



12

EUROPEAN PATENT SPECIFICATION

43 Date of publication of patent specification :
05.08.92 Bulletin 92/32

51 Int. Cl.⁵ : **F02M 35/02**

21 Application number : **89111690.7**

22 Date of filing : **27.06.89**

54 **Set of sectional elements arranged to form a series of filters for the feed air to a heavy vehicle internal combustion engine.**

30 Priority : **28.06.88 IT 5326388 U**

56 References cited :
US-A- 2 480 379

43 Date of publication of application :
03.01.90 Bulletin 90/01

73 Proprietor : **IVECO FIAT S.p.A.**
Via Puglia 35
I-10156 Torino (IT)

45 Publication of the grant of the patent :
05.08.92 Bulletin 92/32

72 Inventor : **Civardi, Pierangelo**
Via Dr. Piano, 12
IT-14010 Antignano (IT)

84 Designated Contracting States :
DE ES FR GB IT NL SE

74 Representative : **Boggio, Luigi et al**
STUDIO TORTA Società Semplice Via Viotti, 9
I-10121 Torino (IT)

EP 0 348 905 B1

Note : Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid (Art. 99(1) European patent convention).

Description

This invention relates to a set of sectional elements arranged to form a series of filters for filtering the feed air to the internal combustion engine of an industrial vehicle. An air cleaner wherein provision is made for connecting said cleaner to air intake types of various sizes and dimensions is known from document US-A-2 480 379.

With the set of elements of the invention it is also possible, by changing certain elements of the set, to form filters suitable for use on vehicles having different dimensions and different engines.

Different filters can be formed by merely mounting on certain basic elements of the unit other selectable elements which differ from each other only in terms of some dimension, but which can be connected to said basic elements without the need for any special adaptation.

The sectional element set of the invention is characterised by comprising:

- a hollow shell defined by side walls, an upper wall and a lower wall, said shell having a first aperture in said side wall and a second and a third aperture in said lower and upper wall respectively;
- a series of socket-shaped bodies each of which has a predetermined height which is different from that of the other and is arranged to be selectively fixed to said hollow shell to close said second aperture and to house, together with said hollow shell, an annular shaped air filter element of predetermined height;
- a series of covers each of which is provided with a tubular connector of diameter different from the others, and is arranged to be selectively fixed to said shell to close said third aperture and to be connected to a corresponding pipe for feeding air to the air manifold of said engine;
- a cup-shaped element to be fixed to said hollow shell in order to close said first aperture and to define an air chamber therewith, said cup-shaped element having a height greater than that of said hollow shell so that when it is mounted on said hollow shell it defines an air inlet port;
- a series of air entry connector elements, each of which is arranged to be fixed selectively to said air inlet port to define an air entry connector of different dimensions from the others. The invention will be more apparent from the detailed description of one embodiment thereof given hereinafter by way of example with reference to the accompanying drawings in which:

Figure 1 is a side view of the sectional elements which form part of the element set according to the invention;

Figure 2 is a partly sectional side view of a filter obtained from the element set of the invention;

Figure 3 is a plan view of the filter of the preceding figure.

The set of sectional elements of the invention comprises substantially a pair of basic sectional elements indicated by 1 and 2 and three different series of sectional elements of slightly different dimensions and arranged to be fixed selectively to the two aforesaid basic elements; the sectional elements of the three said series are indicated overall by 3, 4 and 5.

The basic element 1 is substantially a hollow shell defined by side walls 6, an upper wall 7 and a lower wall 8. Said walls comprise apertures indicated respectively by 9, 10 and 11, and visible in Figure 1. The other basic element, indicated by 2, is substantially cup-shaped and is arranged to be fixed to the hollow shell 1 to close the aperture 9 and define therewith an air chamber 13. Said element has a height greater than that of the aperture 9 so that when it is mounted on the hollow shell it defines an air inlet port indicated by 14. Conveniently, the hollow shell 1 is provided with an annular flange 15 against which there rests a corresponding flange 16 of the cup-shaped element 2, as shown in Figure 1. Each of the two basic elements 1 and 2 is conveniently constructed of thermoplastic material using the normal forming methods for such material. Said two elements can be joined together to form the unit shown in figure 1 by any suitable method, for example by welding, gluing or the like.

