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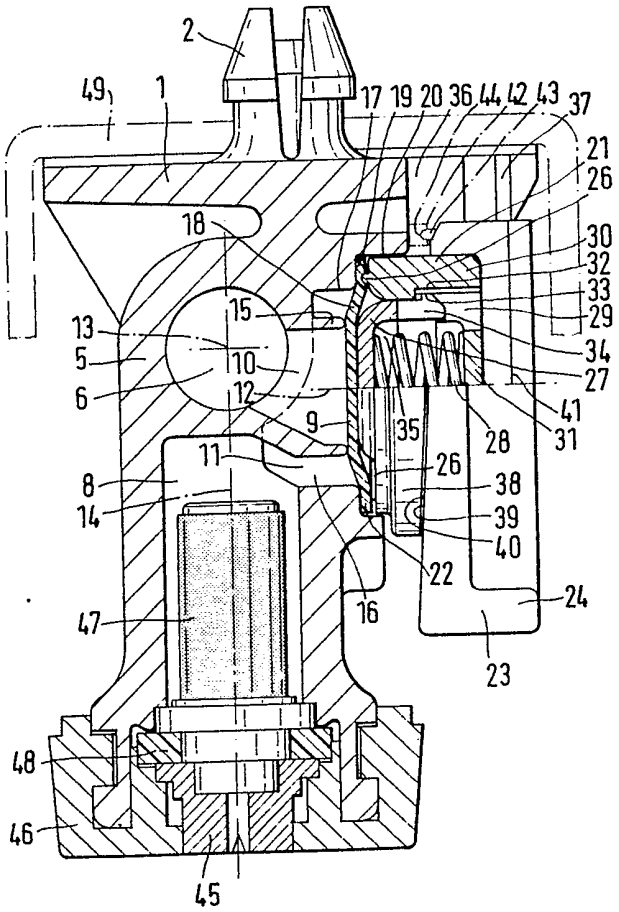
(54) Nozzle holder for agricultural spraying instruments

(57) In a nozzle holder for agricultural spraying implements, more especially field sprayers, including a housing which accommodates a spray medium feed pipe connection, a nozzle connection and possibly an additional connection for connection to additional nozzle holders, of the type wherein a diaphragm valve which seals an annular chamber from a conduit is disposed in the housing between the spray medium feed connection and the nozzle connection, the conduit (10) is connected to the spray medium feed connection (6), the annular chamber (11) is connected to the nozzle connection (8), the conduit (10) extends laterally into the spray medium feed connection (6), and the diaphragm valve (9) is disposed laterally of the spraying medium feed connection (6) or nozzle connection (8), respectively.

