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(54) **A support and distribution element for a pneumatic valve**

Eine Stütz- und Verteilungsvorrichtung eines pneumatischen Ventils

Un élément de support et de distribution pour un distributeur pneumatique

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Description

[0001] The present invention relates to a pneumatic element comprising a support and distribution element and a pneumatic valve of a type having a generally parallelepiped body with internal passages opening into two opposite sides of the valve body.

[0002] A conventional valve of this type is illustrated schematically in Figure 1 of the appended drawings. Outlet openings 12a of the internal passages are formed in a face 11a of the valve body 10, while the inlet connections (not visible in Figure 1) are formed on the face opposite the face 11a.

[0003] In the prior art, in order to mount valves of the aforesaid type into a control panel, a first method involves fixing each valve body to the base of the control panel - each valve independently of the others. Two holes 13 are therefore formed in each valve body for engaging respective fixing elements (not shown).

[0004] This assembly method makes it possible to use the pneumatic logic of the valves particularly flexibly, according to the requirements of the system; the valves can be connected in series, for example, or fed through an outlet opening instead of through an inlet. On the other hand, when valves are arranged in this way some free space S must be left between one valve and another, as shown schematically in Figure 2, in order to fit the connections 14 for the pneumatic pipework (not shown). The pneumatic system thus looks untidy, is rather bulky and takes a long time to assemble and to adjust or service.

[0005] In another prior art arrangement, shown in Figure 3, assemblies of valves 10 of the same format are assembled into modules on a shared support and distribution element 15 which is fixed in turn to a base of the control panel. The element 15 usually has a passage 16 for feeding the valves and other passages 17, 18 for discharge therefrom.

[0006] This type of assembly makes optimum use of available space and rationalises the pneumatic pipework since all the valve porting is facing the operator; assembly and dismantling operations, and thus maintenance, are all simpler. One limitation of this configuration, however, is that its use is not very flexible, since all the valves must be fed through the single passage 16 of the support and distribution element and they cannot be connected in series but only in parallel.

[0007] FR-A-2 307 151 discloses a support and distribution element as defined in the preamble of Claim 1. Another air distribution device is known from GB-A-2 178 139.

[0008] EP-A-0 806 573 discloses a fluid control device comprising:

a pneumatic valve having a parallelepiped body with first and second opposite surfaces and internal passages with first and second openings formed in at least a first surface of the valve body, and three blocks defining an L-shaped support and dis-

tribution element for appropriately accommodating a single pneumatic valve. The blocks have J-shaped air distribution passages with an opening for communication with a first opening of the passages formed through the valve body.

[0009] The object of the present invention is therefore to provide a support and distribution element for a pneumatic valve which tackles the following problems:

- optimizing the overall space occupied by the valves;
- rationalizing the arrangement of the pneumatic pipes;
- simplifying and speeding up assembly, dismantling and servicing operations on the system;
- providing flexibility of use so as to distinguish pneumatic systems according to the specific applications thereof.

[0010] This object is achieved according to the invention by providing a support and distribution element having the characteristics claimed in Claim 1.

[0011] Other significant characteristics of the invention are defined in the dependent Claims.

[0012] Further characteristics and advantages of the invention will become clearer from the detailed description of several embodiments thereof, provided purely by way of non-limitative example, with reference to the appended drawings, in which:

Figure 1 is a schematic perspective view of a known pneumatic valve of the type to which the present invention relates;

Figures 2 and 3 are perspective views of two different ways of assembling and supplying prior art pneumatic valves;

Figure 4 is a schematic perspective view of a support and distribution element according to the present invention;

Figure 5 is a schematic perspective view of the element of Figure 4 coupled to a pneumatic valve of the type illustrated separately in Figure 1;

Figure 6 is a schematic cross section taken on the line VI-VI of Figure 5;

Figure 7 shows a battery of valves each coupled to a distribution and support element of Figure 4; and Figure 8 is a schematic perspective view, similar to Figure 5, of a variant of the invention.