The sectional elements of the series of elements indicated by 3 are substantially socket-shaped bodies 17 and 18, each of which has a predetermined height which is different from the height of the other and is arranged to be fixed selectively to the hollow shell 1 to close the aperture 11 and to house, together with said hollow shell, an annular-shaped air filter of predetermined height. Said filter, indicated by 19, is shown in Figure 2 in which the various sectional elements of the set have been used to form a filter of required dimensions. Each of the socket-shaped bodies 17 and 18 is fixed to the hollow shell 1 conveniently by an axial tie bolt 20 passing through a hole in the body.

Conveniently, the upper edge of each of the socket-shaped bodies 17, 18 is suitably shaped to be able to be housed in the corresponding aperture 11, and for this purpose can have its edge 22 provided with a shoulder 23.

The sectional elements of the series indicated by 4 are substantially covers 24, each of which is provided with a tubular connector 24 of diameter different from the other and is arranged to be selectively fixed to the hollow shell 1 to close the aperture 10 provided in the upper wall 7. The connector 25 is arranged to be connected to a corresponding pipe (not shown) which feeds air to the engine air manifold. Each of the covers is provided with an edge 26 having an annular groove 27 arranged to cooperate with the annular

edge of the aperture 10.

The sectional elements of the series indicated by 5 are actual air entry connector elements and each of them is arranged to be selectively fixed to the inlet port 14. The shape of each of said connector elements can be slightly different: that of the element shown highest in Figure 1 comprises substantially three flat surfaces 28 defining an air inlet channel; in contrast, the other two elements have an assembly of walls defining a chamber 29 and a pipe stub 30 arranged to be connected to an air intake pipe, conveniently to the pipe of a dynamic air intake device the inlet mouth of which is located in known manner above the vehicle cab.

Each of said elements is provided with a flange 31 arranged to be connected to the flange 15 of the hollow shell 1. The two elements which are lowest in Figure 1 are arranged to be fixed to the hollow shell such that the axis of the pipe stub 30 is horizontal (element in centre) or vertical (element below).

The set of sectional elements of the invention is used to form a filter suitable for a particular application in the following manner.

A unit is firstly formed consisting of the two basic elements 1 and 2 as shown in figure 1. Three of the initially described elements pertaining to one of the three series 3, 4 and 5 are then fixed to this unit. The element of the series 3 is selected to enable a filter element 19 of a predetermined height to be housed inside the filter. The element of the series 4 is selected according to the defined air throughput to be fed to the engine intake manifold, the connectors 25 of the elements of this series having different diameters as stated. The element of the series 5 is selected to adapt the filter to either a static air intake (using the element shown highest in Figure 1) or a dynamic air intake having its inlet into the filter on a horizontal axis or on a vertical axis (using one of the other two elements of the series).

A filter obtained in this manner is shown in Figures 2 and 3.

Claims

1. A set of sectional elements arranged to form a plurality of filters for filtering the feed air to the internal combustion engine of a heavy vehicle, characterised by comprising:

- a hollow shell (1) defined by side walls (6), an upper wall (7) and a lower wall (8), said shell having a first aperture (9) in said side wall and a second (11) and a third (10) aperture in said lower and upper wall respectively;
- a series of socket-shaped bodies (17, 18) each of which has a predetermined height which is different from that of the other and is arranged to be selectively fixed to said hollow shell to close said

second aperture (11) and to house, together with said hollow shell, an annular shaped air filter element (19) of predetermined height;

– a series of covers (24) each of which is provided with a tubular connector (25) of diameter different from that of the other, and is arranged to be selectively fixed to said hollow shell to close said third aperture (10) and to be connected to a corresponding pipe for feeding air to the air manifold of said engine;

– a cup-shaped element (2) to be fixed to said hollow shell in order to close said first aperture (9) and to define an air chamber (13) therewith, said cup-shaped element having a height greater than that of said first aperture (9) so that when it is mounted on said hollow shell is defines an air inlet port (14);

– a series of air entry connector elements (5), each of which is arranged to be selectively fixed to said air inlet port (14) to define an air entry pipe stub (30) of dimensions and orientation which are different from those of the others.