FIG. 2



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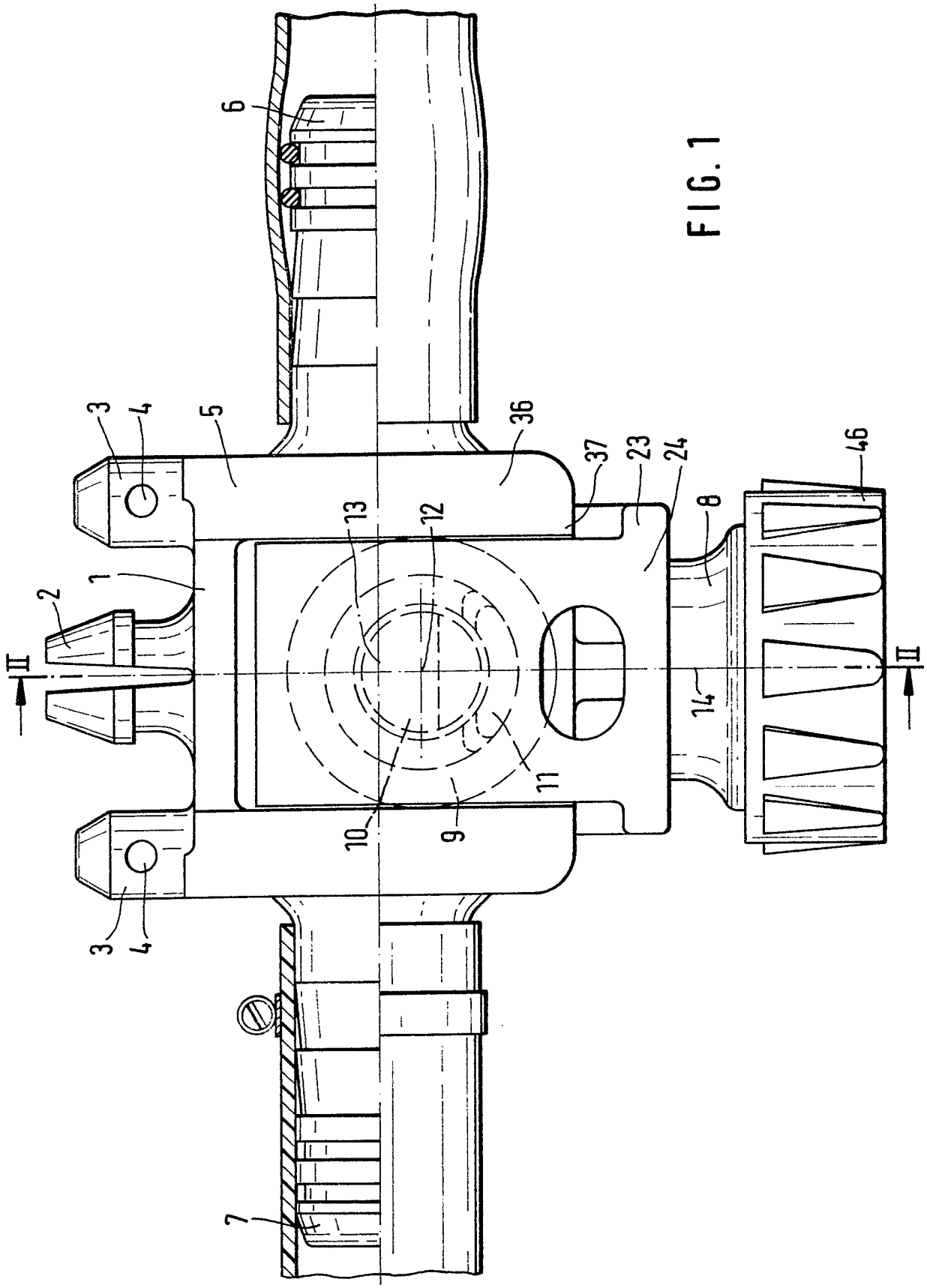