[0013] With reference to Figure 4, a support and distribution element according to the present invention is generally indicated 20, for a conventional pneumatic valve of the type shown in Figure 1 and briefly described in the introduction to this description.

[0014] The structural and functional characteristics of valves of the type shown in Figure 1 and of the pneumatic systems incorporating them are known in the art. The following description will therefore describe in detail only

those elements which are specifically relevant to the embodiment of the present invention. Information on the manufacture of parts and elements not illustrated in detail can be found with reference to any pneumatic system known in the art.

[0015] In the preferred embodiment shown in Figure 4 of the drawings, the outline of the body of the element 20 is elongate with an essentially constant dimension along a direction x here defined as longitudinal, and with a substantially L-shaped cross section in a plane transversal to the direction x.

[0016] The body 20 has a horizontal lower portion or base portion 21 and a vertical side portion 22 extending perpendicular to one side of the base portion 21.

[0017] The base portion 21 has a flat upper surface 23 which defines a seat with the lateral surface 24 of the vertical portion 22 for appropriately housing a single pneumatic valve 10, as shown schematically in Figure 5.

[0018] With reference to Figure 6, the element 20 has a plurality of internal passages 25 for air supply. The passages 25, the number of which can vary in dependence on the type of valve it is associated with, are arranged parallel side by side, along the longitudinal dimension x (which is perpendicular to the plane of Figure 6). The passages 25 extend through the base portion 21 and the vertical portion 22 in substantially the shape of a J, whereby (see Figure 4) the apertures 25a, 25b at opposite ends of the passages 25 open into the upper surface 23 of the base portion 21 and into the horizontal top surface 26 of the vertical portion 22 respectively.

[0019] As can be seen in Figure 6, the apertures 25a of the passages 25 are aligned with and in communication with the lower openings 12a of the passages formed through the valve body 10; the drawings do not show the intermediate portions of these passages, schematically indicated 12, which extend between the lower openings 12a and the upper openings 12b in opposite surfaces 11a and 11b of the valve body 10.

[0020] A known rubber or rubberized canvas seal (not shown) is preferably interposed between the lower surface 11b of the valve body 10 and the horizontal surface 23 of the element 20.

[0021] With reference still to Figure 6, it is advantageous if the element 20 is of a shape and size whereby, once it is coupled to a pneumatic valve 10, the assembly formed by the element 20 and the valve 10 forms a parallelepiped, which substantially matches the maximum dimensions of the element 20, and in which the upper surface 11b of the valve body, with the openings 12b, is coplanar with the horizontal top surface 26 of the vertical portion 22 of the element 20.

[0022] An important characteristic of the arrangement of the invention is that the apertures 25b of the passages 25 through the element 20 and the openings 12b in the valve body 10 all face in the same direction, that is forwards towards the operator. This gives the operator easy access to the valves and to inlet and outlet connections to the valves as well as to pneumatic lines, both when

installing the system and when it is necessary to carry out alterations or maintenance.

[0023] In other words, the support and distribution element of the invention make it possible to divert the inlet and outlet passages through 180° (from the position 25a of Figure 6), moving them alongside the outlet openings 12b of the valve.

[0024] Any known type of removable or releasable fixing elements, not described or shown here, may be used in order to fix the valve to its support and distribution element.

[0025] Figure 8 shows an alternative embodiment of the invention, in which a cavity 11c is formed in the lower surface of the valve body 10 for coupling the valve body to the support and distribution system 20 in an interlocking configuration. In order to further improve this connection, step-like recesses 21c can be formed in the sides of the base portion 21.

[0026] It is evident that the support and distribution element of the invention makes it possible to mount valves on a control panel (indicated 27 in Figure 6) individually but close to each other as shown in Figure 7 or even in direct contact with each other. In any event, the valves offer flexibility with regard to their arrangement and connection, thereby providing the advantages described with reference to Figure 2 in the introduction to this description. The fact that the fittings and pneumatic pipework all face the operator provides the advantages described with reference to the known arrangement illustrated in Figure 3.

