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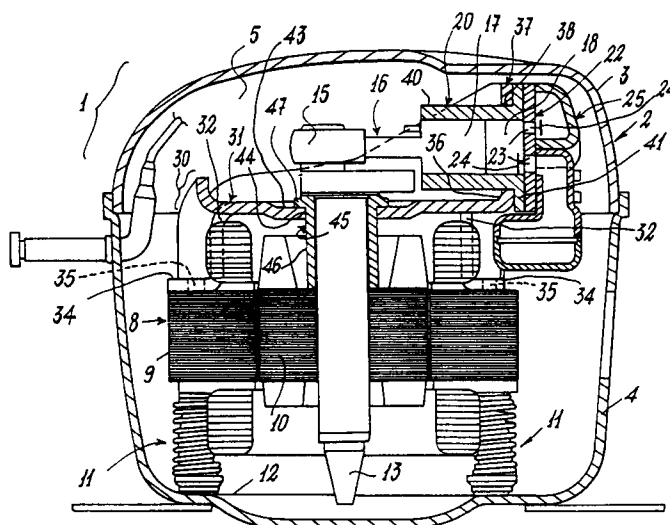
EUROPEAN PATENT APPLICATION(21) Application number: **92103642.2**(51) Int. Cl.⁵: **F04B 39/12**(22) Date of filing: **03.03.92**(30) Priority: **26.03.91 IT MI910251 U****NL-5507 SK Veldhoven(NL)**(43) Date of publication of application:
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I-2105 Comerio (Varese)(IT)(54) **Hermetic motor-compressor unit with an improved motor support frame or bracket.**

(57) A hermetic motor-compressor unit (1) comprises a compressor frame (30) for supporting the usual electric motor (8), the known cylinder (20) within which the piston (17) moves and the known cylindrical piece (45) within which a usual drive shaft (13) rotates, all defining the compression means for a fluid, in particular a refrigerant fluid.

The compressor frame (30) is formed by pressing and comprises a flat portion (31) from which there extend four arms (32) bent at their end (34) to be fixed in known manner to the stator (9) of said

motor (8).

From one end (36) of said compressor frame (30) there rises, perpendicularly to the flat portion (31), a wall (37) in which a passage (38) is provided and which is to be fixed to a usual compressor head (25), said compressor frame (30) comprising a sunken region (43) in the flat portion (31) within which there is an aperture (44) to allow passage of the usual shaft (13) which rotates said piston (17) via a corresponding crank (16).

**FIG.1**

This utility model relates to a hermetic motor-compressor unit, in particular for use in a refrigerator or the like, comprising a casing containing a compressor frame for supporting a usual electric motor provided with a stator and rotor, and a cylinder within which a piston moves driven by a drive shaft and crank, a compressor head being positioned on said cylinder.

A compressor frame can be formed either by casting or from a metal plate by pressing.

In the first case it is formed integrally with the cylinder and is fixed in known manner to the stator of the electric motor. In the second case it comprises a flat body provided with legs or parts projecting perpendicularly from it to be fixed in known manner (by screws) to the electric motor stator. In this latter case the flat body also comprises a plurality of raised parts in which holes are provided for fixing (by screws or the like) the cylinder within which the piston moves, and a central aperture for receiving a usual drive shaft via a known bearing which embraces it.

A frame constructed by casting has various drawbacks, for example it is heavy, and needs considerable chip-forming machining and considerable washing before being used in the compressor. Consequently, to construct this frame in the said manner requires a large number of machines for the said machining. This obviously negatively affects the cost of the finished product.

A frame of plate construction provided with seats for its fixing to the electric motor and cylinder overcomes the drawbacks of the cast frame. It has however the serious drawback of involving a relatively lengthy assembly time because of the various points of fixing between it and the other parts of the compressor.

In addition, even its construction from a flat plate involves a plurality of machining operations which increase the cost of the final product.

An object of the present utility model is therefore to provide a motor-compressor unit of the aforesaid type, in which the compressor frame is constructed by pressing but with a lower construction cost than analogous methods of the state of the art. A further object is to provide a motor-compressor unit having a smaller number of parts than analogous known types.

A further object is to provide a motor-compressor unit in which the compressor frame can be fixed to the remaining compressor parts easily and quickly, resulting in a reduction in overall assembly costs of the motor-compressor unit and a corresponding reduction in the finished cost, aided by the reduction in parts to be stocked.

