(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 180 690**
A1

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **84830281.6**

(22) Date of filing: **18.10.84**

(51) Int. Cl.⁴: **F 01 C 1/46**

(43) Date of publication of application:
14.05.86 Bulletin 86/20

(84) Designated Contracting States:
AT BE CH DE FR GB IT LI NL SE

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(54) Rotary piston-type supercharging device.

(57) A device with a piston 1 rotating in a cylindrical container 4, provided with a profile consisting in an arc 2' of a circle and in a portion of a spiral 2 for determining, at each revolution, the forming of two chambers 10 and 11 with variable volumes, separated and sealed due to valve 6 operated by the pressure of the fluid and by the sliding against said profile 2-2' so as to realize a motor under the action of the pressure of an external liquid, or a supercharger if operated by an external mechanical energy.

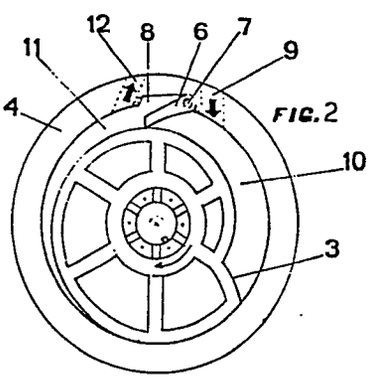

FIG.2

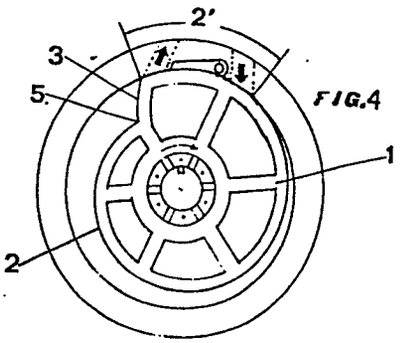

FIG.4

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"A device with a rotating piston provided with an arc portion and a spiral profile for supercharger and fluid motors"

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TITLE MODIFIED
see front page

The present invention concerns a device for superchargers, fluid motors and similar for determining the form of suc - tion and exhaust chambers with variable volume, comprising a piston with a circle's arc and a spiral's portion profile, rotating inside a cylindrical container.

It is already known that actually the art provides superchargers and alternative piston motors showing a global low efficiency due to the need of transforming the mechanical energy from rotating to alternative and vice versa.

On the other hand, small rotating shovel turbines of every kind exploit the impulse of the fluid particles trasnforming the same in a kinetic rotation moment, but their energetic efficiency is limited by the cavitation phenomenon and by the lack of seal.

Finally, the already well known rotating piston motors realize variable volume suction and compression chambers for the fluids by means of various sealing elements which, due to the thermal expansion and to the wear of the parts in contact, do not succeed in keeping the working ambients at separate pressures with consequent lowering of the resulting efficiency.

It is the aim of the present invention to eliminate in the superchargers and in the rotating motors all above mentioned inconveniences.

The present invention, as it is characterized in the attached claims, solves the problem of creating a rotating piston device for all possible applications, showing a high energetic efficiency and a high sealing between the suction and exhaust chambers.

The aim is reached by the device according to the present invention comprising a piston characterized in a profile consisting in a circle's arc and in a spiral's portion, the whole corresponding to 2π radian, rotating, with respect to an axis passing through the geometrical centre, inside a cylindrical container, and characterized in a valve operated by the fluid's pressures for determining the separation and the sealing between the variable volume suction and exhaust chambers, realized at each revolution, from the structure of said profile and the circular wall of the container.

The considerable advantages of the present invention are determined by the high efficiency of the transformation of fluid pressure energy into mechanical energy and vice versa, and by the fact that the device shows to be absolutely reversible being able to realize a supercharger or a motor or a turbine or similar.

A further feature of the device according to the present inven-

tion consists in the long use duration thereof, as those elements subject to wear are very limited and substantially are said valve and said profile which show a minimum friction surface.

The present invention is explained more in detail hereinbelow relating to the attached drawings which show two preferred embodiments.

Figures 1, 2, 3 and 4 show the scheme of the positions of the rotating piston in a complete revolution in a variant of the device according to the present invention for the realization of a fluid supercharger.