FIG. 1

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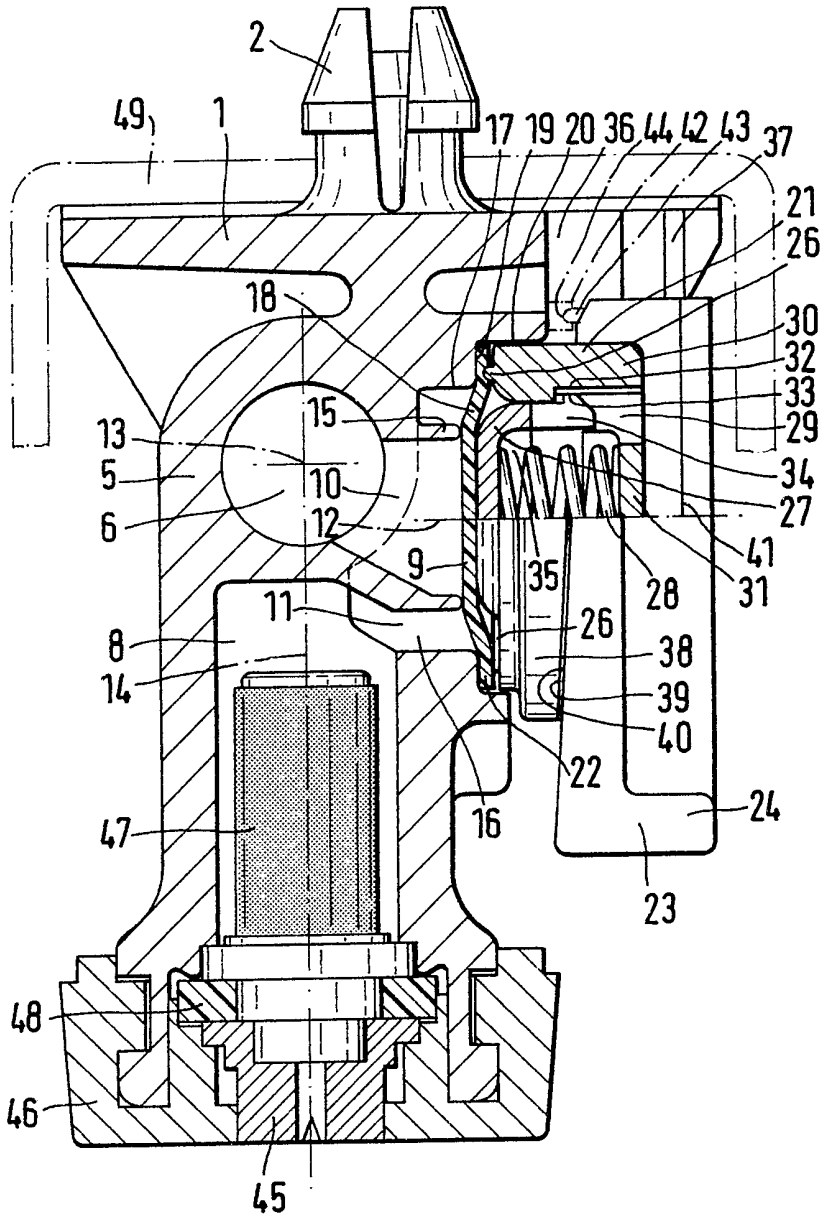
FIG. 2



SPECIFICATION

Nozzle holder for agricultural spraying implements

The present invention relates to a nozzle holder for agricultural spraying implements more especially field sprayers including a housing which accommodates a spray medium feed connection and a nozzle connection, wherein a diaphragm valve which seals an annular chamber from a conduit is disposed in the housing between the spray medium feed connection and the nozzle connection.

A nozzle holder is disclosed in German Gebrauchsmuster No. 8 203 649, wherein the diaphragm valve is disposed at the upper end of the nozzle holder. When the nozzle holder is in its mounted position on the jib-like bar or boom of the field sprayer, the diaphragm valve is inaccessible. When the diaphragm valve needs to be cleaned or replaced, the whole nozzle holder has to be dismantled.

In addition, such prior nozzle holder is considerably disadvantageous because a conduit is provided in the spray medium feed connection. The flow in the spray medium feed connection is adversely affected by the housing of the conduit.

An additional nozzle holder is disclosed in German Gebrauchmuster No. 8 306 319. In this nozzle holder, the diaphragm valve is disposed at the end of the nozzle holder directed away from the mounting end. This arrangement renders the diaphragm valve accessible even in the case where a nozzle holder is mounted on the jib-like bar or boom of the field sprayer. However, the disadvantage of this prior nozzle holder resides in its length. This prior nozzle holder protrudes considerably below the lower edge of the jib-like spray boom. As a result, the nozzle holder may become damaged or dirty, as can the nozzle disposed in the nozzle holder.

The present invention seeks to improve the initially described nozzle holder with regard to the arrangement of the diaphragm valve.

According to the present invention there is provided a nozzle holder for agricultrual spraying implements, including a housing (5) which accommodates a spray medium feed connection (6) and a nozzle connection (8), wherein a diaphragm (9) which seals an annular chamber (11) for a conduit (10) is disposed in the housing (5) between the spray medium feed connection (6) and the nozzle connection (8); characterised in that the conduit (10) is connected to the spray medium feed connection (6), the annular chamber (11) is connected to the nozzle connection (8), the conduit (10) extends laterally into the spray medium feed connection (6) and the diaphragm valve (9) is disposed laterally of the spray medium feed connection (6) and nozzle connection (8), respectively.

