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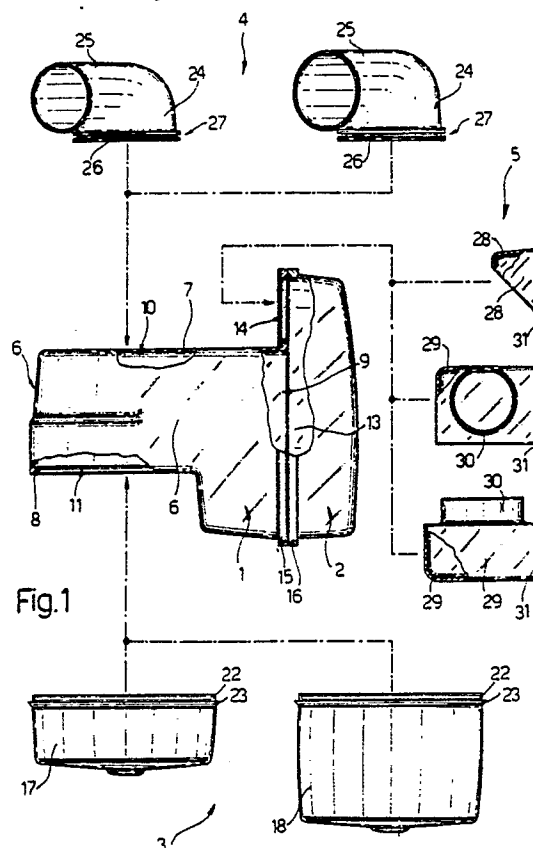
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Set of sectional elements arranged to form a series of filters for the feed air to a heavy vehicle internal combustion engine.

The set comprises a hollow shell (1), a series of socket-shaped bodies (3) each of which is arranged to be selectively fixed to the hollow shell to close an aperture (11) provided in the lower wall of the shell; a series of covers (4) each of which is provided with a tubular connector (25) and is arranged to be selectively fixed to the hollow shell to close an aperture (7) provided in the upper wall thereof; a cup-shaped element (2) arranged to be fixed to the hollow shell to close an aperture (9) provided in the side wall thereof, said cup-shaped element defining an air inlet port (14); and a series of air entry connection elements (5) each of which is arranged to be selectively fixed to said air inlet port.



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SET OF SECTIONAL ELEMENTS ARRANGED TO FORM A SERIES OF FILTERS FOR THE FEED AIR TO A HEAVY VEHICLE INTERNAL COMBUSTION ENGINE

This invention relates to an 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.

With the set of elements of the invention it is 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 third aperture 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 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).

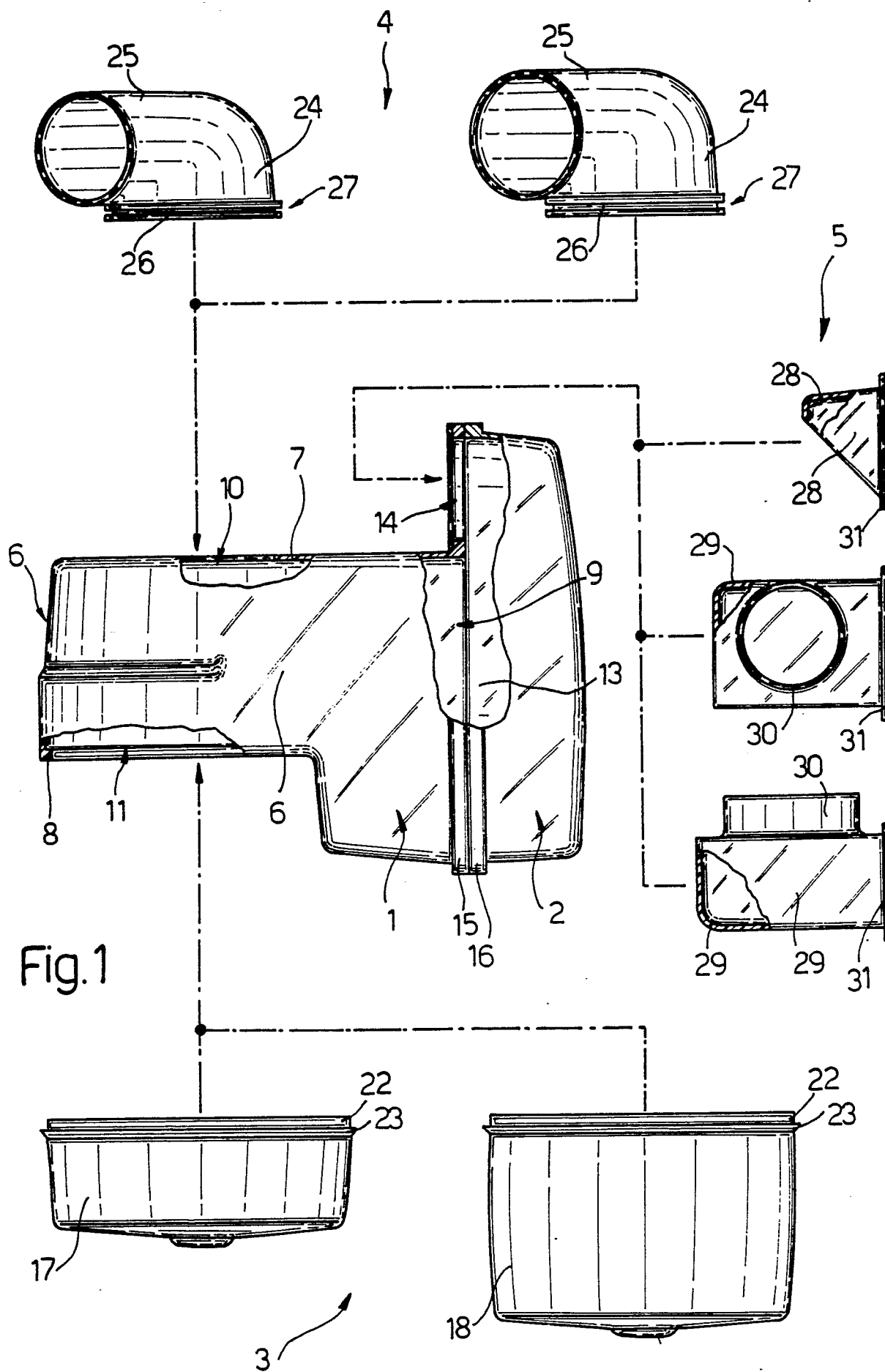
The set of sectional elements of the invention is used to form a filter suitable for a particular application in the following manner.