[0027] The fact that the connections all face the operator also means that the present invention makes it possible significantly to reduce the assembly time of the system, since it is possible first to fix all the support elements and their associated valves to the control panel and then to fit connections and pneumatic pipework to the valves already fitted. This is a clear advantage over the known arrangement described with reference to Figure 2, in which the valves have to be connected before being fixed to the control panel since it is difficult to access the connections once the valves are in place on the panel.

[0028] Finally, the support and distribution elements according to the invention have a surface, the top surface 26 for example, which in use faces the operator and is thus ideal for carrying a symbol, a number for example, to identify each valve.

Claims

1. A pneumatic element comprising a support and distribution element (20) and a pneumatic valve of a type having an essentially parallelepiped body (10) having first and second opposite surfaces (11a, 11b) and internal passages (12) with first and second openings (12a, 12b) formed in at least a first surface (11a) of the valve body, wherein said distribution element (20) has a plurality of air distribution passages

(25), and wherein each passage (25) has a first opening (25a) for communication with a first opening (12a) of the passages (12) through the valve body (10), and a second opening (25b) facing substantially in the same direction as the second openings (12b) of the passages through the valve body (10),

characterised in that

said distribution element (20) includes a lower base portion (21) and a lateral portion (22) which extends perpendicular from a side of the base portion (21) with a substantially L-shape, the said portions (21, 22) forming a seat for appropriately accommodating a single pneumatic valve (10), and that the passages (25) extend through the base portion (21) and the lateral portion (22) each substantially in the shape of a J, in such a way that the first openings (25a) of the passages (25) open into a surface (23) of the base portion (21) arranged against the said first surface (11a) of the valve body (10), and the second openings (25b) open into another surface (26) of the side portion (22) which is essentially adjacent and parallel to the second surface (11b) of the valve body (10).

2. A pneumatic element according to Claim 1, **characterised in that** the second face (11b) of the valve body is substantially coplanar with the said other surface (26) of the lateral portion (22) of the element (20).
3. A pneumatic element according to Claim 1, **characterised in that** its shape and dimensions are such that, once a pneumatic valve (10) is coupled to the support and distribution element (20), the assembly constituted by the element (20) and the valve (10) is in the shape of a parallelepiped substantially matching the maximum dimensions of the distribution element (20).
4. A pneumatic element according to Claim 1, **characterised in that** the base portion (21) of the element (20) is shaped (21c) so as to form-engage with the valve body (10).

Patentansprüche

1. Ein pneumatisches Bauteil mit einem Auflage- und Verteilerelement (20) und einem pneumatischen Ventil, das einen im Wesentlichen parallelepipedalen Körper (10) mit ersten und zweiten gegenüberliegenden Flächen (11a, 11b) und inneren Durchlässen (12) mit ersten und zweiten Öffnungen (12a, 12b) aufweist, die in mindestens einer ersten Fläche (11a) des Ventilkörpers ausgebildet sind, wobei das genannte Verteilerelement (20) mehrere Luftverteilungsdurchlässe (25) aufweist und jeder Durchlass (25) eine erste Öffnung (25a) zum Verbinden mit ei-

ner ersten Öffnung (12a) der Durchlässe (12) durch den Ventilkörper (10) aufweist, und eine zweite Öffnung (25b), die im Wesentlichen in die gleiche Richtung wie die zweiten Öffnungen (12b) der Durchlässe durch den Ventilkörper (10) gerichtet ist,

dadurch gekennzeichnet, dass

das genannte Verteilerelement (20) einen unteren Basisteil (21) und einen Seitenteil (22) umfasst, der sich rechtwinklig von einer Seite des Basisteils (21) im Wesentlichen L-förmig erstreckt, wobei die genannten Teile (21, 22) eine Aufnahme zur entsprechenden Anordnung eines einzelnen pneumatischen Ventils (10) bilden,