These measures permit the nozzle holder to be made extremely short and compact, whilst at the same time permitting easy access to the diaphragm valve. In addition, these measures provide good flow conditions in the spray mediun feed connection. The diaphragm valve also exhibits good sealing behaviour. It is considered there may also be provided an additional duct or connection for connection to additional nozzle holders.

The nozzle holder can be made very short because the lower portion of the end face of the annular chamber extends into the nozzle connection. A short-length arrangement is also achieved because the centre axis of the conduit extends below the centre line of the spray medium feed connection.

To ensure that the diaphragm is securely mounted, the outer wall of the annular chamber widens into a smooth, cylindrical section of the side directed towards the diaphragm of the diaphragm valve, thereby forming an annular step, and said cylindrical section accommodates an annular sealing member or collar which is pressed against the annular step with the inter-position of the edge of the diaphragm. To ensure that the diaphragm is well sealed outwardly, the end of the sealing collar directed towards the diaphragm is also provided with a circumferential bead.

To ensure that the sealing collar is securely retained in the nozzle holder according to the present invention, the sealing collar is pressed against the annular step by a securing or locking member cooperating with the housing.

Slot-like guide members are preferably mounted alongside the annular step of the annular chamber of the diaphragm valve on the side of the housing on which the diaphragm valve is disposed, and the locking member, provided as a slide, is capable of being slid into said guide members. The resultant locking member is one which takes up little space and is simple to release.

To ensure that the sealing collar is securely retained in the nozzle holder by the slide, slots are provided in the external wall of the sealing collar and struts of the slide engage in said slots or grooves.

It is also possible to provide struts on the external wall of the sealing collar and to provide the slide with slots which co-operate with the struts of the sealing collar.

To compensate for manufacturing tolerances and to permit the sealing collar to be firmly pressed against the diaphragm, the struts and slots extend slightly inclinedly relative to the straight line which runs parallel to the guide members of the slide.

Further details are to be found in the remaining sub-claims.

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

Fig. 1 is a front elevational view with parts cutaway of a nozzle holder; and

Fig. 2 is a sectional view of the nozzle holder of Fig. 1 taken along line II-II.

A nozzle holder 1 is secured to a spray bar or boom of a field sprayer by means of the expanding jamming piece or clamp 2 in a manner which is known and therefore not shown. In addition, two mounting pins 3 are disposed at the upper end of the nozzle holder 1 and also protrude through a support member of the spray boom. If the expand-

ing clamp 2 becomes damaged, a securing pin is inserted through each bore 4 formed in the mounting pins 3, so that the nozzle holder 1 may continue to be securely located on the spray boom.

The nozzle holder 1 includes a housing 5 which accommodates a spray medium inlet or feed duct or connection 6, an additional duct or connection 7 for connection to additional nozzle holders, and a nozzle duct or connection 8. In addition, the nozzle holder 1 includes a diaphragm valve 9 which seals a conduit 10 from an annular chamber 11 between the spray medium feed connection 6 and the nozzle connection 8. The conduit 10 is connected to the spray medium feed connection 6, whereby the conduit 10 extends laterally into the spray mediun connection 6. The centre line 12 of the conduit 10 extends below the centre line 13 of the spray medium feed connection 6, while the centre line 14 of the nozzle connection 8 intersects the centre line 13 of the spraying medium feed connection 6. The annular chamber 11 surrounds the wall 15 of the conduit 10. In addition, the annular chamber 11 is connected to the nozzle connection 8, whereby the lower portion of the end face 16 of the annular chamber 11 extends into the nozzle connection 8.

The diaphragm valve 9 is disposed laterally of the spray medium feed connection 6 and the nozzle connection 8. The outer wall 17 of the chamber 11 widens into a smooth, cylindrical section 20 at the end directed towards the diaphragm 18 of the diaphragm valve 9, thereby forming an annular step 19. This section 20 accommodates annular sealing member or collar 21 which is pressed against the annular step 19 by a locking member 24, provided as a slide 23, through the intermediary of the edge 22 of the diaphragm 18. This causes the housing 5 to be closed, so that the spray fluid can pass from the spray medium feed connection 6 to the nozzle connection 8 without any losses from leakage. To achieve particularly good sealing, end face 25 of the sealing ring 21 directed towards the diaphragm 18 is provided with a circumferential bead 26.

