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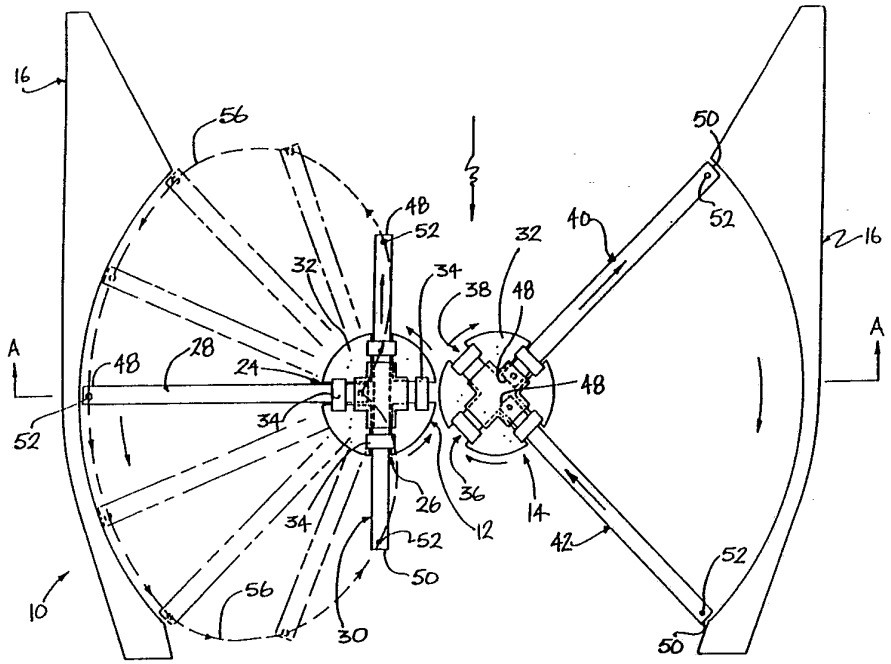
(54) Title: VANE PUMP



(57) Abstract

A vane pump (10) comprising a housing with at least one rotating hub (12, 14) having two vanes (28, 30, 40, 42). Each vane (28, 30, 40, 42) reciprocates in slots (24, 26, 36, 38) in the hub (12, 14) and within the housing between a positive displacement portion of rotation and a non-positive displacement portion of rotation.

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TITLE

VANE PUMP

DESCRIPTION

The present invention relates to a positive displacement pump apparatus.

FIELD OF THE INVENTION

Pumps presently available are disadvantaged by a large size needed to accommodate radial vanes for example. In addition, pumps generally produce a rough or pulsing flow in the fluid being pumped.

SUMMARY OF THE INVENTION

In accordance with one aspect of the present invention there is provided a positive displacement pump apparatus characterised by comprising at least one rotating hub in which two vanes are provided and a housing, each vane able to move through the or each hub within the housing between a positive displacement portion of rotation and a non-positive displacement portion of rotation.

Preferably, the pump apparatus further comprises a housing within which the or each rotating hub is located. The housing having guide means located therein to govern the movement of the vanes through the or each hub.

Preferably, the vanes have provided on both upper and lower edges at each end thereof an engagement means able to engage the guide means of the housing.

BRIEF DESCRIPTION OF THE DRAWINGS

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

Figure 1 is a top plan view of a positive displacement pump apparatus in accordance with the present invention having the top of the housing removed;

Figure 2 is a cross sectional view of the positive displacement pump apparatus of Figure 1 through line A-A;

Figure 3 is an upper perspective view of the positive displacement pump apparatus of Figure 1 shown with the top of the housing removed;

Figure 4 is a top plan view of the positive displacement pump apparatus of the present invention when applied to a water borne vessel as a propulsion system shown with the top of the housing removed; and

Figure 5 is a top plan view of the positive displacement pump apparatus of the present invention when applied to the generation of gravitational radiation shown with the top of the housing removed.

DESCRIPTION OF THE INVENTION

In Figures 1 to 3 there is shown a positive displacement pump apparatus 10 comprising a first hub 12, a second hub 14 and a housing 16.

The hubs 12 and 14 are disposed substantially vertically within the housing 16 and are able to rotate about their vertical axes. This rotation is aided by driving shafts 18 and 20, as can be best seen in Figure 2. Shafts 18 and 20 have provided thereon gears 22 that act to transfer rotational drive from shaft 18 to shaft 20.

The first hub 12 has a first vertical slot 24 and a second vertical slot 26 passing therethrough. The slot 24 receives a first vane 28 and the slot 26 receives a second vane 30.

The slots 24 and 26 perpendicularly bisect so as to disect the hubs 12 into four vertical sections 32, as can be seen in Figure 1. Each section 32 is joined to its neighbouring two sections 32 by n-shaped bracket members 34 spanning the slots 24 and 26.

