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54 **A VALVE COMPONENT FOR A FRICTIONLESS GUIDED VALVE.**

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Description

The present invention relates to a composite valve plate for use in a plate-type non-return valve and more particularly to a valve plate comprising a frictionless guide member and a valve closure member.

Hitherto in frictionless guided valves, valve plates are known which have been integrally formed of steel and have mainly comprised a main outer, annular valve closure portion normally provided with arcuate slots for the passage of air or other gases, and guide means located centrally of the valve closure portion to provide what is termed "frictionless guidance" with said guide means leading to mounting means which, in use in a valve, are clamped in position between the seat and guard of the valve. Hitherto known valve plates have been totally formed of steel or if formed of another material have been integrally formed i.e. the valve closure portion and the guide therefor have been one-piece.

In US-A-1,615,279 an annular valve plate presumably of metal is disclosed having a central air-flow aperture and a metal spring located on the top of the plate with the convolutions of the spring overlying the closure part of the plate and being connected to the plate at the outer periphery by means of an inturned edge so as to provide maximum spring length. The thickness of the combined plate and spring is greater than the plate alone and there is no proposal that the components be of dissimilar metal. Furthermore, the plate cannot move on either side of the central mounting hub of the spring because of the location of the convolutions.

In DE-B-722156 two guide plates 17 and 24 are rivetted together at 25 at their outer edges and the lower resilient guide plate 17 has an inner ring 14 which overlies inner ring 12 of a closure plate 9 and is held thereto by a collared or shaped ring body parts 18 forced apart and into engagement with rings 14, 12 by a spring member 23. Here the resilient guide plates 17/24 are located on top of metal closure plate 9 and have their main resilient action outwardly of the central aperture of plate 9 and thus have substantial thickness.

Proposals have been made to form valve plates wholly of titanium or plastics material or material other than steel but difficulties have been encountered. With a plate formed of titanium or plastics material, a considerable reduction in the weight of the plate can be achieved which is of considerable advantage since the inertia of the plate is reduced and the operation of a valve incorporating such a plate is enhanced. However, difficulties are experienced as a result of the poor flexing and wear characteristics of the central guide

means which has detracted from the advantages resulting from the savings in weight.

According to the present invention there is provided a composite valve plate for use in a plate-type non-return valve comprising a flat outer valve closure member having an inner periphery defining a central region or aperture and a guide member for the valve closure member having central mounting means for mounting the plate locatable or located in the region of said central aperture with said guide member also having at least one flexible guide arm capable of providing frictionless guidance of the valve closure member, said guide member being connectable by location means to said valve closure member; characterised in that said location means comprises inter-cooperation means on the guide member and the valve closure member which when the guide member is connected to the closure member lies or lie wholly within the space defined between the planes in which the opposite surfaces of the valve closure member lie, that the whole of the at least one flexible guide arm lies within the region or aperture defined by the inner periphery of the valve closure member, that the closure member is made of material of lesser density than the material from which the guide member is made and that said guide member when unstressed is generally flat and lies within the space defined between said planes or lies in a single plane.

The guide member will be of a material such as will exhibit the required flexibility and wear characteristics and will normally be of steel as used in known integrally formed valve plates. The guide member may be generally flat or lie in a single plane. The guide member will be of a thickness such as to exhibit the required resilience and flexibility and may be of a constant thickness or have reduced thickness portions to provide enhanced characteristics as may be desired. The central mounting means may be a central hub portion preferably with a central circular aperture therein or may be formed from separate arm portions leading inwardly from an outer continuous mounting portion. The central mounting means will have locating means such as cut out portions to ensure correct location of the member as is known in the central portions of known valve plates.

The at least one flexible guide arm may extend spirally outwardly of the central mounting means and will run into the outer mounting means although any other desired arrangement may be provided.

The outer mounting means will preferably be provided with means to ensure correct position thereof relative to the valve closure member with which it is to be used and this may comprise an outwardly extending projection which cooperates

with and is locatable in a corresponding recess in the inner periphery of the valve closure member.

The outer mounting means will be such as to cooperate with means provided in the inner portion or portions of the valve closure member to ensure adequate retention. Preferably the mounting means will comprise two arms extending circularly from the end of the flexible guide arm in opposite directions and terminating with a space therebetween and being sufficiently resilient in the plane of the plate so as to be engageable with a corresponding circular groove or channel in the inner periphery of the valve closure member which is provided for receiving such in the manner of an internal circlip arrangement. Suitable apertures will be provided on the free ends of the mounting arms to permit engagement by suitable tools such as a pair of circlip pliers.

The guide member thus will normally be integrally formed of one piece material preferably steel and be locatable in a specially formed valve closure member so as to provide for frictionless guidance thereof in desired manner.

The valve closure member comprises a generally annular or otherwise shaped plate member with through passages formed therein and having a central aperture therein for retainably receiving a guide member therein which is to provide frictionless guidance for the valve closure member.

The valve closure member is normally of a material of lesser density than steel and may be of any desired form and may be shaped to correspond to the valve closure portions of known integrally formed plate valve members - there being absent the central frictionless guidance portion and mounting portion and there being provided means for enabling location of the guide member centrally of the valve closure member.

The means for permitting location of the guide member centrally of the valve closure member may comprise a circular groove or channel of any desired cross-section extending around the inner periphery of the valve closure member and being of such a shape as to cooperate with the outer mounting means of a guide member so as to retain such therein. If the guide member were to have on its outer periphery a number of spaced apart projections, then one arrangement for location of the guide member might be to provide slots running into a groove or channel in the inner periphery of the valve closure member so as to permit insertion of the projections into said groove or channel and retention by a twisting movement of the guide member relative to the valve closure member with subsequent positional retention being achieved by the locating pins etc. of the valve to prevent undesired dislodgement of the guide member from the valve closure member.

