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(71) Applicant *(for all designated States except US)*: INGENJÖRSFIRMA T. HENNINGSSON AB [SE/SE]; Nyodlingsvägen 9, S-191 40 Sollentuna (SE).

(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: HENNINGSSON, Thom, Lage [SE/SE]; Nyodlingsvägen 9, S-191 40 Sollentuna (SE).

(74) Agent: ERIK LINDQUIST PATENTBYRÅ AB; P.O. Box 5386, S-102 46 Stockholm (SE).

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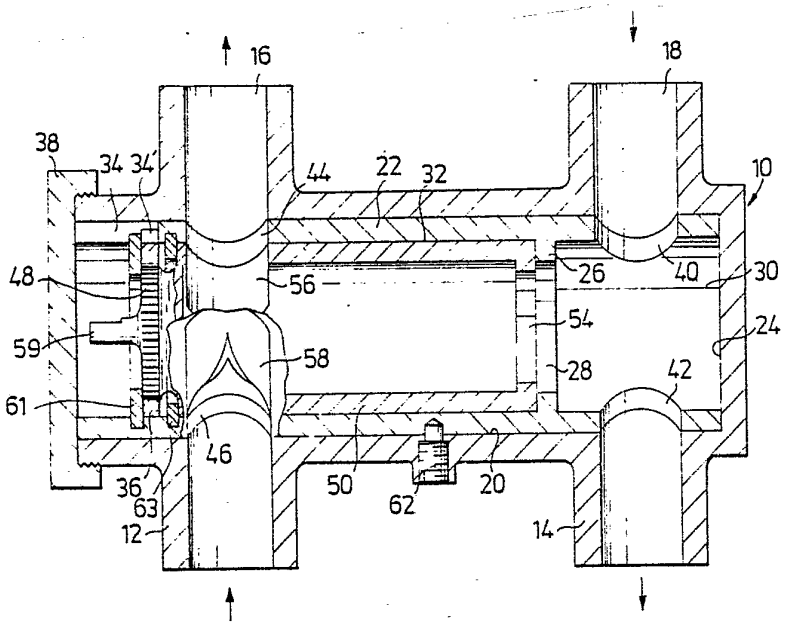
(54) Title: A CONTROL AND CUT-OFF DEVICE FOR FLOWING MEDIA

(57) Abstract

Control and cut-off device for media flowing to consumer apparatuses and flowing back therefrom. For example, dosing equipment, ventilation assemblies, heating and cooling arrangments, among which also conditioning plants are classified. The valve is then made especially to be reliable also after a long period of service, to give a close control of a small quantities of medium, to be capable of admitting locking of the pre-setting and thereby to prevent unauthorized persons from making a resetting without difficulty and to admit cutting-off of the consumer apparatuses from the source of medium. The control and cut-off device according to the invention includes a valve housing (10), having two connection openings (12, 14) for connection to a source of medium and two connection openings (16, 18) for connection to consumer devices and within the valve housing (10) a rotatable control and cut-off member (22) to control and cut-off the flow of medium. The valve housing is then provided with a cylindrical boring (20) with which the connection openings (12, 14, 16, 18) have connection, a first tubular valve slide (22) being rotatably mounted in the boring (20) and having a cylindrical boring (32) into which a second tubular valve slide (50) is rotatably fitted. These valve slides are provided with openings (40, 42, 44, 46 and 56, 58 respectively) so that they bring about a control or cut-off, respectively, of the medium by rotation.



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A CONTROL AND CUT-OFF DEVICE FOR FLOWING MEDIA

Technical field

The present invention refers to a control and cut-off device of the kind defined in the preamble of the main claim.

This control and cut-off device is intended for so-called pre-setting of media flowing to consumer apparatuses and flowing back therefrom and to cut-off the consumer apparatus from a source of medium. As examples may be mentioned dosing equipments for realizing chemical processes of various kinds, ventilation assemblies, heating and cooling plants among which conditioning plants (air condition) are also classified.

Background art:

Control and cut-off devices of this kind known up to now have been found to be unreliable and have not provided the desired function owing to a too primitive design, as unauthorized persons have been able to change the pre-set position without difficulty. Also the precision has been inferior and the valves have been incapable of function even after a short period of use. They have also been too unwieldy or costly in respect of manufacture and maintenance and have often consisted of two individual valves which have been built together.

Disclosure of Invention:

The invention aims at removing the drawbacks of prior control and cut-off devices and to provide a device which is reliable, even after a long period of use, precisely and easily adjustable and so designed that it is compact

and simple to manufacture. It should be easy to pre-set and for the pre-setting a special key is used. Accordingly, the pre-setting can be changed only by authorized persons which have been provided with this key.

