed cutout 31, in which the locking element 32 can be accommodated in a radially displaceable manner.

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The locking element 32 is illustrated interacting with the upper housing part 2 in Figures 3 and 4 and interacting with the spindle 5 in Figures 5 and 6. The locking element 32 has a slide 33, which extends as a perpendicularly arranged and radially displaceable plate from the locking element 32 to the upper side of the upper housing part 2.

Figure 3 illustrates the slide 33 in the radially inserted state with respect to the spindle axis, i.e. in the normal operating state of the valve 1. The slide 33 has a through-opening 34, through which the cams 35, which are formed on the upper side of the upper housing part 2, pass during the rotational movement of the hand wheel 4. In the position shown in Figure 3, the valve 1 can be actuated with the hand wheel 4.

Figure 4 illustrates the slide 33 in the radially withdrawn state. In this position, the radial position of the hand wheel 4 is fixed. The hand wheel 4 cannot be actuated and the spindle 5 cannot be rotated in this position. In order to secure the valve in the locked position, the locking element 32 has a bore 36, into which a padlock (not illustrated here) or any other suitable security device can be introduced. This prevents unauthorized actuation of the valve 1.

As illustrated in Figures 5 and 6, the locking element 32 further has two resilient fingers 37, 38, which are formed in a manner interacting with the spindle 5. The resilient fingers 37, 38 engage with further cams 39, which are formed on the periphery of the spindle 5. The resilient fingers 37, 38 prevent unauthorized removal of the hand wheel 4 from the spindle 5. The axial position of the hand wheel 4 with respect to the spindle 5 is fixed. It is only possible to pull off the hand wheel 4 when the locking element 32 is in the normal operating state, as illustrated in Figure 5. It is only by means of a special tool that the resilient fingers 37, 38 can be moved away from the spindle 5 towards the outside, so that the hand wheel 4 can be pulled off the spindle 5. The hand wheel 4 can only be pulled off when the locking element 32 is secured against radial movement. For this purpose, the resilient fingers 37, 38 have oblique surfaces 40, which can be pressed outwards by the special tool. It can be seen in Figure 6 how the end of the resilient finger 37 engages in a recess in the cam 39 of the spindle 5, thereby preventing the hand wheel 4 from being pulled off in this operating position. With the hand wheel 4 described here, having the locking element 32, the hand wheel 4 can be completely secured both in the radial direction and in the axial direction using a single component.

Figures 7 and 8 illustrate the electric feedback device 6 for providing feedback on the position of the hand wheel 4 and thus the position of the shut-off element of the valve 1. The electric feedback device 6 is arranged in the spindle housing 13 of the upper housing part 2 of the valve 1. Arranged in the upper housing part 2 is a ring 41, which is connected to the spindle 5 and has a screw thread 42 formed on the annular rim. The screw thread 42 interacts via a gear wheel 43 with a worm gear mechanism 44. The worm gear mechanism 44

drives two switching cams 45, which execute a linear movement. As a result of this, the rotational movement of the hand wheel 4 is converted into a linear movement of the switching cams 45. The switching cams 45  
5 interact with microswitches 46, which are able to send electric pulses to a position indicator (not illustrated here).

**Patent claims**

1. Actuating device (4) for actuating valves having a spindle (5), wherein the actuating device is formed as a hand wheel (4) having a locking element (32), characterized in that the locking element (32) is formed in one piece and is arranged integrally in the hand wheel (4).
2. Actuating device (4) according to Claim 1, characterized in that the locking element (32) is formed in a manner interacting with the spindle (5) of the valve (1) to fix the axial and radial positions of the hand wheel (4) with respect to the spindle (5).
3. Actuating device (4) according to at least one of Claims 1 and 2, characterized in that the locking element (32) has at least one resilient finger (37, 38), formed perpendicularly to the spindle axis, in order to fix the axial position of the hand wheel (4) with respect to the spindle (5).
4. Actuating device (4) according to at least one of Claims 1 to 3, characterized in that the locking element (32) has a slide (33), formed parallel to the spindle axis, in order to fix the radial position of the hand wheel (4) with respect to the spindle (5).
5. Actuating device (4) according to at least one of Claims 1 to 4, characterized in that the hand wheel (4) and the locking element (32) are formed such that it is only possible to pull off the hand wheel (4) when the locking element (32) is arranged in a position radially adjacent to the spindle (5).
6. Actuating device (4) according to at least one of Claims 1 to 5, characterized in that the hand wheel (4) is formed as a non-rising hand wheel.

7. Actuating device (4) according to at least one of Claims 1 to 6, characterized in that an electric feedback device (6) is arranged in the spindle housing (13) of the valve (1).

8. Actuating device (4) according to at least one of Claims 1 to 7, characterized in that the electric feedback device (6) has microswitches (46), which are actuated by switching cams (45) arranged in a linearly moveable manner.

9. Actuating device (4) according to at least one of Claims 1 to 8, characterized in that the hand wheel (4) has a ring (41) having a helical contour (42), which is arranged in a manner interacting with a worm gear mechanism (44) such that the rotational movement of the hand wheel (4) is converted into a linear movement of the switching cams (45).

10. Actuating device (4) according to at least one of Claims 1 to 9, characterized in that the electric feedback device (6) is formed in a self-adjusting manner and such that it can be retrofitted.