2. A set as claimed in one of the preceding claims, characterised in that each of said socket-shaped bodies (17, 18) is fixed to said hollow shell by an axially disposed tie bolt (20).

3. A set as claimed in one of the preceding claims, characterised in that each of said covers (24) is provided with an edge (26) along which an annular groove (27) is provided to cooperate with the annular edge of said third aperture (10).

4. A set as claimed in one of the preceding claims, characterised in that said cup-shaped body (2) is provided with an annular flange (16) arranged to rest against a corresponding flange (15) of said hollow shell which delimits said first aperture (9).

Patentansprüche

1. Satz von Elementen zur Bildung einer Anzahl von Filtern zum Filtern der Zufuhrluft einer Brennkraftmaschine eines schweren Fahrzeugs, gekennzeichnet durch

- ein hohles Gehäuse (1), das gebildet wird durch Seitenwände (6), eine obere Wand (7) und eine untere Wand (8), welches Gehäuse eine erste Öffnung (9) in der Seitenwand und eine zweite und dritte Öffnung (11, 10) in der unteren und oberen Wand aufweist, eine Reihe von dosenförmigen Körpern (17, 18), die jeweils eine vorgegebene Höhe aufweisen, die sich von der der anderen unterscheiden und die wahlweise an dem hohlen Gehäuse zum Verschließen der zweiten Öffnung (11) und zur Unterbringung, gemeinsam mit dem hohlen Gehäuse, eines ringförmigen Filterelements (19) vorgegebener Höhe zu befestigen sind,

– eine Reihe von Deckeln (24) mit rohrförmigen Verbindungsstücken (25) unterschiedlichen Durchmessers, die vorgesehen sind zur wahlweisen Befestigung an dem hohlen Gehäuse zum Verschließen der dritten Öffnung (10) und zum Anschließen an ein entsprechendes Rohr zum Zuführen von Luft zu dem Ansaugkrümmer der Maschine,

– ein schalenförmiges Element (2) zur Befestigung an dem hohlen Gehäuse zum Schließen der ersten Öffnung (9) und zur Bildung einer Luftkammer (13) mit dem Gehäuse, welches schalenförmige Element eine Höhe aufweist, die größer als die Höhe der ersten Öffnung (9) ist, so daß es bei Befestigung an dem hohlen Gehäuse einen Lufteinlaß (14) bildet,

– eine Anzahl von Lufteintritts-Anschlußelementen (5), die wahlweise an der Lufteintrittsöffnung (14) zu befestigen sind und einen Lufteintritts-Rohrstutzen (30) mit unterschiedlichen Dimensionen und Richtungen bilden.

2. Satz nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die dosenförmigen Körper (17, 18) an dem hohlen Gehäuse durch einen axial angeordneten Zugbolzen (20) befestigt sind.

3. Satz nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß jeder der Deckel (24) mit einem Rand (26) versehen ist, entlang dem eine ringförmige Nut (27) verläuft, die mit dem ringförmigen Rand der dritten Öffnung (10) zusammenwirkt.

4. Satz nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß der schalenförmige Körper (2) mit einem ringförmigen Flansch (16) versehen ist, der gegen einen entsprechenden Flansch (15) des hohlen Gehäuses anliegt, der die erste Öffnung (9) begrenzt.

Revendications

1. Un jeu d'éléments en sections disposés pour former plusieurs filtres pour filtrer l'air d'amenée à un moteur à combustion interne d'un poids-lourd, caractérisé en ce qu'il comprend :

– une enveloppe creuse (1) définie par des parois latérales (6), une paroi supérieure (7) et une paroi inférieure (8), ladite enveloppe comprenant un premier orifice (9) dans ladite paroi latérale et un deuxième (11) et un troisième (10) orifices dans lesdites parois inférieure et supérieure respectivement;

– une série de corps (17, 18) en forme de douilles qui sont chacun d'une hauteur prédéterminée qui est différente de celle de l'autre et agencés pour être fixés de façon sélective à ladite enveloppe creuse pour fermer ledit deuxième orifice (11) et

pour loger, en coopération avec ladite enveloppe (13), un élément (19) de filtre à air de forme annulaire d'une hauteur prédéterminée;