This is achieved by the fact that the control and cut-off device according to the invention has been given the characteristics defined in the patent claims.

Brief Description of Drawings

The invention is explained more in detail in connection with the drawings showing an embodiment of the invention. Fig. 1 is a longitudinal section of the device according to the invention, Fig. 2 shows a detail included in the device according to Fig. 1 in a lateral view, Fig. 3 is a section along the line III - III in Fig. 2, Fig. 4 shows an alternative design of the detail in Fig. 2, and Fig. 5 shows a section along the line V - V in Fig. 4.

Best Mode of Carrying out the Invention

The control and cut-off device for media shown in the drawing includes a valve housing 10 having an inlet opening 12 and an outlet opening 14 for connection to a source of medium. The opening 12 can of course also be used as outlet and the opening 14 as an inlet, signifying that the direction of flow through the valve housing 10 is thereby reversed. This also applies to two openings 16, 18 which may be inlet and outlet or vice versa for a consumer apparatus or device which is intended for connection to these two openings and in which the medium is to be used, for example dosing equipment, ventilation apparatus, heat exchanger, radiator, cooling plant or consumer devices comparable therewith.

The valve housing 10 has a longitudinal cylindrical boring 20 in which there is an insertable and rotatable cut-off slide 22 similarly of cylindrical design. The slide 22 abuts with its right hand end, as seen in the drawing, against the bottom 24 of the boring 20 and is formed at its inner wall between the two openings 16, 18 with a peripheral flange 26, forming an opening 28 which divides the interior of the slide into two chambers 30 and 32. At its other, left hand end, as seen in the drawing, the slide 22 is provided with a peripheral groove 34 for receiving a locking washer 36, the purpose of which will be described in the following. The slide 22 is kept in its position in the boring 20 by a closing member 38 being fixably arranged for example by means of a screw thread at the left hand end of the valve housing 10, as seen in the figure, whereby it will abut against the slide 22 and lock it against axial motion in its position.

The chamber 30 of the cut-off slide 22 is provided with two openings 40, 42 which connect the chamber 30 with the openings 14 and 18 of the valve housing and which may have any desired shape according to the demands which are made on the connection between the chamber and the openings of the valve housing. The chamber 32 of the slide 22 also has two openings 44 and 46 which connect the chamber 32 with the openings 12 and 16 of the valve housing and which may be of any desired shape according to the demands made.

In the chamber 32 there is provided a control slide 50, see also Figs. 2 and 4, which slide 50 at its right hand end, as seen in the drawing, is provided with a wall 52 which, on the one hand, may be closed. Fig. 4 or, on the other hand, as shown in Figs. 1 and 2, may be provided with an opening 54, so that the medium may pass between

the chamber 30 and the interior of the control slide 50. The opposite end of the control slide 50, that to the left in the drawing, is closed and towards the periphery an exterior splines coupling 48 is provided which co-operates with an interior splines coupling on the locking washer 36. Furthermore, the locking washer 36 is provided with a projection 34' which cooperates with the groove 34 to lock the control slide 50 against rotation in relation to the cut-off slide 22. Axially the control slide 50 is maintained locked by a locking ring 63, for example an interior seger security member. From the closed end of the control slide 50 a member 59 is furthermore provided for enabling rotation of the control slide 50 when it is located within the slide 22. In addition the control slide 50 is provided with two openings 56 and 58 which cooperate with the two openings 12 and 16 of the valve housing 10 via the two openings 44 and 46 of the slide 22. The opening 56 may be shaped in the same way as the other openings in the slide 22 according to the desired function. In Figs. 3 and 5 the opening 56 is shown in the shape of a slot which extends along the periphery of the adjustment slide 50. The opening 58 in one direction has a semicircular wall 58 and in the other direction a wall which tapers off into a point 58^{11} which is formed so as to give a desired flow characteristic depending on the adjustment position of the slide for controlling the flow of medium between the control slide 50 and the cut-off slide 22.

When adjusting the cut-off slide 22 the groove 34 is utilized into which a special wrench may be inserted and effect a rotation of the same. In the valve housing there is a marking for indicating the position of the slide 22. If the locking ring 36 is in its position the adjustment slide 50 will take part in the rotation. If the locking ring 36 is removed the adjustment slide 50 may be rotated in relation to the slide 22 and for that purpose the

member 59 is utilized. Possibly the splines 48 on the adjustment slide 50 may also be utilized for effecting this rotation. Here also there is a marking for indicating the relative position of the slides 22, 50. A locking screw 62 is provided in the valve housing 10, said screw restricting the rotation of the slide 22. The locking screw 62 also effects a certain locking action in the axial direction. The locking washer 36 is fixed axially by an outer locking ring 61, for example a seger security member. This locking ring is also intended to make it more difficult for unauthorized persons to get at the locking washer 36 and thereby be able to carry out unauthorized resettings of established adjustments of the control slide 50.