Figures 5, 6, 7 and 8 show the four positions of the piston relating to the turbine or motor variant.

Figure 9 shows a vertical, lateral section.

Relating to the details of the drawings, the device according to the present invention mainly consists in rotor 1 formed by a circle's arc 2' and a spiral's portion 2 with a maximum bending radius - in correspondence to arc 2' - equal to the inner maximum bending radius of container 4 and the minimum bending radius, in point 5, at the end of spiral portion 2 corresponding to the extroflexion of valve 6, having its fulcurm in 7, for the sealing separation of chambers 10 and 11, said valve being provided for returning in the apposite housing 8, realized in the thickness of container 4 so that through inlet opening 9, the fluid - being liquid or gaseous - will

be sucked in variable volume chamber 10 while, at the same time, the one present in chamber 11 will be pushed by the pressure, due to the progressive volume reduction determined by the sliding of circular portion 2' against the inner wall of container 4 towards outlet opening 12.

It is evident that varying the radius vector of the spiral, motors and superchargers will be obtained with different working quantities. Furthermore, the provided amplitude of arc 2' may vary according to the distance of openings 9 and 12 which are completely closed at the dead point of said arc.

Particularly in the supercharger variant of figures 1, 2, 3 and 4, the diameter of opening 12 is provided smaller than the one of inlet opening 9 so as to cause the pressure increase of the fluid flowing out towards utilization.

It is obvious that the movement of valve 6 is determined by the sliding of profile 2 - 2' and by the pressure of the fluid present in housing 8; in the present invention also a spring for opening said valve may be provided.

A further feature of the present invention are two connection ducts 13 and 14 between openings 9 and 12 and chambers 10 and 11 for facilitating the opening of valve 6 in the variant of a motor or turbine, when rotating piston 1 is near the dead point where both openings 9 and 12 are closed by portion 2' of the profile. In the variant of the supercharger, said

said ducts will facilitate the exhaust, particularly of housing 8, and the opening of valve 6 against end 3 of the profile.

The device according to the present invention and in the variant of figures 5, 6, 7 and 8 rotates anti-clockwise, i. e. opposite to above mentioned first variant, because the fluid coming from a superheated steam container, or from a container for compressed gases, or expansion gases from fuel, when entering opening 12 exerts a pressure against the structure 15 of the profile, eventually acting also through duct 14, and the expansion thereof in variable volume chamber 11 is exploited for operating the axis of rotor 1, like a turbine or a motor. In this case the exploited fluid will be ejected through opening 9 towards the exhaust.

In all the variants the box of the cylindrical container 4 will be screwed or closed in any other way at the two sides thereof by means of covers or flats 16, and the axis or pinion 17 is connected to the pivots 18 of flat bearing 19 and to outer bearings 20.

In a further variant, valve 6 may show such a thickness to close housing 8 and to avoid the movement and the turbulence of the fluid in said housing. In this case container 4 will have a thickness to allow the realization of an inner ambient for receiving and containing the body of said valve 6.

CLAIMS

1. A device for fluid superchargers and motors comprising a rotor (1) inside a cylindrical container (4), closed by covers or flats (16), characterized in a circle's arc (2') and spiral's portion (2) profile with a maximum bending radius - in correspondence to arc (2') - equal to the inner maximum bending radius of container (4) and the minimum bending radius, in point (5), at the end of spiral portion (2) corresponding to the extroflexion of valve (6), having its fulcrum in (7), for the sealing separation of chambers (10) and (11), said valve being provided for returning in apposite housing (8), realized in the thickness of container (4) so that through inlet opening (9) the fluid - being liquid or gaseous - will be sucked into variable volume chamber (10) while, at the same time, the one present in chamber (11) will be pushed by the pressure, due to the progressive volume reduction determined by the sliding of circular portion (é') against the inner wall of container (') towards outlet opening (12).

2. A device according to claim 1, characterized in that the diameter of outlet opening (12) is less than the one of inlet opening (9) so as to increase the outlet fluid pressure.