The location means will preferably be inter-cooperation means on the guide member and valve closure member and preferably comprise an annular groove or channel in the inner periphery of the valve closure member lying in the same plane as the valve closure member and into which channel or groove spring arms in the form of an internal circlip may be locatable for retention purposes. Other location means may be provided by way of projection or rivetting or bonding or otherwise securing the guide member in position in the valve closure member.

It is of course important for the guide member to be retained against rotation relative to the valve closure member so as to maintain the passages in alignment with appropriate parts in the valve housing etc. and in this respect means are provided to prevent rotation of the guide member in the location means about a central axis transverse to the member. Stop means may comprise a radially extending projection and corresponding radially extending recess which are cooperable to prevent the mentioned rotation and may be provided on the guide member and closure member or vice versa. The same considerations as regards resilience and flexibility and lateral stability of the guide member as exist with the frictionless guide portions of known valve plates, for example when the guide member insert according to the present invention is made of steel or any other material suitable to provide the necessary lateral stiffness i.e. to prevent undue movement of the valve closure member in the plane in which it lies whilst at the same time providing the requisite resilience for frictionless guidance with other required characteristics of, for example, long life.

It is also important for the guide member to find its own central position or location concentrically within the valve and in this respect when, for example, the outer mounting means are in the form of oppositely directed arcuate spring arms to provide an internal circlip arrangement locatable within a groove within the central periphery of the aperture of the valve closure member, it is important for such spring arms to flex outwardly in opposite directions in the plane in which the member lies so that when located in the groove or channel of the valve closure member the central mounting means etc. ensure that the valve closure member is concentrically located within the valve housing.

It is accordingly to be appreciated that the concept of the invention enables a composite valve plate to be provided wherein the outer valve closure member may benefit from materials which enhance valve efficiency, for example, when of titanium or certain plastics material considerable weight reduction and therefore reduction in inertia is achieved whilst at the same time providing the

requisite desirable characteristics of frictionless guidance i.e. guidance without sliding contact. The guide member will normally be made of steel as similar or equivalent to the central frictionless guide portions of known guide plates. It is of course to be appreciated that the thickness of the plate from which the guide member is made and indeed the thickness of the guide member may be considerably less than the thickness of the valve closure member to provide the required resilient flexibility somewhat along the lines of the central frictionless guide portion of known valve plates wherein the resilient guide arms are made of reduced thickness relative to the remainder of the valve plate.

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

Fig. 1 is a plan view of a guide member according to the present invention;

Fig. 2 is a side elevation of the guide member of Fig. 1;

Fig. 3 is a plan view of a composite valve plate according to the present invention incorporating the guide member of Figs. 1 and 2 and including an outer valve closure member also according to the present invention; and

Fig. 4 is a section on the line X - X of Fig. 3 but with the guide member being omitted.

In Figs. 1 and 2 a guide member 1 is illustrated comprising a central mounting means 2 in the form of an annular hub with cut-outs 2a, 2b for location purposes on pins within the valve housing (not shown). The hub 2 merges via a transition portion into a resiliently flexible spring arm or guide arm 3 which in the embodiment is concentric with the hub 2 although may in other embodiments be of spiral or other shape extension. The guide arm 3 merges via transition portion into outer mounting means 4 and 5 comprising two oppositely directed resilient spring arms 4 and 5 which are spirally tapered and lead to enlarged end portions 4a and 5a which have apertures therein for receiving circlip pliers to enable the arms 4 and 5 to be moved together to permit insertion of the guide member within an outer valve closure member as will be described subsequently. It will be appreciated that the arms 4 and 5 have to be resiliently flexible in the plane of the guide member 1 and spring apart upon release of the circlip pliers to engage in the grooves of a valve closure member and preferably when in such engaged position there will be certain pressure on the groove walls to ensure some abutment contact. A projection 6 extends from one side of the guide member and is cooperable with a recess 7 in the valve closure member 8 to ensure that the guide member 1 and closure member 8 do not move relative to one another once the guide member has been located so as to ensure correct alignment of

the valve closure member within a valve housing. The guide member 1 in this embodiment is formed of steel and is of a thickness and characteristic as to provide the required resilient flexibility to ensure pliable frictionless guidance whilst providing the necessary actual stability as is required with frictionless guidance portions of known integrally formed valve plate. The guide member 1 is of constant thickness although may be fashioned as desired.

The outer valve closure member 8 illustrated in Figs. 3 and 4 in the embodiment is made of plastics material or may be formed of suitable metal such as titanium to provide desired characteristics such as lightweight relative to known valve plates or at least the known outer valve closure portions of known integrally formed valve plates. It will be appreciated that the outer valve closure member may be of any suitable arrangement to close and open the valve ducts of a plate-type non-return valve and thus the particular arrangement is given by way of example only. The closure member 8 has a central circular aperture 9 and a continuous annular or groove 10 is provided as location means for the guide member 1 and receives the resilient arms 4 and 5. A recess 7 is provided to cooperate with the projections 6 so as to permit the guide member 1 to be inserted in the central aperture 9 in the valve closure member 8 and for the arms 4 and 5 to be located in the groove 10 but is such as to prevent rotation of guide member 1 relative to closure member 8 once the location has been effected. Whilst the groove 10 in Fig. 4 is illustrated as being of rectangular section such may be of any suitable shape or may in fact be of lesser relief, i.e. of lesser depth.

In a modification, in a valve plate arrangement whereby frictionless guidance or other guidance is effected by way of a guide portion being outwardly of the valve closure portion, the same considerations as regards composite construction and formation of the guide member of one suitable material and the valve closure member of another suitable and desirable material may be achieved.

As an example of an alternative arrangement for location of the guide member within the closure member, separate projections may be provided on the outer surface of the guide member almost in the form of castellations and be insertable via corresponding castellated recesses in the periphery of the central aperture of the valve closure member leading to a groove therein or grooves therein with suitable locking means to prevent removal possibly somewhat in a manner of a bayonet clip arrangement. Alternatively projections or rivets may be provided for the location and securement.