In Figs. 4 and 5 an alternative form of the control slide 50 is shown which is intended for a two-tube installation. Here the control slide 50 is without the opening in the end wall and control takes place only between the control slide 50 and the slide 22. When using the control and cut-off device it functions in the following way: the medium flows into the valve housing 10, for example through the opening 12. A first part of the medium passes further through the opening 16 to the consumer device. A second part of the medium passes in the embodiment shown in Figs. 1 and 2 and having the opening 54 through the latter to the chamber 30 and here combines with the said first part of the medium which returns from the consumer device and flows out through the opening 14.

If the wall 52 of the control slide 50 is closed, all the medium passes through the opening 16, since because of the closed wall 52 no by-pass flow is possible. The first embodiment with openings 54 can be applied for example to one-tube systems (series systems with shunt-

connected apparatuses) and the second embodiment with closed wall 52 to two-tube systems (apparatuses connected in parallel).

The cut-off slide 22 can be used, on the one hand, for effecting pre- or rough adjustment, on the other hand, for wholly cutting off the openings 16, 18, whereupon the consumer apparatus connected to the openings 16, 18 can be dismounted to be replaced by another or for repair. For example, the openings in the cut-off slide 22 may be formed such that by rotating the slide 22 a predetermined angle in one direction in relation to the valve housing 10 the flow of the medium to the consumer apparatus is interrupted but at the same time the flow of the medium through the valve housing 10 is made possible. By rotating the slide 22 a predetermined angle in the opposite direction the connection openings 12, 14 of the valve housing 10 (to the connection lines) are closed.

The control slide 50 is intended to effect fine adjustment of the medium passing through the valve housing 10; for this purpose the opening 58 is formed in the way shown in the drawing with a side of the opening 58 bounded at a point 58". By this means a flow characteristic can be realized which admits a very simple adjustment of the small amounts of liquid desired to be passed through.

With the control slide 50 in the position shown in the drawing a control of the amount of flowing medium may be realized by rotating the slide 50 in relation to the slide 22 so that a major or minor part of the opening 58 is uncovered according to Fig. 2 in relation to the inlet opening 12. If the control slide 50 is constructed according to Fig. 2, one-tube system, this adjustment applies to the total flow in the one-tube loop but is

not influenced by the flow in the radiator circuit. If the control slide 50 is of a construction according to Fig. 2, two-tube system, the adjustment applies also now to the total flow but this equals the flow in the radiator circuit.

If the control slide 50 is rotated so that the control takes place between the openings 16 and 58 a control of the flow in the radiator circuit will take place also now, but according to two different principles depending upon how the control slide 50 is constructed.

In the construction according to Fig. 2, one-tube system, the adjustment is directed to how much per cent of the total flow forms the flow in the radiator circuit.

In the construction according to Fig. 4, two-tube system, the adjusted radiator flow equals the total flow in the valve. These different control possibilities thus apply to both one- and two-tube systems, and the adjusted position is not changed when cutting off by means of the slide 22.

The consumer apparatus connected to the openings 16, 18 can of course be provided with a readjustment valve in which the flow in the radiator circuit can be reduced individually either manually or automatically and in this way it can be prevented that the room temperature becomes to high owing to sun heat, heat emitting apparatuses or people's heat.

Industrial Applicability

The device is used in connection with dosing equipment, ventilation assemblies, heating and cooling arrangements, among which also conditioning plants are classified.

CLAIMS

1. A control and cut-off device for flowing media in plants where one or more consumer devices to be supplied with a medium are connected to a source of medium, said control and cut-off device including a valve housing (10) having two connection openings (12, 14) for connection to a source of medium and two connection openings (16, 18) for consumer devices and control and cut-off members rotatable within the valve housing (10) to control and cut-off the flow of medium from the source of medium to the consumer devices and again back to the source, characterized by the fact that the valve housing (10) is provided with a cylindrical boring (20) to which the connection openings (12, 14, 16, 18) have connection, a first tubular valve slide (22) being rotatably mounted in the boring (20) and having a cylindrical boring in which a second tubular valve slide (50) is rotatably fitted, said slides being locked against axial displacement when in use and provided with openings (40 to 46; 56, 58) arranged to effect control or cut-off, respectively, of the medium when rotating the slides.