– une série de couvercles (24) qui sont pourvus, chacun, d'un connecteur tubulaire (25) d'un diamètre différent de celui de l'autre, et qui sont disposés de manière à être fixés sélectivement à ladite enveloppe creuse pour fermer ledit troisième orifice (10) et pour être reliés à une tubulure correspondante d'amenée d'air au collecteur d'air dudit moteur;

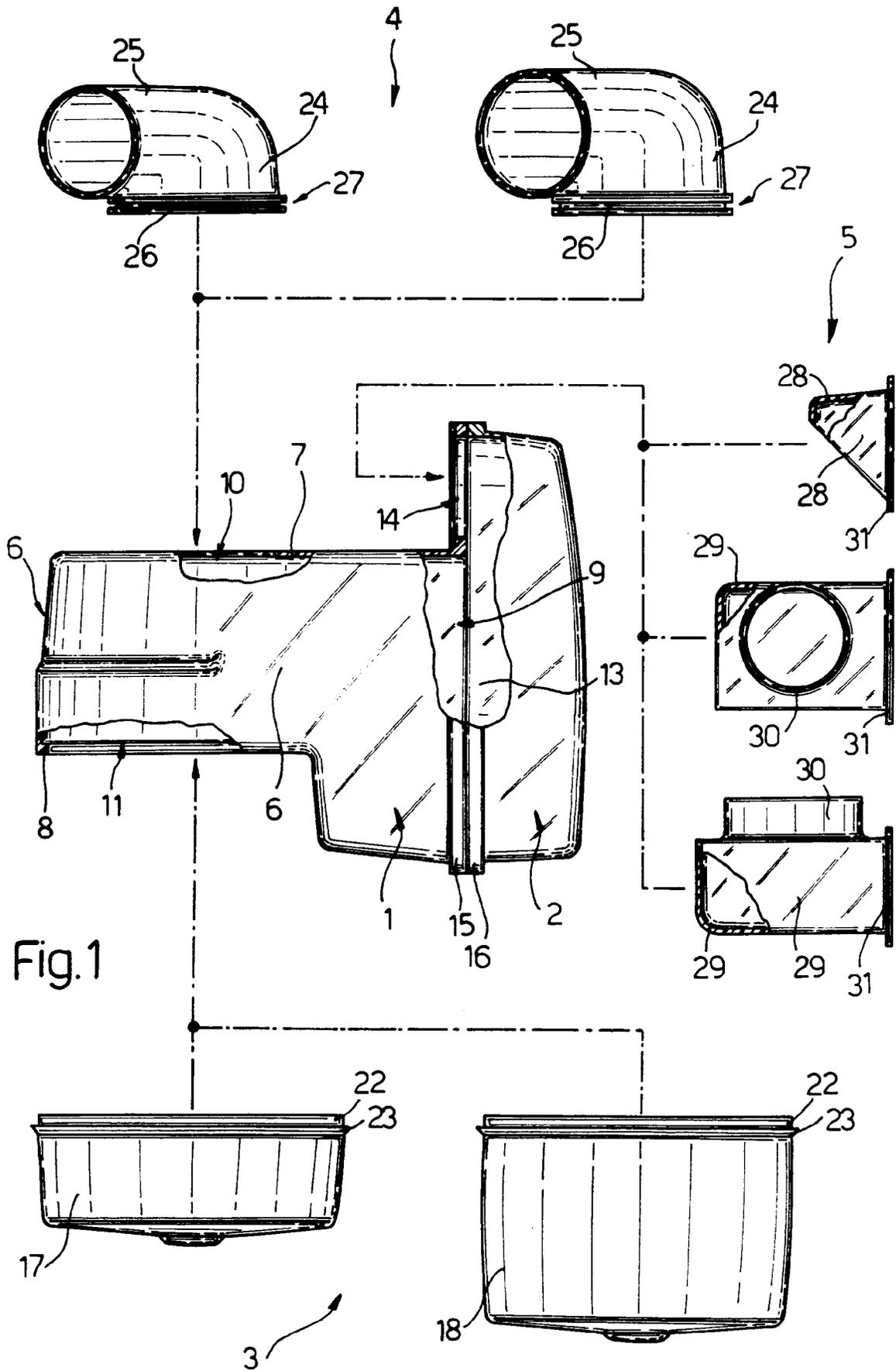
– un élément (2) en forme de coupelle à fixer sur ladite enveloppe creuse afin de fermer ledit orifice (9) et de définir avec lui une chambre d'air (13), ledit élément en forme de coupelle étant d'une hauteur supérieure à celle dudit premier orifice (9) de façon à définir un orifice d'entrée d'air (14) lorsqu'il est fixé sur ladite enveloppe creuse;