As a further development of the inventive concept of the present invention a composite valve

plate comprises an outer plate portion forming a valve closure part of the plate, and an integrally formed metal plate part having an outer portion encapsulated, embedded or otherwise bonded to the outer plate portion formed of a plastics material or other material of lesser density than that of the metal from which said metal plate is composed and said metal plate part having an inner portion comprising central mounting means and at least one resiliently flexible guide arm extending outwardly from or located outwardly of said central mounting means and joining with the outer plate portion; said outer portion of the metal plate part extending from said central portion to act as interconnection means with said plastics material which is shaped so as to form the valve closure part of the plate. This development of the concept enables the weight of the valve plate to be reduced relative to known valve plates formed wholly of metal whilst taking advantage of the desirable characteristics of resilience, flexibility and long life enjoyed by the frictionless guidance of metal plates i.e. normally of steel. The metal plate part may be formed in the shape of part of a known valve plate but with at least the valve closure portion being of considerably reduced density relative to known plates thereby achieving considerable weight reduction. The plastics material may be integrally moulded around the outer portion of the metal plate part or form a laminate with two annular sheets bonded either side of the outer plate portion of the metal plate part and forming the valve closure portion.

Claims

1. A composite valve plate for use in a plate-type non-return valve comprising a flat outer valve closure member (8) having an inner periphery defining a central region or aperture (9) and a guide member (1) for the valve closure member (8) having central mounting means (2) for mounting the plate locatable or located in the region of said central aperture (9) with said guide member (1) also having at least one flexible guide arm (3) capable of providing frictionless guidance of the valve closure member (8), said guide member (1) being connectable by location means (4, 5, 10) to said valve closure member (8); characterised in that said location means comprises inter-cooperation means on the guide member (1) and the valve closure member (8) which when the guide member (1) is connected to the closure member (8) lies or lie wholly within the space defined between the planes in which the opposite surfaces of the valve closure member (8) lie, that the whole of the at least one flexible guide arm (3) lies within the region or aperture (9) defined by the inner periphery of the valve closure member (8), that the closure member (8) is of a material of lesser density than the material from which the guide member (1) is made and that said guide member when unstressed is generally flat and lies within the space defined between said planes or lies in a single plane.
2. A composite valve plate as claimed in claim 1, in which the location means comprises an annular groove or channel (10) in the inner periphery of the valve closure member (8) lying in the same plane as the valve closure member (8), and into which groove or channel (10), spring arms (4, 5) extending from the resilient arm (3) of the guide member (1) in the form of an internal circlip are locatable for retention purposes.
3. A composite valve plate as claimed in any of claims 1 to 2, in which means (6) are provided to prevent rotation of the guide member (1) in the location means (10) about a central axis transverse to the member (1).
4. A composite valve plate as claimed in claim 3, in which the rotation prevention means comprise stop means in the form of a radially extending projection (6) of the guide member (1) and a corresponding radially extending recess (7) located within the annular groove (10) which are cooperable to prevent the mentioned rotation of the guide member (1).
5. A composite valve plate as claimed in any of claims 1 to 4, wherein the outer valve closure member (8) is of titanium or plastics material, or other material which enhances valve efficiency and achieves considerable weight reduction and therefore reduction in inertia; and the guide member (1) is made of steel similar or equivalent to the central frictionless guide portions of known guide plates.
6. A composite valve plate as claimed in any of claims 1 to 5, in which the closure member is of a material of lesser density than steel or of the material from which the guide member is made.
7. A composite valve plate as claimed in any of claims 1 to 6, in which the thickness of the guide member (1) is considerably less than the thickness of the valve closure member (8) to provide the required resilient flexibility.
8. A composite valve plate as claimed in any of

- claims 1 to 7, in which the guide member comprises central mounting means (2) for enabling the guide member (1) to be located in position in a valve, at least one resiliently flexible guide arm (3) extending outwardly from or located outwardly of said central mounting means (2) and leading to or joining with outer mounting means (4,5) which permits the guide member (1) to be connected to or mounted on the outer valve closure member (8), wherein said mounting means comprises two arms (4,5) extending circularly from the end of the guide arm (3) of the guide member (1) in opposite directions and terminating with a space therebetween and being sufficiently resilient in the plane of the plate with which it is to be used so as to be engageable with a corresponding circular groove or channel (10) in the inner periphery of the valve closure member (8) when provided for receiving such in the manner of an internal circlip arrangement.
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16. A composite valve plate as claimed in any of claims 8 to 15, in which the outer mounting means (4,5) is provided with means (6) to ensure correct position thereof relative to the valve closure member (8) with which it is to be used.
17. A composite valve plate as claimed in claim 16, in which the correct positioning means comprises an outwardly extending projection (6) which cooperates with and is locatable in a corresponding recess (7) in the inner periphery of the valve closure member (8).
18. A composite valve plate as claimed in any of claims 8 to 17, in which the outer mounting means (4,5) are such as to cooperate with means (10) provided in the inner portion or portions of the valve closure member (8) to ensure adequate retention.
19. A composite valve plate as claimed in any of claims 1 to 18, in which the valve closure member comprises a generally annular or otherwise shaped plate member (8) of titanium, plastics material or of other material of lesser density than steel and has through passages formed therein and having said central aperture (9) therein for retainably receiving therein the guide member (1).
20. A composite valve plate as claimed in claim 19, in which the means for permitting location of the guide member (1) centrally of the valve closure member (8) comprises a circular groove or channel (10) extending around the inner periphery of the valve closure member (8) and being of such a shape as to cooperate with the outer mounting means (4,5) of a guide member (1) with which it is to be used so as to retain such therein.
21. A composite valve plate as claimed in claim 20, in which, where the means for permitting location of the guide member centrally comprises a number of spaced apart projections on the outer periphery, one arrangement for location of the guide member comprises the provision of slots running into a groove or channel in the inner periphery of the valve closure member so as to permit insertion of the projections into said groove or channel and retention by a twisting movement of the guide member relative to the valve closure member with subsequent positional retention being achieved by

the locating pins etc. of the valve to prevent undesired dislodgement of the guide member from the valve closure member.