A cylindrical thrust collar or member in the form of a cap-like member is disposed within the sealing ring or collar 21 and its closed end portion is pressed against the diaphragm 18 by means of spring 28 which is supported at its other end by an on end part of the sealing collar 21. This causes the diaphragm 18 to be pressed against the wall 15 of the conduit 10, so that the diaphragm 18 can seal the conduit 10 from the annular chamber 11 under suitable pressure conditions. In order that the sealing collar 21 can support the spring 28, the sealing ring 21 has a stop portion or member 31, on its end remote from the diaphragm 18, connected to outer ring wall 30 by spaced crosspieces 29.

The inner region of the sealing collar 21 - when viewed from the end directed towards the diaphragm 18 - widens into a larger, cylindrical section 32. The thrust member 27 also widens into a circumferential edge 33 at the end directed away from the diaphragm 18, thereby forming an annular step, and the edge 33 is disposed within the cylindrical section 32 of the sealing collar 21. The edge 33 of the thrust member 27 is interrupted by the apertures 34 co-operable with crosspiece 29 so that the thrust member 27 can be displaceably pressed into the sealing collar 21 and, in consequence, so that the edge 33 can fit into the section 32.

The thrust member 27 has the cylindrical recess 35 formed in its end surface facing away from the diaphragm 18, and the spring 28 is disposed in said recess. The spring 28 is inserted into this recess before the thrust member 27 and sealing ring 21 are assembled.

Slot-like guide members 37 are mounted beside the annular step 19 of the annular chamber 11 of the diaphragm valve 9 on side 36 of the housing 5 on which the diaphragm valve 9 is disposed. These guide members 37 run parallel to the centre line 14 of the nozzle connection 8. The slide 23 is inserted in these guide members 37.

Two oppositely facing slots 39 are provided in the external wall 38 of the sealing collar 21. Two oppositely facing projecting struts or ribs 40 are also disposed on the slide 23 and are provided in such a way that they can be inserted into slots or grooves 39 in the sealing ring 21. In consequence, the grooves 39 can co-operate with the struts 40 of the sealing ring 21 and the slide 23 ensures that the sealing collar 21 is firmly positioned in the housing 5 of the nozzle holder 1. The struts 40 and the grooves 39 extend slightly inclinedly relative to the straight line 41 which runs parallel to the guide members 37 for the slide 23. Use of the inclined plane or wedge principle always ensures that the diaphragm 18 is firmly positioned.

If required, a securing member 42, which is shown by a dash-dot line, may be disposed between the slide 23 and the housing 5. Such securing member 42 is provided as a can 43 which is disposed on a resilient part of the slide 23 and co-operates with a recess 44 formed in the housing 5.

A nozzle 45 is disposed in the housing 5 by means of a union or clamping nut 46 at the lower end of the nozzle connection 8. In addition, a filter 47 is connected to the nozzle 45 and a sealing ring 48 is connected to the union nut 46 at the end of the nozzle connection.

Because the diaphragm valve 9 is laterally disposed in the manner according to the invention, a compact and low nozzle holder is achieved whilst being simultaneously protected in a supporting beam 49, which is shown in Fig. 2 by dash-dot lines, as supporting the spray boom of a field sprayer.

The diaphragm valve operates as follows:

When a sufficiently high pressure exists in the spray medium feed connection 6, the diaphragm 18 is raised from the wall 15 of the conduit 10 in opposition to the resilient pressure of the spring 28. The spray fluid then flows from the conduit 10 into the annular chamber 11 and thence to the nozzle connection. From there, the spray fluid passes through the filter 47 to the nozzle 45. The nozzle 45 then distributes the fluid in a known manner.