und dass sich die Durchlässe (25) derart durch den Basisteil (21) und den Seitenteil (22) erstrecken, dass diese jeweils im Wesentlichen J-förmig ausgebildet sind und dass die ersten Öffnungen (25a) der Durchlässe (25) in eine Fläche (23) des Basisteils (21) münden, die an der genannten ersten Fläche (11a) des Ventilkörpers (10) angeordnet ist, und dass die zweiten Öffnungen (25b) in eine weitere Fläche (26) des Seitenteils (22) münden, die im Wesentlichen angrenzend und parallel zur zweiten Fläche (11b) des Ventilkörpers (10) angeordnet ist.

2. Ein pneumatisches Bauteil nach Anspruch 1, **dadurch gekennzeichnet, dass** die zweite Fläche (11b) des Ventilkörpers im Wesentlichen koplanar zu der genannten anderen Fläche (26) des Seitenteils (22) des Verteilerelements (20) angeordnet ist.
3. Ein pneumatisches Bauteil nach Anspruch 1, **dadurch gekennzeichnet, dass** seine Form und Abmessungen so ausgeführt sind, dass die Anordnung, die vom Verteilerelement (20) und vom Ventil (10) gebildet wird - sobald ein pneumatisches Ventil (10) an das Auflage- und Verteilerelement (20) gekoppelt ist - der Form eines Parallelepipeds entspricht, das im Wesentlichen mit den maximalen Abmessungen des Verteilerelements (20) übereinstimmt.
4. Ein pneumatisches Bauteil nach Anspruch 1, **dadurch gekennzeichnet, dass** das Basisteil (21) des Elementes (20) so geformt ist (21c), dass es form-schlüssig mit dem Ventilkörper (10) verbindbar ist.

Revendications

1. Élément pneumatique comprenant un élément de support et de distribution (20) et une soupape pneumatique ayant un corps (10) pour l'essentiel parallélépipédique comportant une première et une seconde surfaces opposées (11a, 11b) et des passages internes (12) avec des premières et secondes ouvertures (12a, 12b) formées dans au moins une première surface (11a) du corps de soupape, dans lequel ledit élément de distribution (20) comporte

une pluralité de passages de distribution d'air (25), et dans lequel chaque passage (25) possède une première ouverture (25a) pour la communication avec une première ouverture (12a) des passages (12) à travers le corps de soupape (10) et une se- 5
conde ouverture (25b) sensiblement face à la même direction que les secondes ouvertures (12b) des passages à travers le corps de soupape (10),

caractérisé en ce que

ledit élément de distribution (20) inclut une partie in- 10
férieure de base (21) et une partie latérale (22) qui s'étend perpendiculairement à partir d'une face latérale de la partie de base (21) avec sensiblement une forme de L, lesdites parties (21, 22) formant un 15
siège pour recevoir de façon appropriée une soupape pneumatique unique (10),
et **en ce que** les passages (25) s'étendent à travers la partie de base (21) et la partie latérale (22), chacun sensiblement sous la forme d'un J, de telle façon 20
que les premières ouvertures (25a) des passages (25) s'ouvrent dans une surface (23) de la partie de base (21) disposée contre ladite première surface (11a) du corps de soupape (10) et les secondes 25
ouvertures (25b) s'ouvrent dans une autre surface (26) de la partie latérale (22) qui est pour l'essentiel adjacente et parallèle à la seconde surface (11b) du corps de soupape (10).

2. Élément pneumatique selon la revendication 1, **ca- 30
ractérisé en ce que** la seconde face (11b) du corps de soupape est sensiblement sur le même plan que ladite autre surface (26) de la partie latérale (22) de l'élément (20).
3. Élément pneumatique selon la revendication 1, **ca- 35
ractérisé en ce que** sa forme et ses dimensions sont telles que, une fois qu'une soupape pneumatique (10) est couplée à l'élément de support et de distribution (20), l'ensemble constitué par l'élément 40
(20) et la soupape (10) se présente sous la forme d'un parallélépipède qui correspond sensiblement aux dimensions maximales de l'élément de distribution (20).
4. Élément pneumatique selon la revendication 1, **ca- 45
ractérisé en ce que** la partie de base (21) de l'élément (20) est formée (21c) de façon à s'engager par la forme avec le corps de soupape (10).