22. A composite valve plate comprising an outer plate portion forming a valve closure part (8) of the composite valve plate and an integrally formed metal plate part being a guide member and having an inner portion comprising central mounting means and at least one resiliently flexible guide arm extending outwardly from or located outwardly of said central mounting means and joining with an outer portion of the metal plate which is connected to said valve closure part (8); characterised by the feature that said at least one flexible guide arm lies wholly within the space defined between the planes in which the opposite surfaces of the valve closure part lie and is located within a central aperture defined by the valve closure part, that said outer portion of the metal plate is encapsulated or embedded in or otherwise bonded to the said outer plate portion forming the valve closure part (8), and that the outer portion of the composite valve plate forming the valve closure part is formed totally of plastics material or other material of lesser density than that of the metal from which said metal plate part is composed.

Patentansprüche

1. Zusammengesetzte Ventilplatte zur Verwendung an einem plattenförmigen Sperrventil, die ein ebenes äußeres Ventilverschlußelement (8) mit einer inneren Berandung, die einen Zentralbereich oder eine Öffnung (9) definiert, und ein Führungselement (1) für das Ventilverschlußelement (8) mit zentralen Befestigungsmitteln zur Befestigung der im Bereich der zentralen Öffnung (9) anordenbaren oder angeordneten Platte am Führungselement (1) aufweist und mit wenigstens einem flexiblen Führungsarm (3), der geeignet ist zur Bewirkung einer reibungslosen Führung des Ventilverschlußelements (8), wobei das Führungselement (1) durch Mittel zur Anordnung (4,5,10) mit dem Verschlußglied (8) verbindbar ist, dadurch gekennzeichnet, daß die Mittel zur Anordnung Anschlußmittel zum Anschluß am Führungselement (1) und Ventilverschlußelement (8) aufweisen, das oder die bei Verbindung von Führungselement (1) und Ventilverschlußelement (8) vollständig innerhalb eines Bereichs liegt oder liegen, der zwischen den Ebenen definiert ist, in denen die entgegengesetzten Oberflächen des Ventilverschlußelements (8) liegen, daß die Gesamtheit wenig-

stens eines beweglichen Führungsarmes (3) innerhalb des Bereichs oder der Öffnungen (9) liegt, die durch die innere Berandung des Ventilverschlußelements (8) definiert ist, daß das Verschlußelement (8) aus einem Material geringerer Dichte besteht als das Material, aus dem das Führungselement (1) gemacht ist, und daß das Führungselement im unbelasteten Zustand im allgemeinen eben ist und in einem Raum liegt, der zwischen den Ebenen definiert ist, oder in einer einzigen Ebene liegt.

2. Zusammengesetzte Ventilplatte nach Anspruch 1, bei der die Mittel zur Anordnung eine ringförmige Nut oder einen Kanal (10) am inneren Rand des Ventilverschlußelements (8) aufweisen, der in derselben Ebene liegt wie das Ventilverschlußelement (8), und in welche Nut oder in welchen Kanal (10) Federarme (4,5) für Rückhalte Zwecke anordenbar sind, die sich vom federnden Arm (3) des Führungselementes (1) in der Form eines internen Sicherungsrings erstrecken.
3. Zusammengesetzte Ventilplatte nach einem der Ansprüche 1 bis 2, bei der Mittel (6) vorgesehen sind, um eine Rotation des Führungselementes (1) in den Mitteln zur Anordnung (10) um eine zentrale Achse quer zum Element (1) zu verhindern.
4. Zusammengesetzte Ventilplatte nach Anspruch 3, bei der die Rotationsverhinderungsmittel Stoppelemente aufweisen in Form eines sich radial erstreckenden Vorsprungs (6) des Führungselementes (1) und in Form einer entsprechenden sich radial erstreckenden Ausnehmung (7), die innerhalb der ringförmigen Nut angeordnet ist, welche zur Verhinderung der erwähnten Rotation des Führungselementes zusammenwirken.
5. Zusammengesetzte Ventilplatte nach einem der Ansprüche 1 bis 4, wobei das äußere Ventilverschlußelement (8) aus Titan oder Kunststoffmaterial oder aus anderem Material besteht, das die Ventilwirksamkeit erhöht und eine nennenswerte Gewichtsreduktion und damit eine Trägheitsreduktion bewirkt, und daß das Führungselement (1) aus Stahl besteht ähnlich oder äquivalent zu den zentralen reibungslosen Führungsabschnitten bekannter Führungsplatten.
6. Zusammengesetzte Ventilplatte nach einem der Ansprüche 1 bis 5, bei der das Verschlußelement aus einem Material geringerer Dichte als Stahl oder aus einem Material besteht, aus

dem das Führungselement gemacht ist.