3. A device according to claim 1, characterized in that rotor (1) turns anti-clockwise under the push of gases, compressed or derived drom fuels, against the structure (15) of the profile, and in the txpansion thereof in the variable volume chamber (11) is exploited for operating the axis or pivot (17).

4. A device according to claim 1, characterized in that valve (6) is operated by the sliding of profile (2-2') and by the pressure of the fluid present in housing 8.

5. A device according to claim 1, characterized in a spring which pushes, when opening, valve (6) against profile (2-2').

6. A device according to claim 1, characterized in two connection ducts (13) and (14) between openings (9) and (12) and chambers (10) and (11) for facilitating the opening of valve (6) in the variant of a motor or turbine, when rotating piston (1) is near the dead point where both openings (9) and (12) are closed by portion (2') of the profile.

7. A device according to claim 1, characterized in that in the variant of the supercharger, said ducts will facilitate the exhaust, particularly of housing (8), and the opening of valve (6) against end (3) of the profile.

8. A device according to claim 1, characterized in that valve (6) shows a dimension such as to close housing (8), but within the thickness of container (4).

9. A device according to claim 1, characterized in that the provided amplitude of arc (2') may vary according to the distance of openings (9) and (12) which are completely closed at the dead point of said arc.

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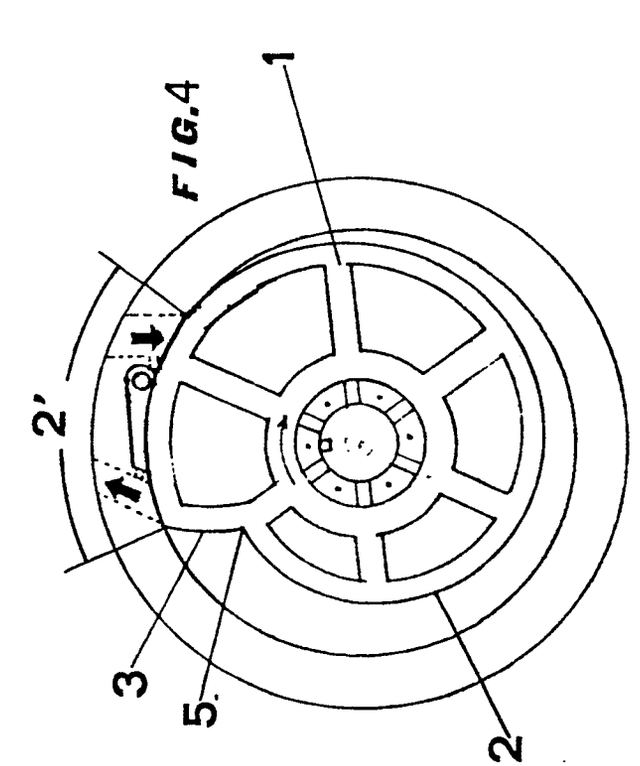