These and further objects which will be apparent to the expert of the art are attained by a motor-compressor unit of the aforesaid type, characteris-

ed in that from one end of the compressor frame there rises a wall in which an aperture is provided, said wall being integral with said frame and intended to be fixed to the compressor head, said compressor frame comprising in its flat part a sunken region containing an aperture to allow passage of the drive shaft, said frame being advantageously constructed of pressed plate.

The present utility model will be more apparent from the accompanying drawing, which is provided by way of non-limiting example and in which:

Figure 1 is a cross-section through a motor-compressor unit according to the utility model;

Figure 2 is a perspective view of a part of the motor-compressor unit of Figure 1;

Figure 3 is a plan view of the part shown in Figure 2 before its formation; and

Figure 4 is a view similar to that of Figure 2, but of a different embodiment of the part shown in that figure.

With reference to said figures, a motor-compressor unit is indicated by 1 and comprises a casing 2 defined by two half-casings 3 and 4 fixed together in any known manner.

A cavity 5 defined by said casing 2 contains an electric motor 8 comprising a usual stator 9 and a rotor 10.

The motor rests in any known manner on spring dampers 11 which themselves rest on a base part 12 of the half-casing 4.

The motor 8 rotates an output shaft (or drive shaft) 13 on which the big end 15 of a connecting rod 16 secured to a piston 17 is mounted. This latter moves within the bore 18 of a cylinder 20 to compress for example a usual refrigerant fluid of a refrigerator in which the motor-compressor unit is used.

At one end of said bore there is a valve plate 22 provided with ports 23 on which usual valves 24 act.

On the valve plate 22 there is provided a compressor head 25. The motor 8 is associated with a compressor frame 30 constructed of pressed plate and comprising a flat part 31 from which a plurality of arms 32 extend. Said arms are arranged perpendicular to the part 31 and are bent at their free ends 34 where they are provided with through holes 35 for receiving usual frames (screws, not shown) for its fixing to the motor 8.

According to the utility model, from a side edge 36 of the flat part 31 there rises a wall 37 substantially perpendicular to the part 31.

Said wall comprises an aperture 38. The wall is intended to be fixed by usual screws, not shown, to the compressor head 25. In the example shown in Figure 1, a hollow cylindrical portion 40 of a cylindrical body provided with a flange 41 at its free end is inserted into the aperture 38. This cylindrical

body, formed advantageously by pressing and deep-drawing a metal plate (or alternatively of sintered material), defines the cylinder 20 within which the piston 17 moves.

The flange 41 is positioned between the valve plate 22 and the wall 37, and is secured to this latter by the screws which fix the head 25 to the wall. The ports 23 of said plate 22 open into said cylindrical portion 40.

In its flat part 31, the frame 30 comprises a sunken region 43 facing the motor 8.

In the region 43 there is provided an aperture 44 in which there is placed a hollow cylindrical body 45, formed advantageously by pressing and deep-drawing a metal plate or alternatively of sintered material, possibly covered with an anti-friction material of known type. The body 45 surrounds the shaft 8.

For this purpose the cylindrical body 45 comprises a cylindrical part 46 provided with an end flange 47 disposed in the sunken region 43 in any known manner.

Advantageously both the cylindrical body 45 and that defining the cylinder 20 can be formed integrally with the frame or bracket 30 by respectively deep-drawing those portions of the wall 37 and sunken region 43 in positions corresponding with the apertures 38 and 44 (as shown in Figure 4, in which parts corresponding to those of the preceding figures are indicated by the same reference numerals). In this manner, in constructing the frame 30, further parts are formed which in any other manner would have to be subsequently associated with the frame, so lengthening the compressor construction time.

In the case under examination, when the body 45 (which acts as a guide for the rotation of the shaft 13 and as a support for it) has been obtained by deep-drawing the metal plate defining the frame 30, a usual bearing, for example of anti-friction material, can be placed in the aperture 44 to separate the drive shaft 13 from the frame or bracket 30.

The construction of the frame 30 starts from a flat stamped plate, shown in Figure 3.

The aperture 44 (shown dashed in Figure 1) is then formed in this plate, of surface area much larger than the flat part 31, by blanking. The aperture edges are then deep-drawn if the cylindrical body 45 is to be formed integrally with the compressor frame 30.