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. It is apparent that modifications can be made to the present invention but without leaving its scope. In particular, although series 3, 4 and 5 are shown comprising only a few elements, each of these series can comprise a larger number of elements.

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 third 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).



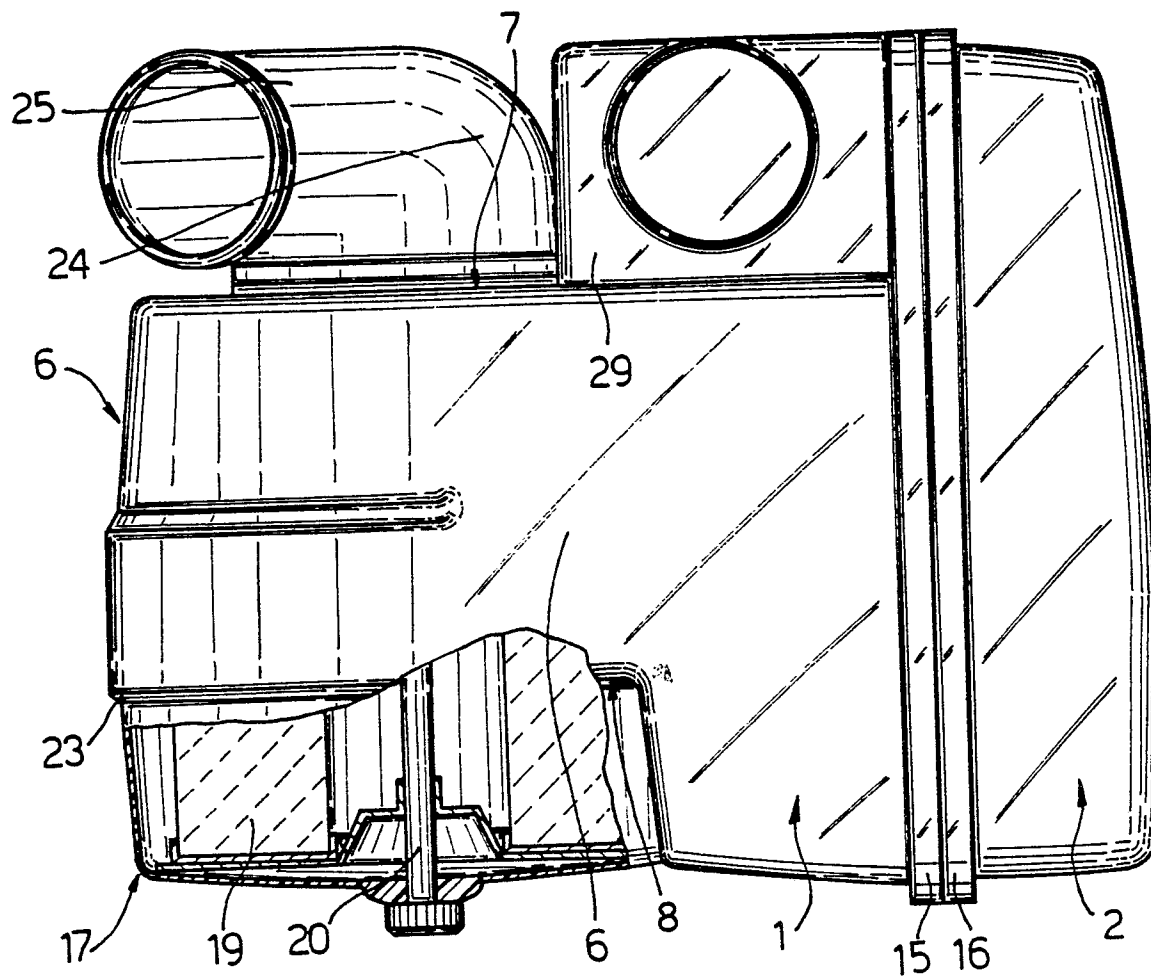


Fig. 2