2. A control and cut-off device according to claim 1, characterized by the fact that between the openings (12, 16, 46, 44, 58, 56) for the medium flowing from the source to the consumer, on the one hand, and the openings (14, 18, 42, 40) for the medium returning from the consumer to the source, on the other hand, there is provided a wall (52) in the second valve slide (50) to separate the forward and the return flow.

3. A control and cut-off device according to claim 2, characterized by the fact that the wall (52) is provided with an opening (54) to bring about a by-pass between the two flows.

4. A control and cut-off device according to claim 1, characterized by the fact that one end of the valve housing (10) is provided with a closing member (38) arranged to close the valve housing and lock the first valve slide (22) against axial movement.

5. A control and cut-off device according to claim 1, characterized by the fact that the first valve slide (22) is provided with a peripheral annular locking ring (63) arranged to lock second valve slide (50) against axial movement in relation to the first valve slide (22).

6. A control and cut-off device according to claim 1, characterized by the fact that the second valve slide (50) is provided with axial bars and grooves, for example splines (48), at the end thereof facing the opening of the boring (20) and that the first valve slide (22) at the corresponding end is provided with an axial groove (34) and that a locking washer (36) having internal splines and a projection (34^1) is intended to cooperate with the splines (48) and the groove (34) to fix the two slides (22, 50) against rotation in relation to each other.

7. A control and cut-off device according to claim 1, characterized by the fact that the locking washer (36) is fixed by a second outer locking ring (61) which locks the washer (36) axially.