The compressor frame 30 is then shaped to form those arms 32 close to what is to become the wall 37. To achieve this, that portion of the frame 30 bounded by the dashed line 30A in Figure 3 is deep-drawn and the frame thus drawn is blanked along the dashed lines 30B. The first operation defines the wall 37, the perimetral raised edges 50,

51 and 52 (see Figure 2), with the edge 51 extending along the entire perimeter of the frame 30, and the arms 32, substantially with the same elevation and providing stiffening for the frame (the edges 50, 52 connect the edge 51 to the wall 37). The second operation releases the arms 32 positioned at the wall 37.

All the arms 32 are then bent down from the flat part 31 and their ends bent.

Having done this, the compressor frame 30 is fixed to the motor (in known manner) and the cylinder and cylindrical body 45 are then inserted into it. The valve plate 22 and head 25 are then fixed to the wall 37, so as to also fix to this latter the flange 41 of the cylinder 20, the body 45 then being secured to the flat part 31.

If the cylinder 20 and the cylindrical body 45 are formed integrally with the compressor frame 30 by deep-drawing the wall portion 3 and the sunken region 43 (these being in positions corresponding with the apertures 38 and 44), these fixing operations are no longer necessary. This further simplifies the operations involved in the manufacture and assembly of the compressor.

Thus in both said cases, the frame 30 is easily formed by operations of limited cost, as stated. This frame can thus itself incorporate the cylinder within which the piston moves (with considerable advantages in terms of assembly of the compressor components), or alternatively the cylinder be fitted after constructing the frame. The same applies to the cylindrical guide and support body 45 for the drive shaft 8.

Specific embodiments of the utility model have been described. However further embodiments equivalent to those described are possible which fall within the scope of the present document.

Claims

1. A hermetic motor-compressor unit, in particular for use in a refrigerator or the like, comprising a casing containing a compressor frame for supporting a usual electric motor provided with a stator and rotor, and a cylinder within which a piston moves driven by a drive shaft and crank, a compressor head being positioned on said cylinder, said compressor frame comprising a flat part from which arms project towards the motor to be fixed to the stator of this latter, characterised in that from one end (36) of the compressor frame (30) there rises a wall (37) in which an aperture (38) is provided, said wall (37) being integral with said frame (30) and intended to be fixed to the compressor head (25), said compressor frame (30) comprising in its flat part (31) a sunken region (43) containing an aperture (44) to allow passage of the drive shaft, said frame being advantageously constructed of

stamped plate.

2. A motor-compressor unit as claimed in claim 1, characterised in that the aperture (38) in the wall (37) receives a hollow cylindrical body having a portion (40) defining the cylinder (20) within which the piston (17) moves, driven by the drive shaft (18), said body comprising a flange (41) arranged between said wall (37) and a usual valve plate (22) positioned against the compressor head (25), said flange (41) being fixed to said wall (37) by the usual fixing members which fix said head (25) to the wall (37).

3. A motor-compressor unit as claimed in claim 2, characterised in that the flanged compressor body (20) is formed of pressed and deep-drawn metal plate.

4. A motor-compressor unit as claimed in claim 1, characterised in that the cylinder (20) within which the piston (17) moves is formed integrally with the wall (37) of the cylindrical frame (30), advantageously by deep-drawing said wall.

5. A motor-compressor unit as claimed in claim 1, characterised in that the aperture (44) in the sunken region (43) of the flat part (31) of the compressor frame (30) receives a hollow cylindrical body (45) which is to surround the drive shaft (8), said hollow body (45) comprising a cylindrical part (46) to receive said shaft (8) and an end flange (47) to be positioned within said sunken region (43).

7. A motor-compressor unit as claimed in claim 6, characterised in that the hollow cylindrical body (45) is formed of anti-friction material.

8. A motor-compressor unit as claimed in claim 6, characterised in that between the hollow cylindrical body (45) and the drive shaft (8) there is provided a bearing or a similar decoupling member.

9. A motor-compressor unit as claimed in claim 1, characterised by comprising a hollow cylindrical portion projecting from the sunken portion (43) of the flat region (31) of the cylinder frame (30), said cylindrical portion surrounding the drive shaft (8) and being advantageously formed by deep-drawing said flat region (31).

10. A motor-compressor unit as claimed in claim 1, characterised by comprising a perimetral stiffening edge (51) projecting from the cylinder frame (30) and terminating in edges (50, 52) connected to the wall (37) which rises from the flat portion of said frame (30).