7. Zusammengesetzte Ventilplatte nach einem der Ansprüche 1 bis 6, bei der die Stärke des Führungselements (1) beträchtlich geringer ist als die Stärke des Ventilverschlußelements (8), um die gewünschte elastische Flexibilität zu verschaffen. 5
8. Zusammengesetzte Ventilplatte nach einem der Ansprüche 1 bis 7, bei der das Führungselement zentrale Befestigungsmittel zur Ermöglichung der Anordnung des Führungselements in Position in einem Ventil, wenigstens einen elastisch flexiblen Führungsarm (3), der sich auswärts von den zentralen Befestigungsmitteln (2) erstreckt oder auswärts gerichtet an den zentralen Führungsmitteln (2) befindet und zu Befestigungsmitteln (4,5) hinführt oder mit diesen verbunden ist, die ermöglichen, das Führungselement (1) mit dem äußeren Ventilverschlußelement (8) zu verbinden oder daran zu befestigen, wobei die Befestigungselemente zwei Arme (4,5) aufweisen, die sich kreisförmig vom Ende des Führungsarmes (3) des Führungselements (1) in entgegengesetzter Richtung erstrecken und einen Raum dazwischen begrenzen und ausreichend elastisch in der Ebene der Platte, mit der sie zusammen benutzt werden, sind, so daß sie mit einer entsprechenden kreisförmigen Nut oder einem Kanal (10) am inneren Rand des Ventilverschlußelements (8) betätigbar sind, wenn dieser zu dessen Aufnahme in der Art einer internen Sicherungsringvorrichtung ausgebildet ist. 10
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9. Zusammengesetzte Ventilplatte nach Anspruch 8, bei der Öffnungen an den freien Enden (4a,5a) der Befestigungsarme (4,5) vorgesehen sind, um eine Betätigung durch ein geeignetes Werkzeug zu erlauben. 40
10. Zusammengesetzte Ventilplatte nach Anspruch 8 oder 9, die aus Stahl besteht, mit Charakteristiken von Federarmen, wie sie bei bekannten integral geformten Ventilplatten eingesetzt werden. 45
11. Zusammengesetzte Ventilplatte nach einem der Ansprüche 8 bis 10, bei der das Führungselement im allgemeinen eben ist oder in einer einzigen Ebene liegt. 50
12. Zusammengesetzte Ventilplatte nach einem der Ansprüche 8 bis 11, bei der die zentralen Befestigungsmittel des Führungselementes ein zentraler Nabenabschnitt (2) ist. 55
13. Zusammengesetzte Ventilplatte nach Anspruch 12, bei dem der zentrale Nabenabschnitt (2) eine zentrale kreisförmige Öffnung darin besitzt oder aus gesonderten Armabschnitten geformt ist, die einwärts, ausgehend von einem äußeren kontinuierlichen Befestigungsabschnitt gerichtet sind.
14. Zusammengesetzte Ventilplatte nach einem der Ansprüche 8 bis 13, bei der die zentralen Befestigungsmittel (2) Mittel zur Anordnung wie ausgeschnittene Abschnitte (2a,2b) haben, um eine korrekte Lage des Elementes (8) in einem Ventil zu gewährleisten.
15. Zusammengesetzte Ventilplatte nach einem der Ansprüche 8 bis 14, bei der sich wenigstens der eine flexible Führungsarm (3) spiralförmig auswärts von den zentralen Befestigungsmitteln (2) erstreckt, die den zentralen Nabenabschnitt bilden und der Arm (3) in die äußeren Befestigungsmittel (4,5) übergeht.
16. Zusammengesetzte Ventilplatte nach einem der Ansprüche 8 bis 15, bei dem die äußeren Befestigungsmittel (4,5) mit Mitteln (6) versehen sind, um eine korrekte Position relativ zum Ventilverschlußelement (8) zu gewährleisten, mit dem zusammen es gebraucht wird.
17. Zusammengesetzte Ventilplatte nach Anspruch 16, bei dem die Mittel zur korrekten Positionierung einen auswärts gerichteten Vorsprung (6) aufweisen, der mit einer entsprechenden Ausnehmung (7) der inneren Berandung des Ventilverschlußelementes (8) zusammenarbeitet und in ihr anordenbar ist.
18. Zusammengesetzte Ventilplatte nach einem der Ansprüche 8 bis 17, bei der die äußeren Befestigungsmittel (4,5) so ausgebildet sind, daß sie mit Mitteln (10) zusammenarbeiten, die im inneren Bereich oder in den inneren Bereichen des Ventilverschlußelementes (8) vorgesehen sind, um einen gleichmäßigen Halt zu gewährleisten.
19. Zusammengesetzte Ventilplatte nach einem der Ansprüche 1 bis 18, bei der das Ventilverschlußelement ein im allgemeinen ringförmig oder anders geformtes Plattenelement (8) aus Titan, Kunststoffmaterial oder aus anderem Material mit geringerer Dichte als Stahl aufweist und darin eingeformte Durchtrittsöffnungen besitzt, wobei die zentrale Öffnung (9) darin für die lösbare Aufnahme des Führungselementes (1) darin vorgesehen ist.

20. Zusammengesetzte Ventilplatte nach Anspruch 19, bei der die Mittel, die eine zentrale Anordnung des Führungselementes (1) des Ventilverschlußelements (8) erlauben, eine kreisförmige Nut oder einen Kanal (10) aufweisen, der sich um die innere Berandung des Ventilverschlußelements (8) herum erstreckt und so geformt ist, daß es mit den Befestigungselementen (4,5) eines Führungselementes (1) zusammenwirkt, mit dem es benutzt wird, um es darin zu halten. 5
21. Zusammengesetzte Ventilplatte nach Anspruch 20, bei der die Mittel, die eine zentrale Festlegung des Führungselementes erlauben, eine Anzahl von voneinander entfernt angeordneten Vorsprüngen an der äußeren Umrandung umfassen und bei der eine Vorrichtung zur Festlegung des Führungselementes die Anordnung von Schlitzten aufweist, die in eine Nut oder einen Kanal in der inneren Berandung des Ventilverschlußelements so hineinlaufen, um ein Einsetzen der Vorsprünge in die Nut oder den Kanal zu erlauben und wobei ein Halt durch eine Drehbewegung des Führungselements relativ zu dem Ventilverschlußelement mit anschließender lagegenauer Positionierung erhalten wird durch Haltestifte oder dergleichen des Ventils, um ein unerwünschtes Entfernen des Führungselements vom Ventilverschlußelement zu verhindern. 10 15 20 25 30
22. Zusammengesetzte Ventilplatte mit einem äußeren Plattenabschnitt, der ein Ventilverschlußteil der zusammengesetzten Ventilplatte formt, und mit einem vollständig geformten Metallplattenteil, das ein Führungselement ist und einen inneren Abschnitt besitzt, der zentrale Befestigungsmittel aufweist, und mit wenigstens einem elastisch flexiblen Führungsarm, der sich von den zentralen Befestigungsmitteln auswärts erstreckt oder an diesen auswärts gerichtet angeordnet ist und der mit einem äußeren Abschnitt der Metallplatte verbunden ist, die mit dem Ventilverschlußteil (8) verbunden ist, gekennzeichnet durch das Merkmal, daß der flexible Führungsarm vollständig innerhalb eines Raumes liegt, der durch die Ebenen definiert ist, in denen die entgegengesetzten Oberflächen des Ventilverschlußteiles liegt und innerhalb der zentralen Öffnung angeordnet ist, die durch das Ventilverschlußteil definiert ist, und daß der äußere Abschnitt der Metallplatte eingekapselt oder eingebettet ist oder sonstwie verbunden ist zu dem äußeren Plattenabschnitt, der den Ventilverschlußteil (8) formt, und daß der äußere Abschnitt der zusammen-