FIG.4

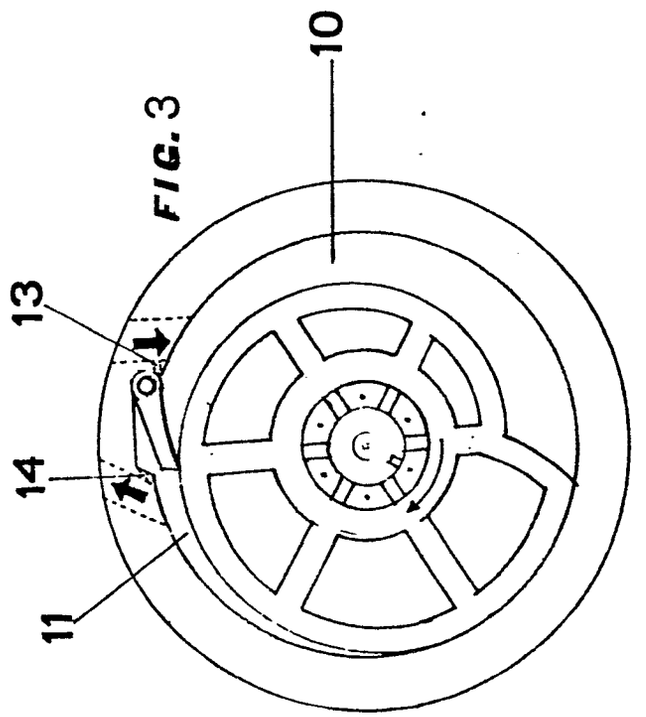

FIG.3

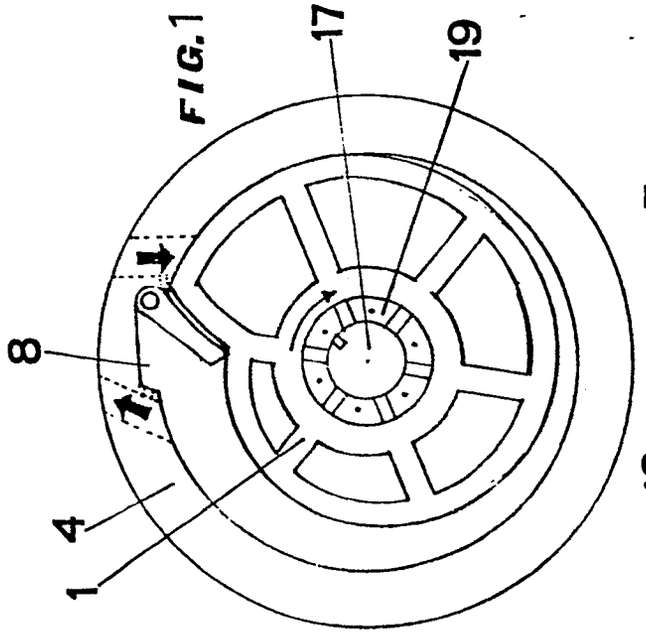

FIG.1

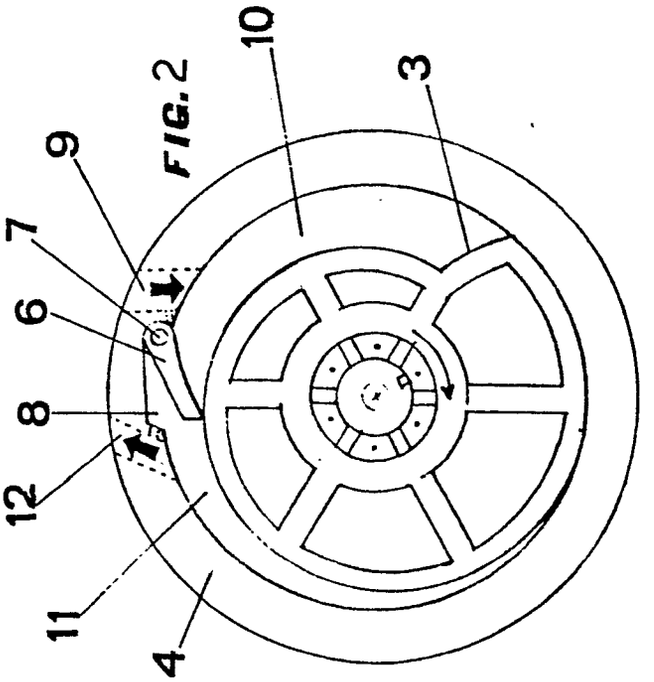

FIG.2

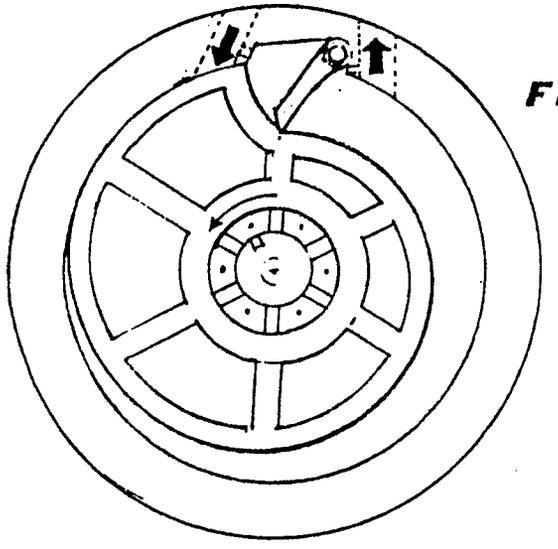

FIG.5

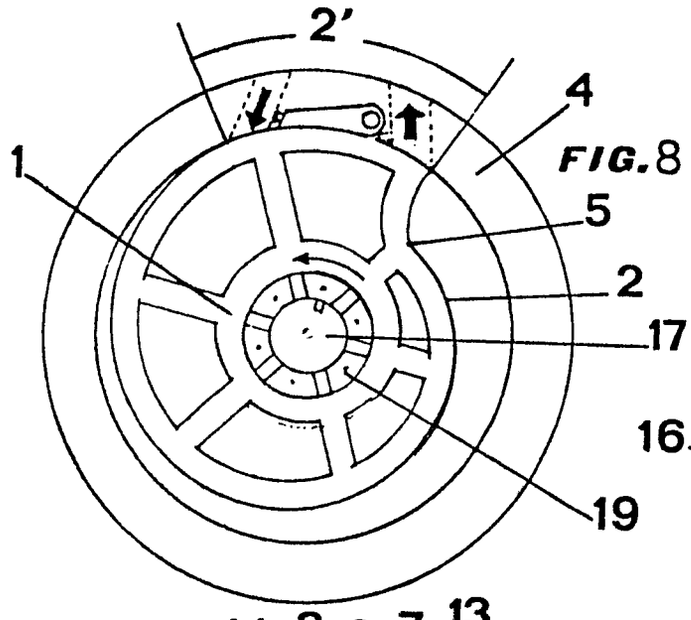

FIG.8

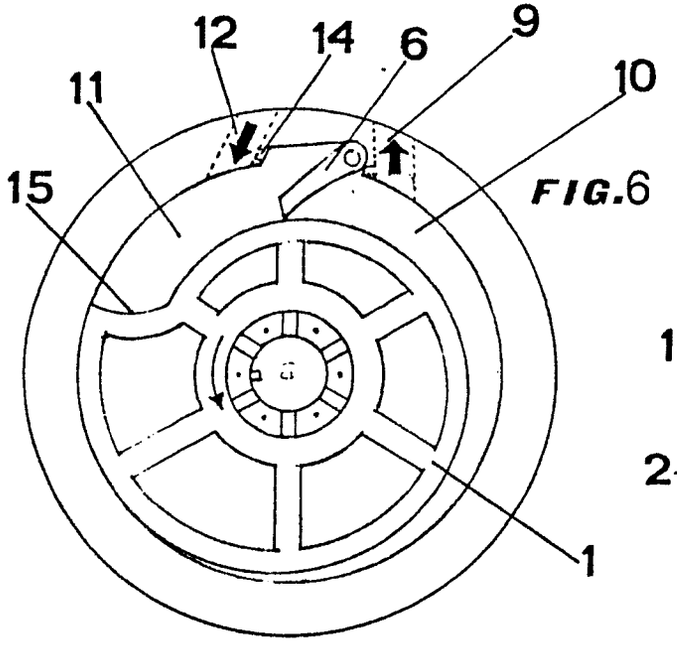

FIG.6

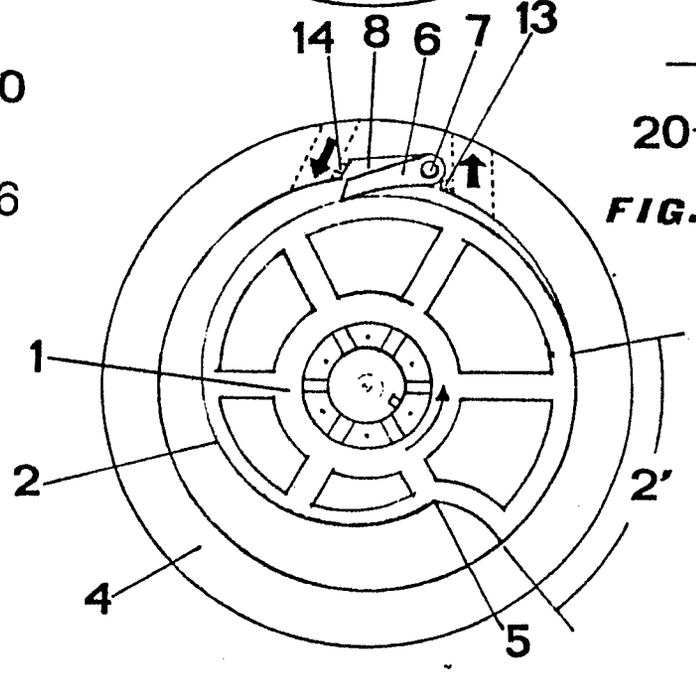

FIG.7

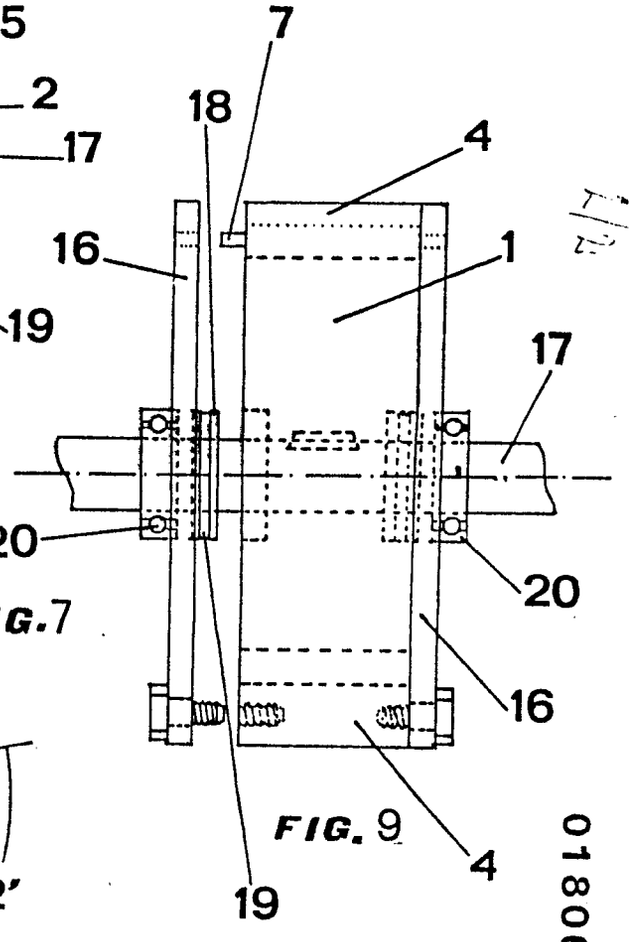

FIG. 9

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EUROPEAN SEARCH REPORT

0180690
Application number

EP 84 83 0281

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 4)