As soon as the spraying operation is interrupted,

the supply of spray medium is halted. This causes the pressure in the spray medium feed connection 6 to drop. As soon as the pressure in the spraying medium feed connection has dropped so far that the pressure is no longer sufficient to keep the diaphragm valve open, the spring 28 presses the diaphragm 18 against the wall 15 of the conduit 10 via the thrust member 27. The diaphragm 18 seals the conduit 10 from the annular chamber 11 and, in consequence, seals the spray medium feed connection 6 from the nozzle connection 8. It is impossible for the nozzles 45 to drip as a result of undesired fluid passage.

CLAIMS

1. A nozzle holder for agricultural spraying implements, including a housing which accommodates a spray medium feed connection and a nozzle connection, an additional duct or connection for connection to additional nozzle holders, wherein a diaphragm valve which seals an annular chamber from a conduit is disposed in the housing between the spray medium feed connection and the nozzle connection; characterised in that the conduit is connected to the spray medium feed connection, the annular chamber is connected to the nozzle connection, the conduit extends laterally into the spray medium feed connection, and the diaphragm valve is disposed laterally of the spray medium feed connection and nozzle connection, respectively.

2. A nozzle holder as claimed in claim 1, in which the lower portion of the end face of the annular chamber extends into the nozzle connection.

3. A nozzle holder as claimed in claim 1, in which the centre axis of the conduit extends below the centre axis of the spray medium feed connection.

4. A nozzle holder as claimed in claim 1, in which the centre axis of the nozzle connection intersects the centre axis of the spray medium feed connection.

5. A nozzle holder as claimed in claim 1, in which the outer wall of the annular chamber widens into a smooth, cylindrical section of the end facing towards the diaphragm of the diaphragm valve, thereby forming an annular step, and said cylindrical section accommodates an annular sealing member which is pressed against the annular step via the intermediary of the edge of the diaphragm.

6. A nozzle holder as claimed in claim 5, in which the end face of the sealing member directed towards the diaphragm is provided with a circumferential bead.

7. A nozzle holder as claimed in claim 5, in which a thrust member is disposed within the annular sealing member; and the thrust member presses the diaphragm against the end face of the wall of the conduit by means of a spring.

8. A nozzle holder as claimed in claim 7, in which the inner region of the sealing member - when viewed from the end directed towards the diaphragm - widens into a larger, cylindrical section, thereby forming an annular step; the thrust collar widens into a circumferential edge at the end directed away from the diaphragm, thereby forming an annular step; and the edge of the thrust member is disposed within the cylindrical section of the sealing member.

9. A nozzle holder as claimed in claim 8, in which the edge is interrupted by notches or apertures.

10. A nozzle holder as claimed in claim 7, in which the thrust member has a cylindrical recess formed in its end directed away from the diaphragm; and the spring is disposed in said recess.

11. A nozzle holder as claimed in claim 7, in which the sealing member has a stop member connected to its outer ring on its end directed away from the diaphragm; and the spring abuts against said stop member.

12. A nozzle holder as claimed in claim 5, in which the sealing member is pressed against the annular step by a locking member co-operating with the housing.

13. A nozzle holder as claimed in claim 12, in which the diaphragm valve is disposed on the side of the housing; slot-like guide members are mounted alongside the annular step of the annular chamber of the diaphragm valve; and the locking member, provided as a slide, is capable of being slid into said guide members.

14. A nozzle holder as claimed in claim 13, in which slots are provided in the external wall of the sealing member; and struts for supporting the slide engage in said slots.

15. A nozzle holder as claimed in claim 13, in which struts or projecting ribs are disposed in the external wall of the sealing member and the slide has slots or grooves formed therein which co-operate with the ribs of the sealing member.

16. A nozzle holder as claimed in claim 14 or 15, in which the struts and slots extend slightly inclinedly relative to the straight line which runs parallel to the guide members for the slide.

17. A nozzle holder as claimed in claim 13, in which a securing member is disposed between the slide and the housing.

18. A nozzle holder as claimed in claim 17, in which the securing member is provided as a cam; the cam is disposed on a resilient part of the slide; and the cam co-operates with a recess formed in the housing.

19. A nozzle holder substantially as herein described and illustrated with reference to the accompanying drawings.

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