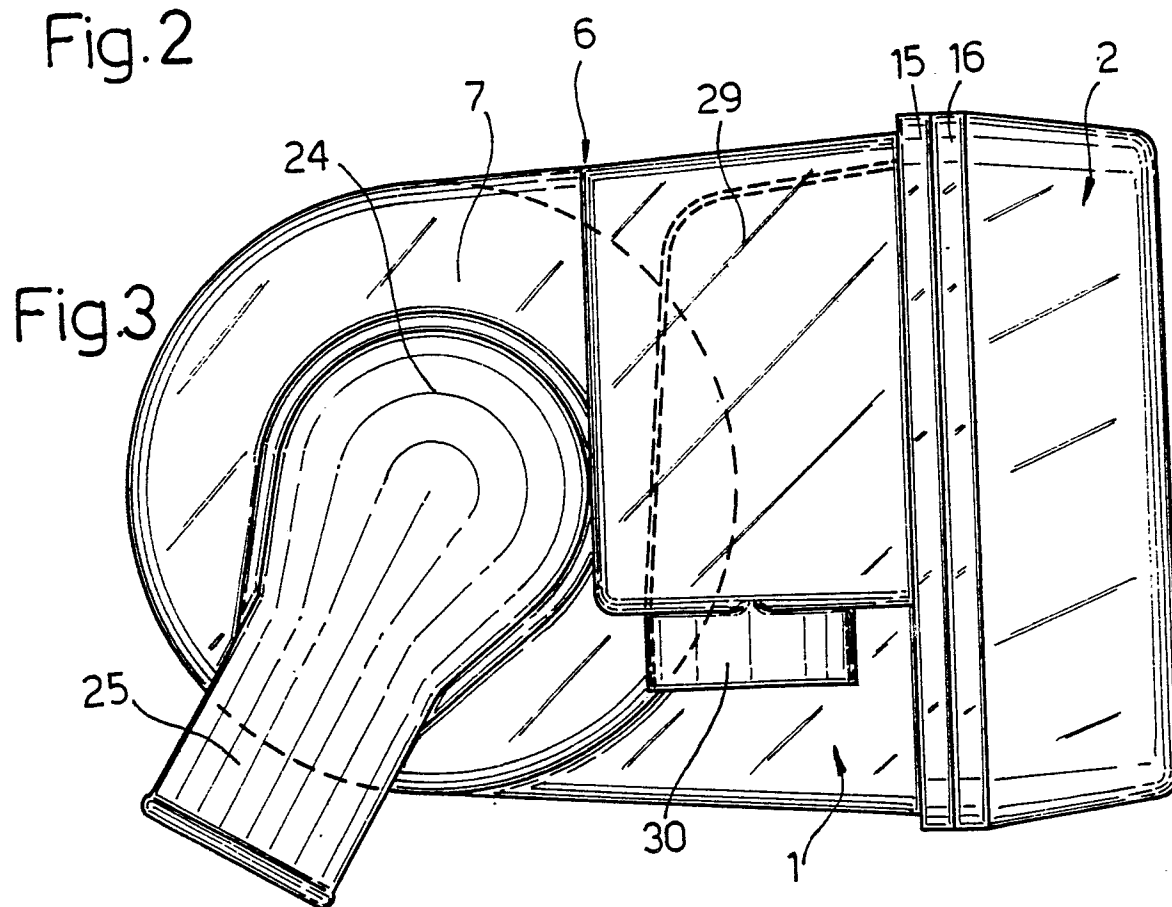


Fig. 3



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	US-A-2 480 379 (L.W. NEWBERRY) * Column 1, lines 12-15; column 1, line 44 - column 2, line 2; column 5, lines 30-52 * -----	1	F 02 M 35/02
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			F 02 M B 01 D
The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
THE HAGUE	30-08-1989	ALCONCHEL Y UNGRIA J.A.	
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	