Y	FR-A- 536 112 (CAUT) * Page 1, last paragraph; page 2, lines 1-18; figure 1 *	1,3,4,8	F 01 C 1/46
Y	EP-A-0 085 427 (RÖSER) * Page 8, paragraph before last; page 11, last paragraph; pages 12,13; page 14, first paragraph; figures 1,3 *	1,3,4,8	
A		9	
Y	US-A-2 065 090 (NITTKA) * Page 1, left-hand column, line 47 - right-hand column, line 5, and line 19 - the end; figure 2 *	1,3-5	TECHNICAL FIELDS SEARCHED (Int. Cl.4)
Y	US-A-2 533 252 (HINCKLEY) * Column 2, lines 10-16; column 3, line 21 - column 4, line 18; figures 3,5 *	1,4,5	F 01 C F 04 C
Y	DE-A-2 406 442 (FRANK) * Page 7, last paragraph; page 8; figures 1,2 *	3-5,8	
A	FR-A-1 134 870 (PREMOBIL) * Page 3, left-hand column, second paragraph; figure 2 *	6,7	

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	23-01-1986	KAPOULAS T.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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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 4)
A	GB-A- 600 383 (SERRUYS) * Page 3, lines 1-9; figure 4 *	6,7	

TECHNICAL FIELDS SEARCHED (Int Cl 4)

The present search report has been drawn up for all claims

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THE HAGUE	23-01-1986	KAPOULAS T.

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