gesetzten Ventilplatte, die den Ventilverschlußteil bildet, vollständig aus Kunststoffmaterial oder einem anderen Material von geringerer Dichte geformt ist als das des Metalls, aus dem der Metallplattenteil aufgebaut ist.

Revendications

1. Plaque de soupape composite utilisable dans une soupape de retenue du type à plaque, comprenant un élément externe plat (8) de fermeture de soupape présentant une périphérie interne délimitant une zone ou ouverture centrale (9), ainsi qu'un élément de guidage (1) pour l'élément de fermeture de soupape (8) présentant des moyens de montage centraux (2) destinés au montage de la plaque, pouvant être disposés ou étant disposés dans la zone de ladite ouverture centrale (9), ledit élément de guidage (1) présentant également au moins un bras de guidage flexible (3) capable de fournir un guidage sans frottement de l'élément de fermeture de soupape (8), ledit élément de guidage (1) pouvant être raccordé, à l'aide de moyens de positionnement (4, 5, 10) audit élément de fermeture de soupape (8), caractérisée en ce que lesdits moyens de positionnement comprennent des moyens de coopération mutuelle sur l'élément de guidage (1) et l'élément de fermeture de soupape (8), moyens qui, lorsque l'élément de guidage (1) est raccordé à l'élément de fermeture (8), se trouvent entièrement dans l'espace délimité entre les plans dans lesquels se trouvent les faces opposées de l'élément de fermeture de soupape (8), en ce que la totalité d'au moins un bras de guidage flexible (3) se trouve dans la zone ou ouverture (9) définie par la périphérie intérieure de l'élément de fermeture (8), en ce que l'élément de fermeture (8) est en un matériau d'une densité inférieure à celle du matériau de l'élément de guidage (1), et en ce que ledit élément de guidage est, à l'état non sollicité, généralement plat et se trouve dans l'espace défini entre lesdits plans ou bien se trouve dans un plan unique. 35 40 45
2. Plaque de soupape composite selon la revendication 1, caractérisée en ce que les moyens de positionnement comprennent une rainure ou un canal annulaire (10) dans la périphérie intérieure de l'élément de fermeture de soupape (8) se trouvant dans le même plan que l'élément de fermeture (8), des bras élastiques (4, 5) s'étendant à partir du bras élastique (3) de l'élément de guidage (1) sous la forme d'une bague-ressort interne, pouvant être logés dans ladite rainure ou ledit canal en vue d'as-

surer le maintien.