The second hub 14 has a first vertical slot 36 and a second vertical slot 38 passing therethrough. The slot 36 receives a first vane 40 and the slot 38 receives a second vane 42. The slots 36 and 38 perpendicularly bisect so as to disect the hub 14 into four vertical sections 32, as can be seen in Figure 1. Each section 32 is joined to its neighbouring two sections 32 as described above.

Each vane 28, 30, 40 and 42 has an upper edge 44 and a lower edge 46, as can be seen in Figure 2. Also, each has a first end 48 and a second end 50. At a point near the ends 48 and 50 on both the upper edge 44 and the lower edge 46 of each vane 28, 30, 40 and 42 is located an engagement means in the form of an upstanding pin 52.

The pins 52 are received in a guide track for the vanes 28, 30, 40 and 42 in the form of a channel 54 and whose path is indicated by dotted line 56 in Figure 1.

The vanes 28, 30, 40 and 42 are held partially within their respective slots 24, 26, 36 and 38 upon rotation of the hubs 12 and 14. The movement of each vane, for example vane 28 follows a path to be described hereinafter.

In Figure 1 vane 28 is shown fully extended from the hub 12 in a positive displacement or thrust position with its first end 48 sealing with the housing 16.

Positive displacement or thrust is maintained throughout a

quarter of a rotation of the hubs 12 and 14 by each vane as shown by the positions of vane 40, just entering positive thrust and by vane 42, just leaving positive thrust.

At the end of the positive thrust portion of a rotation the engagement of the pins 52 and the channel 54 draw the vane 28 through the slot 26. When the vane 28 is next in a positive thrust position, one half a rotation since leaving a positive thrust position it is the second end 50 thereof that seals with the housing 16.

As the vanes pass through their respective slots the pins 52 pass under the bracket members 34.

in effect, in a single rotation of the hubs 12 there are four positive thrust portions of that rotation. The first by vane 28, the second by vane 30, the third by vane 28 and the fourth by vane 30. This action results in a smooth non pulsing flow of a fluid being pumped.

The non pulsing flow of fluid is also enhanced by the contra-rotating nature of the hubs 12 and 14. The hubs 12 and 14, as shown in Figure 1, are preferably offset by 45° in their rotation so as to ensure one vane on one hub is in the middle of its positive thrust portion at the moment vanes on the other hub are entering and leaving the positive thrust portion.

The arrangement of hubs 12 and 14 ensures there is no engagement between the vanes located therein. This allows the positive displacement pump mechanism 10 to occupy smaller places than conventional pumps.

In Figure 4 there is shown a propulsion apparatus 100 as may be used on a water vessel 102. The propulsion mechanism 100

comprises two hubs 104 and 106 located in a housing 108 mounted on or in-built with the stern of the vessel 102. The operation of the mechanism 100 is substantially similar to that of the pump apparatus 10 and like numerals denote like parts.

The hubs 104 and 106 rotate in opposed directions. The hubs 104 and 106 comprises vertical slots 109 and 110 in which are received vanes 112 and 114 respectively. The vanes 112 and 114 have first ends 116 and 118 respectively, and second ends 120 and 122 respectively. The vanes 112 and 114 each have provided on upper and lower edges at each end thereof pins 52. The pins 52 are received in the guide tracks for the vanes 112 and 114 in the form of a channel whose path is indicated by the dotted line 56.

The housing 108 has located near the vessel 102 fluid intake passages 124. The housing 108 also has provided therein a fluid expulsion passage 126 through which the pumped fluid is expelled.

Each rotation of a hub 104 and 106 driven by an external source comprises four positive displacement or thrust portions. For example, in Figure 4 vane 112 is shown in the middle of a positive displacement or thrust portion of the rotation of hubs 104 and 106 generated by the sealing of its end 116 with the housing 106. The following positive thrust portion of rotation is generated by vane 114 and the sealing of its end 118 with the housing 108. The following positive thrust portion of rotation is generated by vane 112 and the sealing of its end 120 with the housing 108.

In effect, in a single rotation of the hubs 104 and 106

there are four positive thrust portions of that rotation. The first by vane 112, the second by vane 114, the third by vane 112 and the fourth by vane 114.

As in apparatus 10 the movement of the vanes through the hubs is achieved by the engagement of the pins in the guide track, shown in Figure 4 by dotted line 56.

It is envisaged that each vane 112 and 114 may have provided therein a flexibly resilient member (not shown). The flexibly resilient member may be compressed, or have energy stored therein, as it moves toward the positive displacement portion of rotation. As the vane moves through the positive displacement portion the energy is not released. As the vane exits the positive displacement portion of rotation the flexibly resilient member decompresses and thereby releases the energy held therein accelerating the vane through the hubs 104 and 106 respectively.