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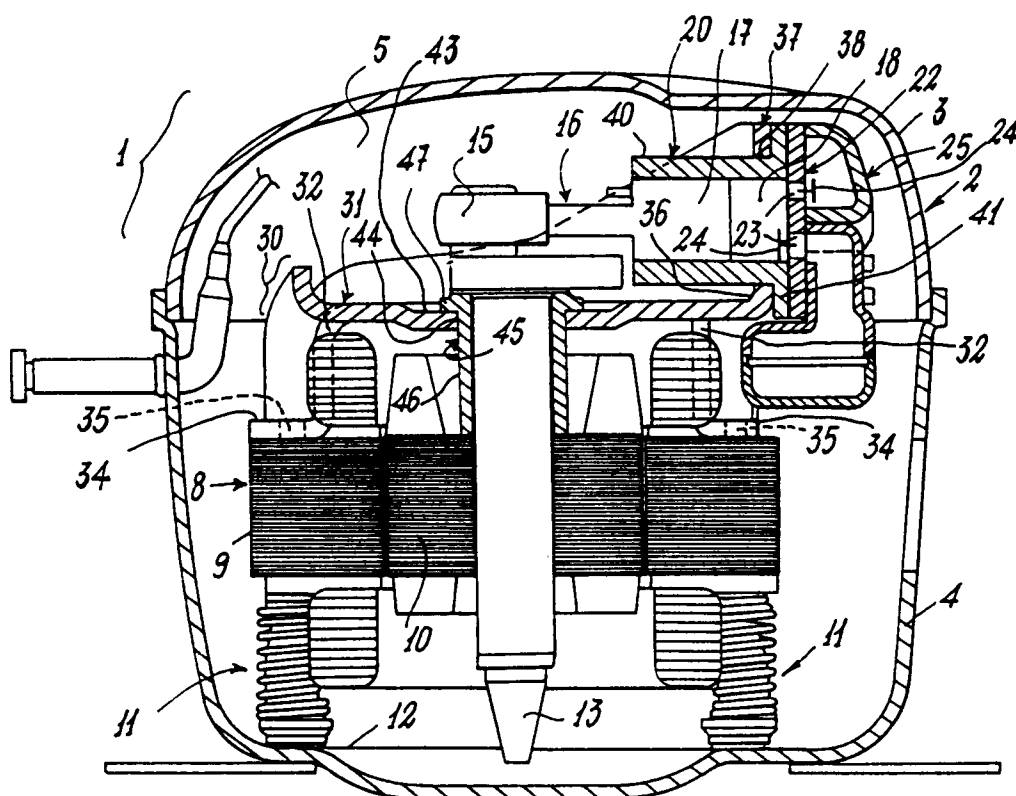