Fig. 1

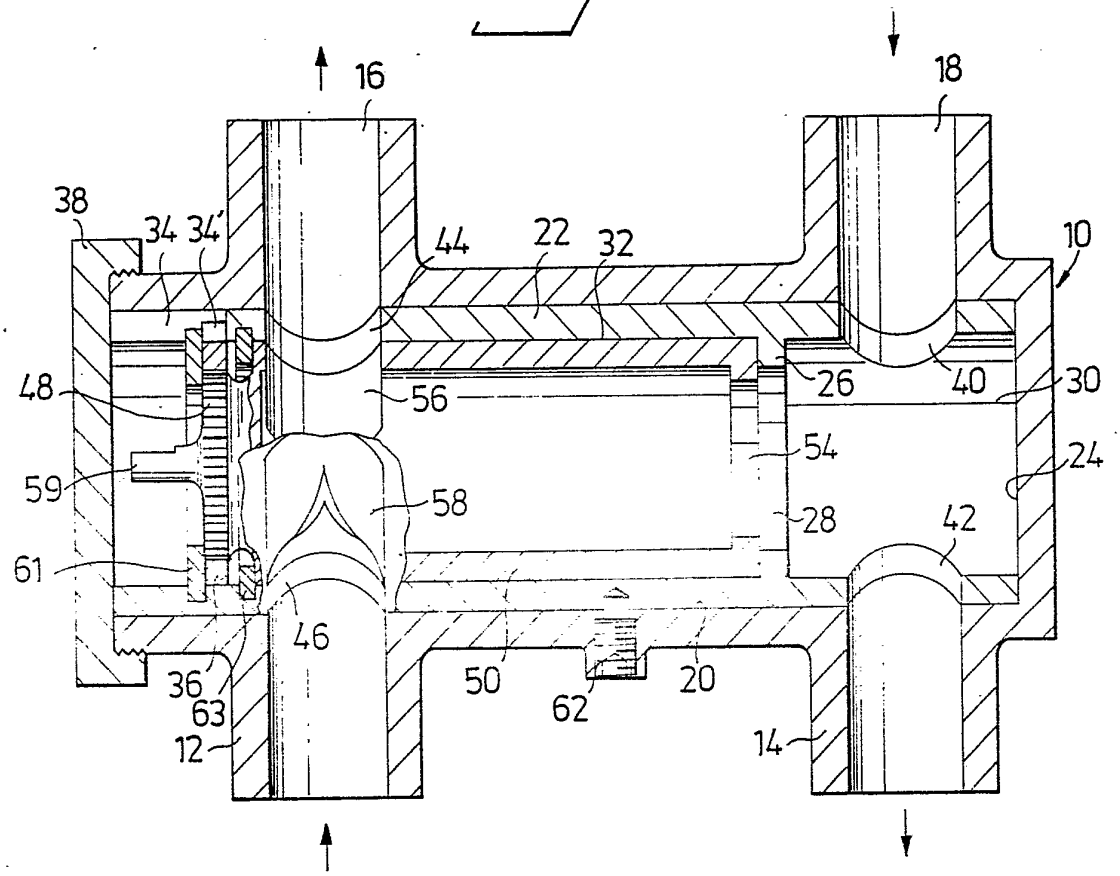


Fig. 2

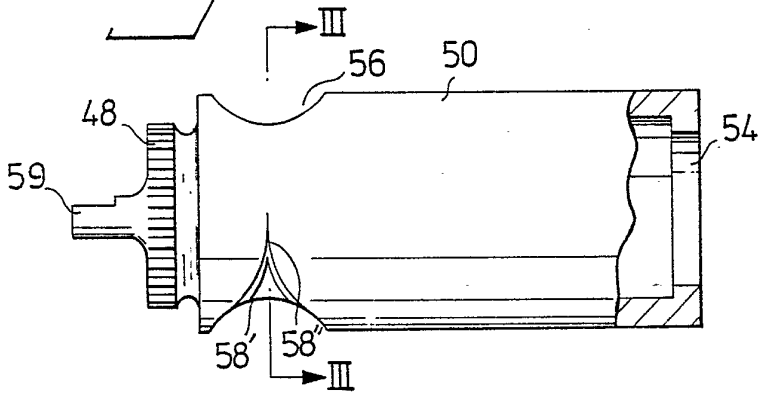


Fig. 3

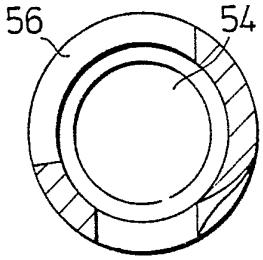


Fig. 4

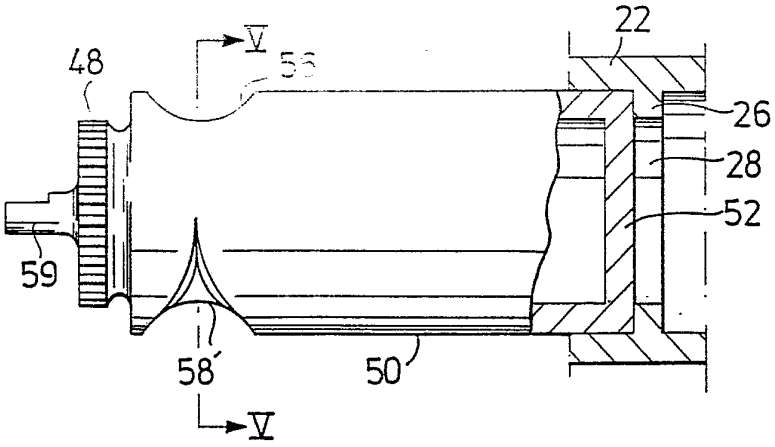
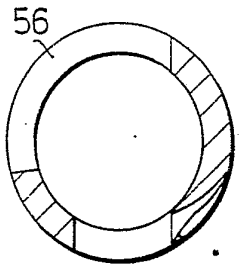


Fig. 5



INTERNATIONAL SEARCH REPORT

International Application No PCT/SE79/00238

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [3]

According to International Patent Classification (IPC) or to both National Classification and IPC 3

F 16 K 11/10

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System	Classification Symbols
IPC 3	F 16 K 11/00, 11/10, 11/17, 11/20, 11/22
Deutsche Kl	47g:20/01
US Cl	137:625, 625.12, 625.15, 625.2-24, 625.28-32, 625.46-47 .../...

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [5]

SE, NO, DK, FI classes as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category *	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
X	SE, A, 142 415 published 1953, October 6, Johansson, Rydén, Oscarsson	1, 4
X	US, A, 676 179 published 1901, June 11, Elliott	1, 4
X	US, A, 782 954 published 1905, February 21, Elliott	1, 4
A	US, A, 1 354 522 published 1920, October 5, Takala	1, 4
A	US, A, 2 500 239 published 1950, March 14, Beyette	1, 4

* Special categories of cited documents: [15]

"A" document defining the general state of the art

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"P" document published prior to the international filing date but on or after the priority date claimed

"T" later document published on or 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

IV. CERTIFICATION

Date of the Actual Completion of the International Search [2]	Date of Mailing of this International Search Report [2]
1980-02-01	1980-02-26
International Searching Authority [1]	**Signature of Authorized Officer [20]**
Swedish Patent Office	Sven-Erik Bergdahl

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

II Continuation classification system

US Cl: 627.5, 628, 630, 637-637.5, 594, 595, 596-596.13, 597, 599-599.2

V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE [10]

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers ....., because they relate to subject matter [12] 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 [13], specifically:

VI. ☐ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING [11]

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.