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FIG. 1 (PRIOR ART)

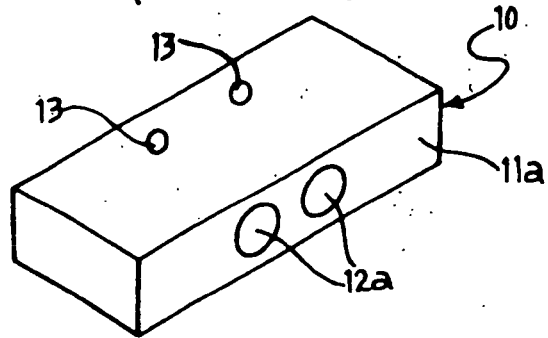


FIG. 2 (PRIOR ART)

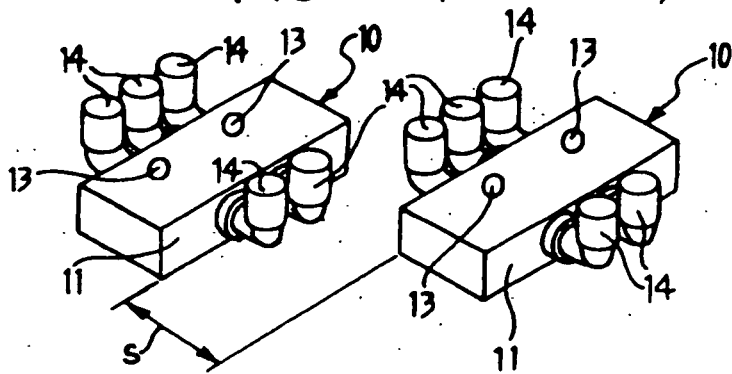


FIG. 3 (PRIOR ART)