FIG. 1

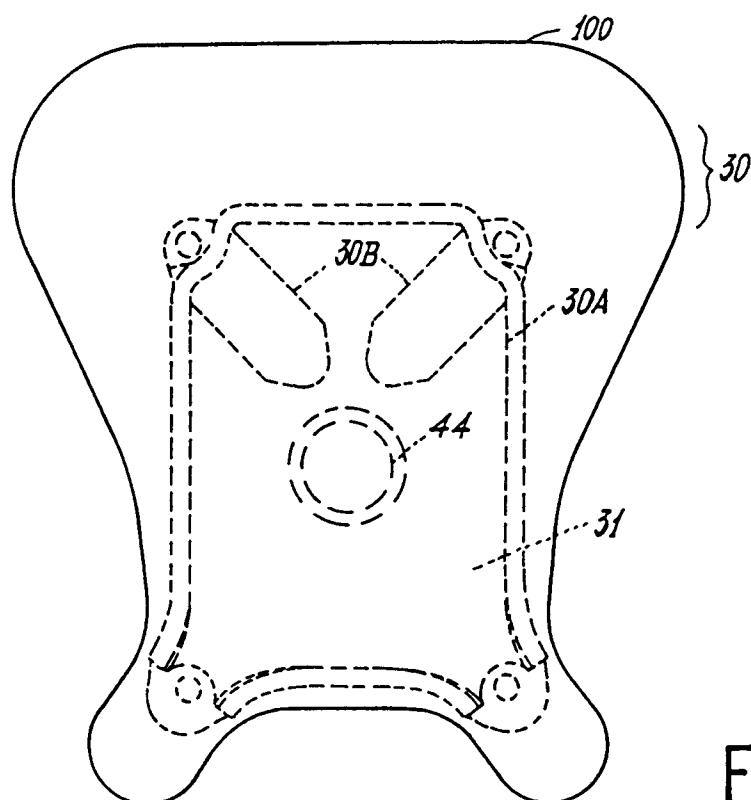


FIG.3

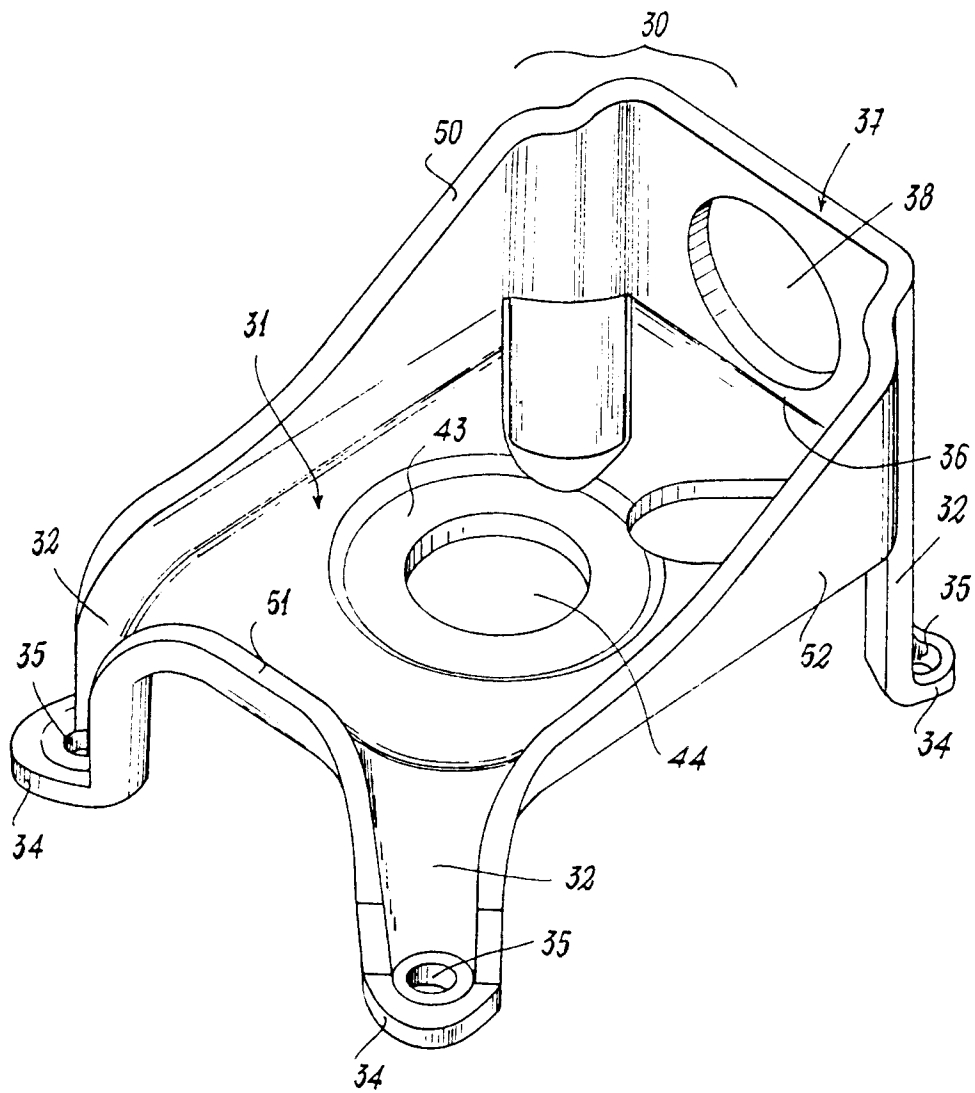


FIG.2

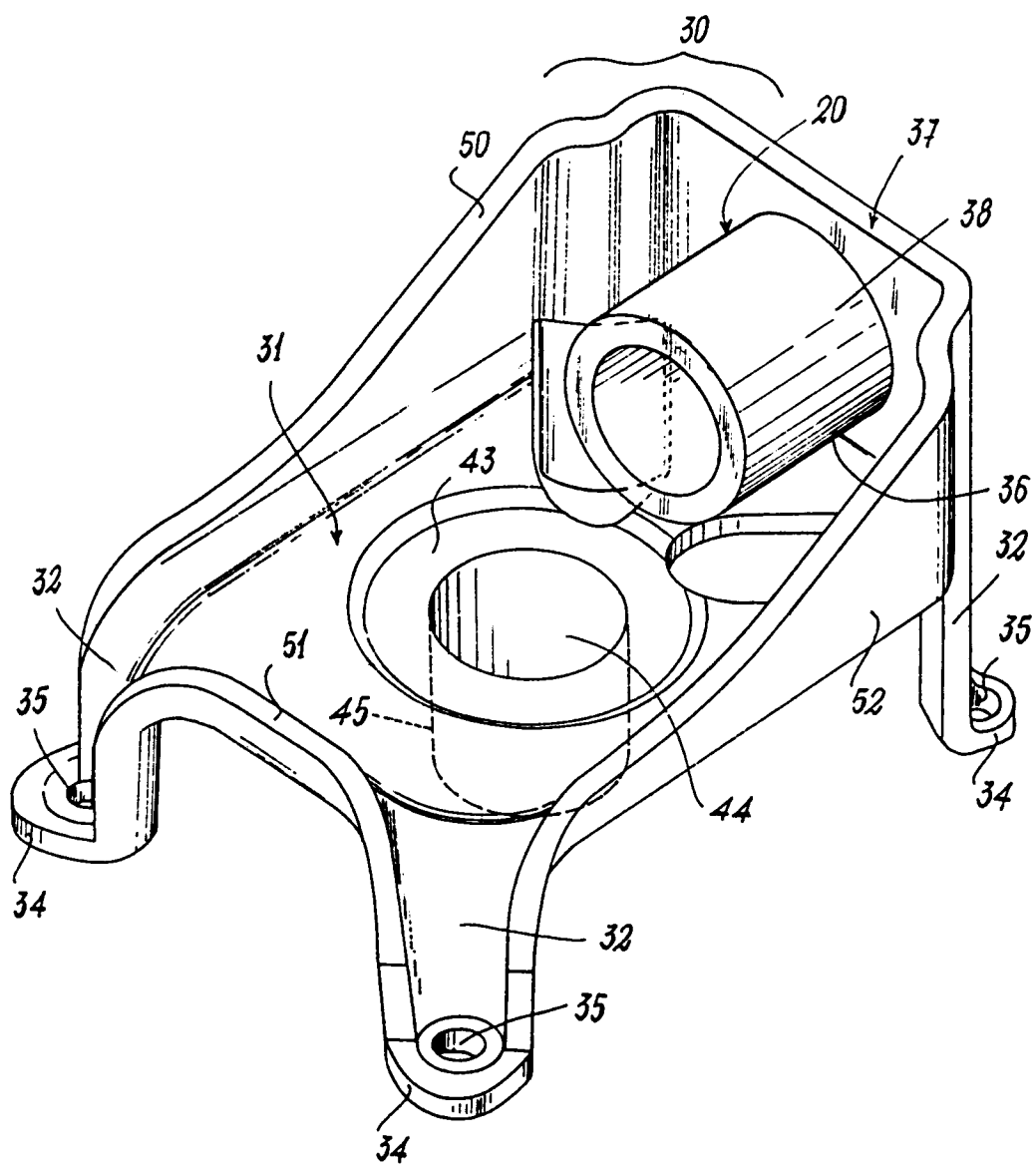


FIG.4



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EUROPEAN SEARCH REPORT

Application Number

EP 92 10 3642

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)
X A	EP-A-0 325 694 (GANNAWAY) * column 10, line 2 - column 11, line 16; figure 4 * ---	1,4 5,7,9	F04B39/12
X A	GB-A-959 243 (HINTZE) * the whole document * ---	1,2 5,7	
A	US-A-2 492 547 (WILLARD) * column 3, line 8 - line 31; figures 1,2 * ---	1,5,7	
A	DE-A-2 030 047 (LEWIS) * page 8, paragraph 2 - page 9, paragraph 2; figures 1,7 * -----	1,3-7,9	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			F04B
Place of search THE HAGUE		Date of completion of the search 29 JULY 1992	Examiner VON ARX H. P.
CATEGORY OF CITED DOCUMENTS			
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