– une série d'éléments (5) de connecteurs d'entrée d'air qui sont fixés chacun sélectivement audit orifice d'entrée d'air (14) afin de définir un piquage (30) de tubulure d'entrée d'air dont les dimensions et l'orientation sont différentes de celles des autres.

2. Un jeu selon l'une quelconque des revendications précédentes, caractérisé en ce que chacun desdits corps (17, 18) en forme de douilles est fixé sur ladite enveloppe creuse par un tirant de raccordement disposé axialement (20).

3. Un jeu selon l'une quelconque des revendications précédentes, caractérisé en ce que chacun desdits couvercles (24) est pourvu d'un bord (26) le long duquel est ménagée une gorge annulaire (27) pour coopérer avec le bord annulaire dudit troisième orifice (10).

4. Un jeu selon l'une quelconque des revendications précédentes, caractérisé en ce que ledit corps en forme de coupelle (2) est pourvu d'une bride annulaire (16) disposée de manière à reposer contre une bride correspondante (15) de ladite enveloppe creuse qui délimite ledit premier orifice (9).



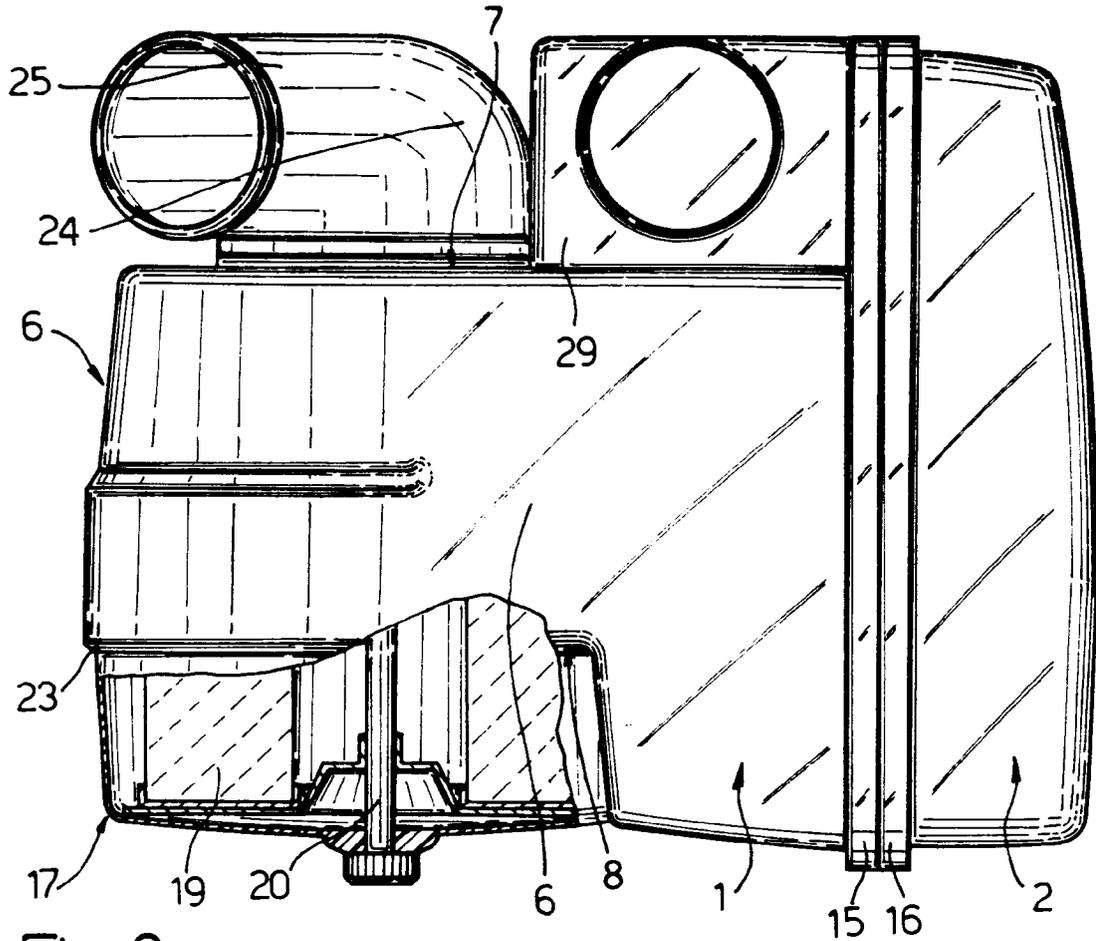


Fig. 2

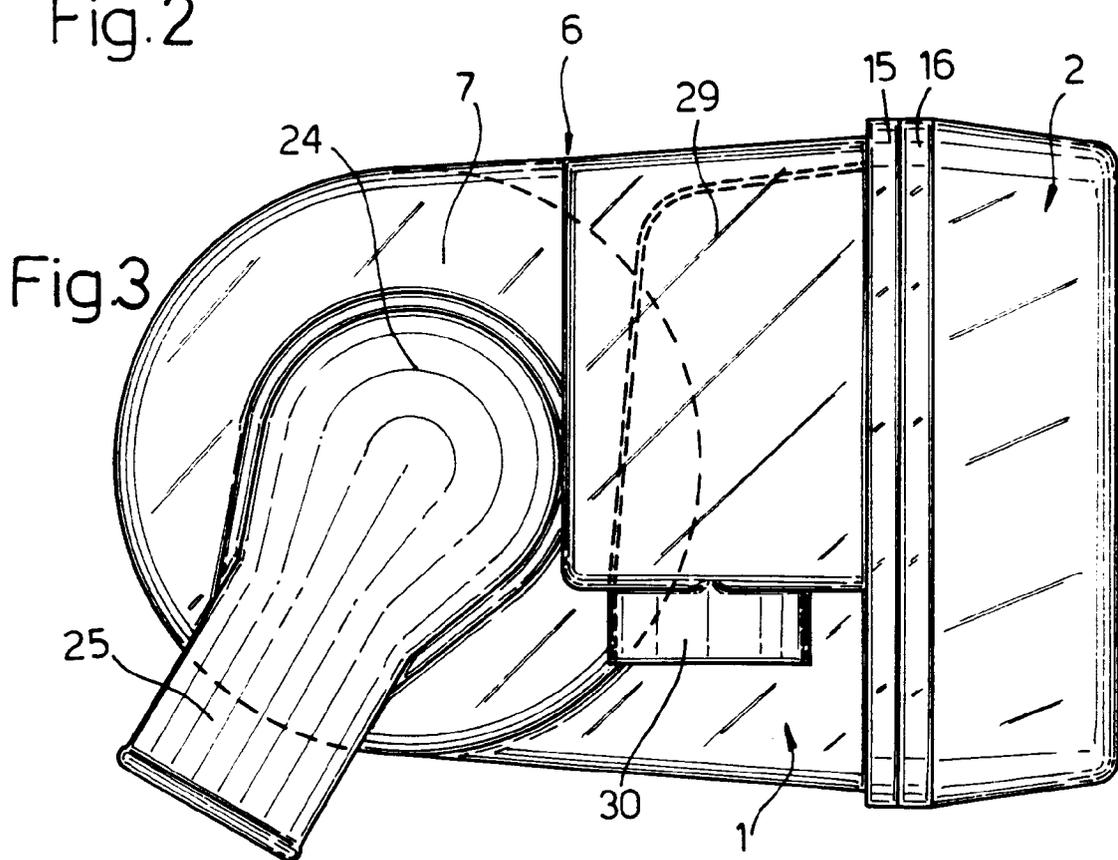


Fig. 3