3. Plaque de soupape composite selon l'une des revendications 1 et 2, caractérisée en ce que des moyens (6) sont prévus pour empêcher la rotation de l'élément de guidage (1) dans les moyens de positionnement (10), autour d'un axe central transversal à l'élément (1). 5
4. Plaque de soupape composite, selon la revendication 3, caractérisée en ce que les moyens empêchant la rotation comprennent des moyens de retenue se présentant sous la forme d'une saillie radiale (6) de l'élément de guidage (1) et d'un évidement radial correspondant (7) prévu dans la rainure annulaire (10), coopérant entre eux afin d'empêcher la rotation précitée de l'élément de guidage (1). 10 15
5. Plaque de soupape composite, selon l'une des revendications 1 à 4, caractérisée en ce que l'élément extérieur de fermeture de soupape (8) est en titane ou en matière plastique ou en un autre matériau augmentant l'efficacité de la soupape et permettant d'obtenir une réduction importante du poids et, de ce fait, une moindre inertie, et en ce que l'élément de guidage (1) est fabriqué en acier similaire ou équivalent aux parties de guidage centrales sans frottement des plaques de guidage connues. 20 25 30
6. Plaque de soupape composite, selon l'une des revendications 1 à 5, caractérisé en ce que l'élément de fermeture est en un matériau de plus faible densité que l'acier ou en un même matériau que celui de l'élément de guidage. 35
7. Plaque de soupape composite, selon l'une des revendications 1 à 6, caractérisée en ce que l'épaisseur de l'élément de guidage (1) est considérablement inférieure à l'épaisseur de l'élément de fermeture de soupape (8) en vue d'obtenir la souplesse élastique requise. 40
8. Plaque de soupape composite, selon l'une des revendications 1 à 7, caractérisée en ce que l'élément de guidage comprend des moyens de montage centraux (2) permettant de loger en position l'élément de guidage (1) dans une soupape, au moins un bras de guidage élastiquement souple (3) s'étendant à l'extérieur desdits moyens de montage centraux (2) ou disposés à l'extérieur de ceux-ci, et conduisant à des moyens de montage extérieurs (4, 5) ou reliant ces derniers, ce qui permet que l'élément de guidage (1) soit relié à /ou monté sur/ l'élément de fermeture de soupape (8), et en ce que lesdits moyens de montage comprennent deux bras (4, 5) s'étendant circulairement à partir de l'extrémité du bras de guidage (3) de l'élément de guidage (1) en des directions opposées et se terminant tout en ménageant un espace entre eux, et tout en étant suffisamment élastiques dans le plan de la plaque avec laquelle ces moyens de montage doivent être utilisés, de manière à pouvoir coopérer avec une rainure ou un canal circulaire correspondant (10) dans la périphérie intérieure de l'élément de fermeture de soupape (8) en vue d'assurer un logement du type à agencement à bague-ressort intérieure. 45 50 55
9. Plaque de soupape composite, selon la revendication 8, caractérisée en ce qu'il est prévu sur les extrémités libres (4a, 5a) des bras de montage (4, 5), des ouvertures destinées à permettre une prise par un outil approprié.
10. Plaque de soupape composite, selon l'une des revendications 8 ou 9, caractérisée en ce qu'elle est fabriquée en acier présentant les propriétés des bras élastiques utilisés dans des plaques de soupape réalisées d'une seule pièce de type connu.
11. Plaque de soupape composite, selon l'une des revendications 9 ou 10, caractérisée en ce que l'élément de guidage est de forme générale plate ou se trouve dans un plan unique.
12. Plaque de soupape composite, selon l'une des revendications 8 à 11, caractérisée en ce que les moyens de montage centraux de l'élément de guidage sont constitués par une partie centrale formant un moyeu (2).
13. Plaque de soupape composite, selon la revendication 12, caractérisée en ce que la partie centrale formant un moyeu (2) présente une ouverture centrale circulaire ou est formée par des portions de bras séparées aboutissant à l'intérieur, en provenance d'une portion de montage continue extérieure.
14. Plaque de soupape composite, selon l'une des revendications 8 à 13, caractérisée en ce que les moyens de montage centraux (2) présentent des moyens de positionnement tels que des parties découpées (2a, 2b) permettant la mise en place correcte de l'élément (8) dans une soupape.
15. Plaque de soupape composite, selon l'une des revendications 8 à 14, caractérisée en ce qu'au moins un bras de guidage flexible (3) s'étend en spirale à l'extérieur des moyens de

- montage centraux (2) constitués par une partie centrale formant un moyeu (2), et en ce que ledit bras (3) s'étend dans les moyens de montage extérieurs (4, 5).
16. Plaque de soupape composite, selon l'une des revendications 8 à 15, caractérisée en ce que les moyens de montage extérieurs (4, 5) présentent des moyens (6) destinés à assurer un positionnement correct de ceux-ci par rapport à l'élément de fermeture de soupape (8) avec lequel ils sont utilisés.
17. Plaque de soupape composite, selon la revendication 16, caractérisée en ce que les moyens assurant un positionnement correct comprennent une saillie (6) s'étendant vers l'extérieur et coopérant avec/et susceptible de se loger dans/ un évidement correspondant (7) prévu dans la périphérie intérieure de l'élément de fermeture de soupape (8).
18. Plaque de soupape composite, selon l'une des revendications 8 à 17, caractérisée en ce que les moyens de montage extérieurs (4, 5) sont conçus de manière à coopérer avec des moyens (10) prévus dans la partie interne ou dans des parties internes de l'élément de fermeture de soupape (8) afin d'assurer un maintien approprié.
19. Plaque de soupape composite, selon l'une des revendications 1 à 18, caractérisée en ce que l'élément de fermeture de soupape comprend une plaque (8) de forme générale annulaire ou autrement profilée, en titane, en matière plastique ou en un autre matériau de densité inférieure à celle de l'acier, présentant des passages traversants profilés dans cette plaque, ainsi que ladite ouverture centrale (9) destinée à loger, tout en le retenant, l'élément de guidage (1).
20. Plaque de soupape composite, selon la revendication 19 caractérisée en ce que les moyens permettant le positionnement de l'élément de guidage (1) au centre de l'élément de fermeture de soupape (8) comprennent une rainure ou un canal circulaire (10) s'étendant autour de la périphérie intérieure de l'élément de fermeture (8) et ayant un profil leur permettant de coopérer avec les moyens de montage extérieurs (4, 5) d'un élément de guidage (1) avec lequel lesdits moyens de positionnement sont utilisés pour le retenir.
21. Plaque de soupape composite, selon la revendication 20, caractérisée en ce que les moyens
- 5
- 10
- 15
- 20
- 25
- 30
- 35
- 40
- 45
- 50
- 55
- permettant le positionnement central de l'élément de guidage comprennent plusieurs saillies espacées entre elles sur la périphérie extérieure, et en ce qu'un agencement pour le positionnement de l'élément de guidage consiste à prévoir des encoches dans une rainure ou un canal dans la périphérie intérieure de l'élément de fermeture de soupape, de façon que les saillies soient insérées dans ladite rainure ou ledit canal et soient maintenues par un mouvement de torsion de l'élément de guidage par rapport à l'élément de fermeture de soupape, le maintien ultérieur en position étant réalisé au moyen des goupilles de positionnement, etc... de la soupape, afin d'empêcher que l'élément de guidage se détache de façon indésirable de l'élément de fermeture de soupape.
22. Plaque de soupape composite comprenant une portion externe plate, formant une pièce de fermeture de soupape de ladite plaque de soupape composite et une partie de plaque métallique réalisée d'une seule pièce constituant un élément de guidage et présentant une portion interne comprenant des moyens de montage centraux, et au moins un bras de guidage élastiquement souple s'étendant à l'extérieur, ou disposé à l'extérieur desdits moyens de montage centraux et étant relié à une portion externe de la plaque métallique qui est raccordée à ladite pièce de fermeture de soupape (8), caractérisée en ce qu'au moins un bras de guidage flexible se trouve entièrement à l'intérieur de l'espace délimité entre les plans dans lesquels sont situées les faces opposées de la pièce de fermeture de soupape et est logé dans une ouverture centrale définie par la pièce de fermeture de soupape, en ce que ladite portion externe de la plaque métallique est encapsulée ou encastrée dans/ou reliée autrement à ladite portion de plaque externe formant la pièce de fermeture de soupape (8), et en ce que la portion externe de la plaque de soupape composite formant la pièce de fermeture de soupape est entièrement fabriquée en matière plastique ou en un autre matériau d'une densité inférieure à celle du métal dont ladite partie de la plaque métallique est formée.