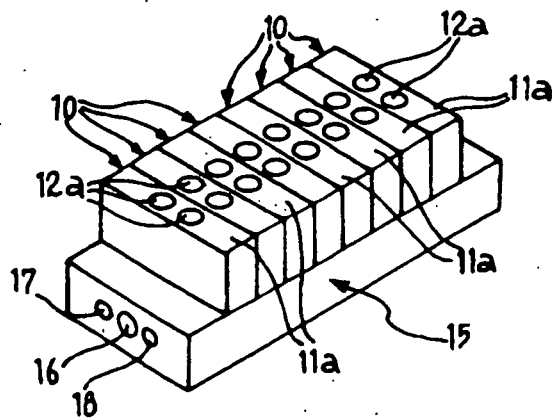


FIG. 4

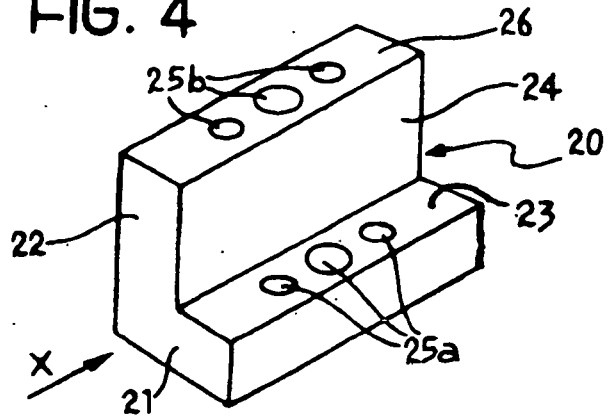


FIG. 5

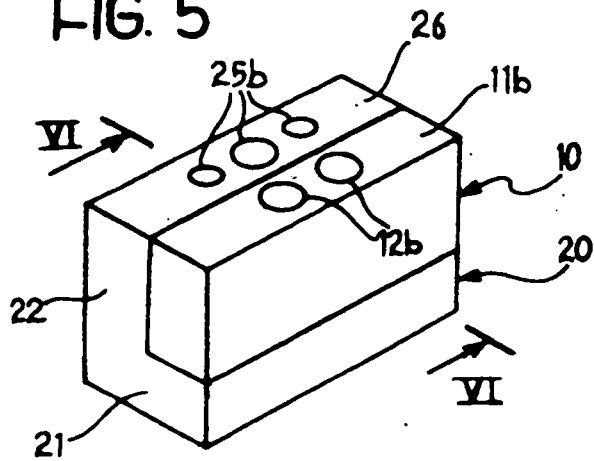


FIG. 6

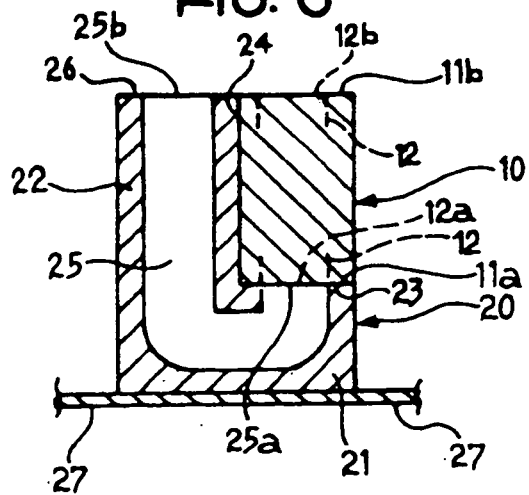


FIG. 7

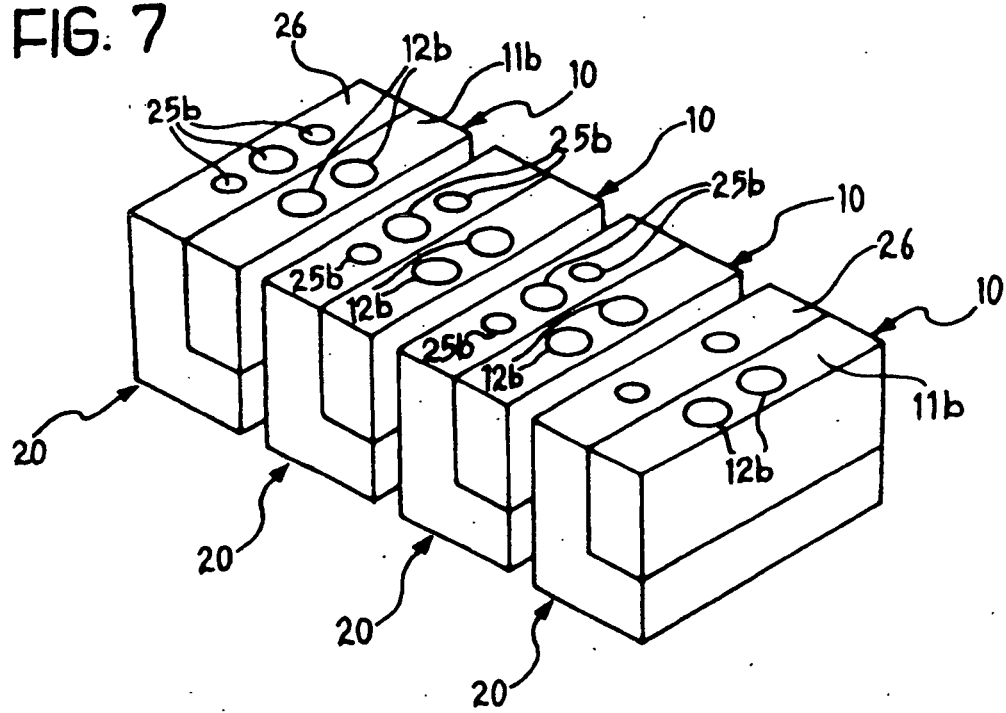


FIG. 8