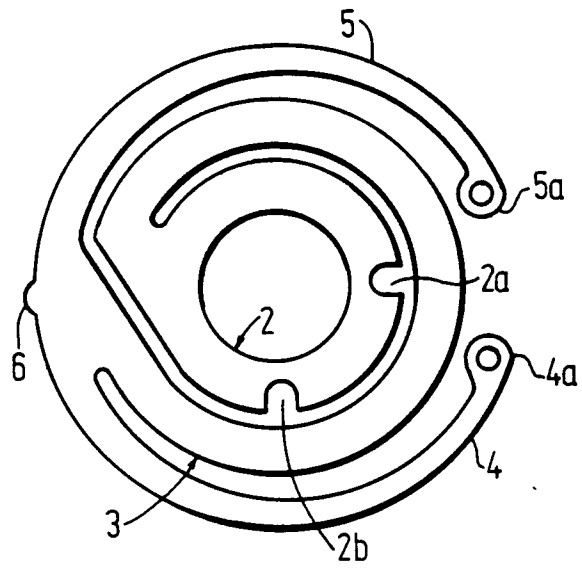


FIG. 1



FIG. 2

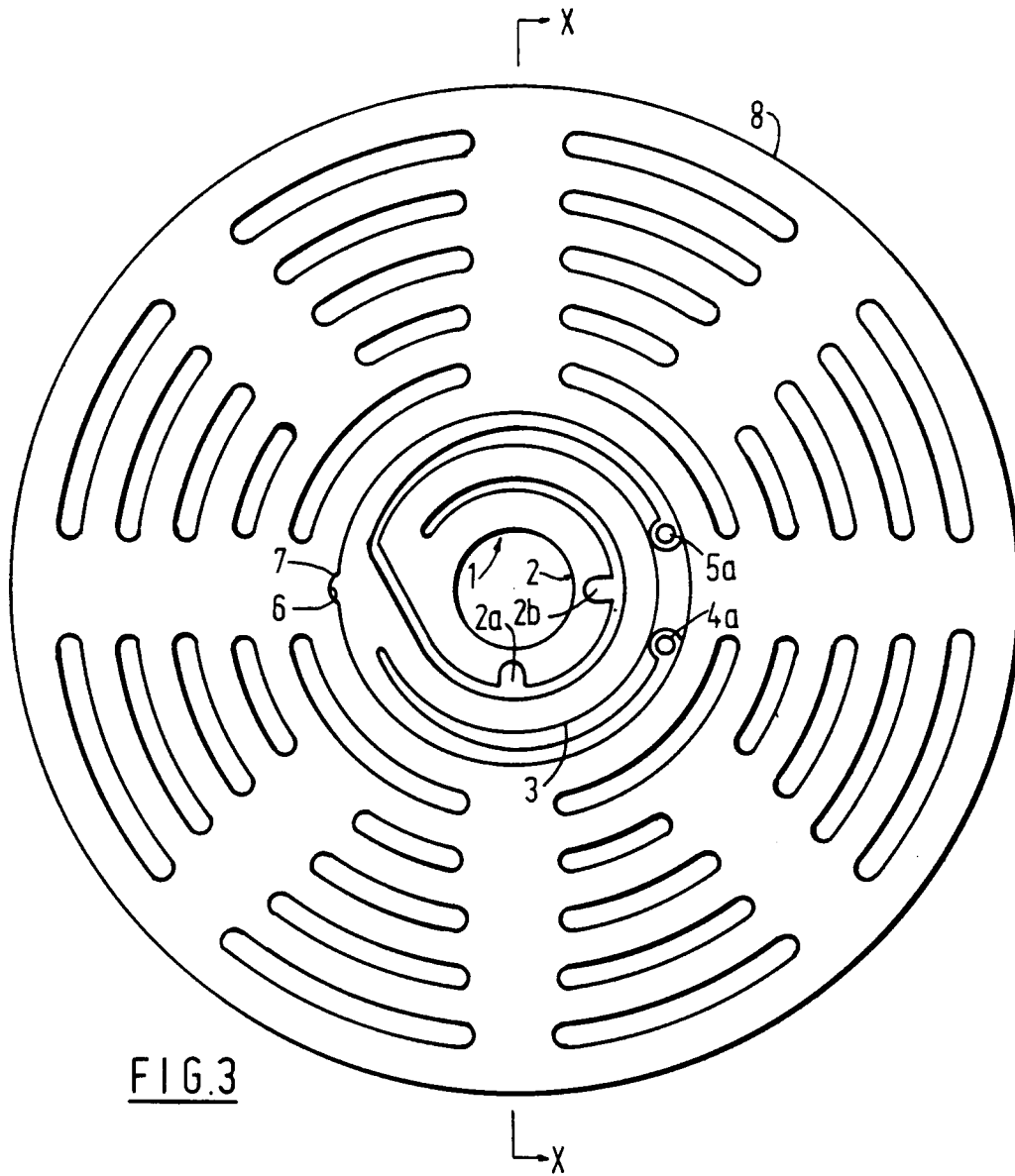


FIG. 3



FIG. 4