In Figure 5 there is shown a mechanism 200 for the generation of gravitational radiation. The mechanism 200 comprises a single hub 202 having slots 204 and 206 located therein. The slots 204 and 206 perpendicularly bisect each other dividing the hub 202 into four equal segments 208. The hub 202 is located within a housing 210. The housing 210 has a positive displacement portion 212 and a hub locating portion 214. Consequently, the hub 202 is located eccentrically within the housing 210.

A vane 216 is received in the passage 204. A vane 218 is received in the passage 206. Each vane 216 and 218 has a first end 220 and a second end 222. Each end 220 and 222 has provided therein a flexibly resilient member, for

example a spring 224. It should be noted that the flexibly resilient member may alternatively be a rigid member acting as a resilient member because of an opposing electromagnetic field.

As the hub 202 is rotated, for example by an electromagnetic field generated by superconductors, the vanes are in turn flung partially from their respective passages to collide with the housing 210 at an impact point 226. It should be noted that the term impact does not necessarily indicate mechanical interaction of the vanes and the housing 210 but may involve an electromagnetic field simulating impact between the vanes and the housing 210.

During a single rotation of the hub 202 there will be four impacts at the impact point 226. The first, as shown in Figure 5 may be for example by end 220 of vane 216. The spring 224 then acts to propel the vane 216 fully into the passage 204. The second impact will be by end 222 of vane 216. The third impact will be by end 222 of vane 216. The fourth by end 222 of vane 218.

The impacts may be harnessed to generate gravitational radiation if the speed of rotation reaches a sufficient speed. The impacts can disrupt electrons to create a stream of gravitons in the direction of arrow 230. The stream of gravitons may be harnessed to provide propulsion for various crafts and varied purposes, for example space travel.

It is envisaged that to reach the required speed of rotation it would be necessary to suspend the hub 202 in a vacuum using the electromagnetic field mentioned previously.

It is further envisaged that the impacts described above may

be harnessed in a more obviously mechanical manner for purposes such as the breaking of rocks in either a crushing mill or a portable rock breaking apparatus.

It is still further envisaged that in the apparatus 10 and apparatus 100 the vanes may be louvred. The louvres of the vanes would be closed during the positive displacement portion of rotation and open during the non-positive portion of rotation. Such a construction may increase efficiency by decreasing resistance by the pumped fluid.

It is further envisaged that the apparatus 10 or 100 of the present invention may be easily applied to use as a flow meter, wind turbine or water turbine. In addition, the apparatus 200 may be applied to combustion engine technology and to use in sex aids, for example vibrators.

Modifications and variations such as would be apparent to a skilled addressee are deemed within the scope of the present invention.

CLAIMS

1. A positive displacement pump apparatus characterised by comprising at least one rotating hub in which two vanes are provided and a housing, each vane able to move through the or each hub within the housing between a positive displacement portion of rotation and a non-positive displacement portion of rotation.

2. A pump apparatus according to Claim 1, characterised in that the vanes are provided in two perpendicularly bisecting slots in the or each hub.

3. A pump apparatus according to Claim 1 or 2, characterised in that the movement of the vanes through the positive and non-positive portions of rotation is caused by engagement means on the vanes engaging a guide track in the housing.

4. A pump apparatus according to Claim 3, characterised in that the guide track is a channel in the housing and the engagement means is a plurality of upstanding pins provided on the vanes.

5. A pump apparatus according to Claim 4, characterised in that each vane has two ends and that each end has a pin provided substantially thereat.

6. A pump apparatus according to any one of the preceding claims, characterised in that a single rotation of the or each hub comprises four positive displacement portions of rotation, a first hub causing a first and third portion and a second hub causing the second and fourth portions thereby constituting an alternating sequence.

7. A pump apparatus according to any one of the preceding

claims, characterised in that there are two hubs arranged to rotate such that they are offset by 45°, whereby as a vane on one first hub is in the middle of positive displacement two vanes on the other hub are entering and leaving positive displacement respectively.

8. A pump apparatus according to Claim 7, characterised in that each hub rotates in a different direction.

9. A pump apparatus according to any one of the preceding claims characterised in that the housing is mounted to a vessel and contains one or more fluid intake passages.

10. A pump apparatus according to any one of the preceding claims, characterised by the vanes comprising a number of louvres which are closed during the positive displacement portion of rotation and open during the non-positive displacement portion of rotation.

11. A pump apparatus according to Claim 1 or 2, characterised in that a single hub is mounted eccentrically in a housing, rotation of the hub is achieved through an external driving force, wherein the vanes impact the housing during the positive displacement portion of rotation.

12. A pump apparatus according to Claim 10, characterised by each vane having provided at each end thereof a flexibly resilient means acting to return the vane to the non-positive displacement portion of rotation after impacting the housing.

13. A pump apparatus according to Claim 10 or 11, characterised in that the impacting of the vanes occurs at such speed so as to cause the release of gravitons from impacted electrons and thereby produce directional

gravitational radiation.

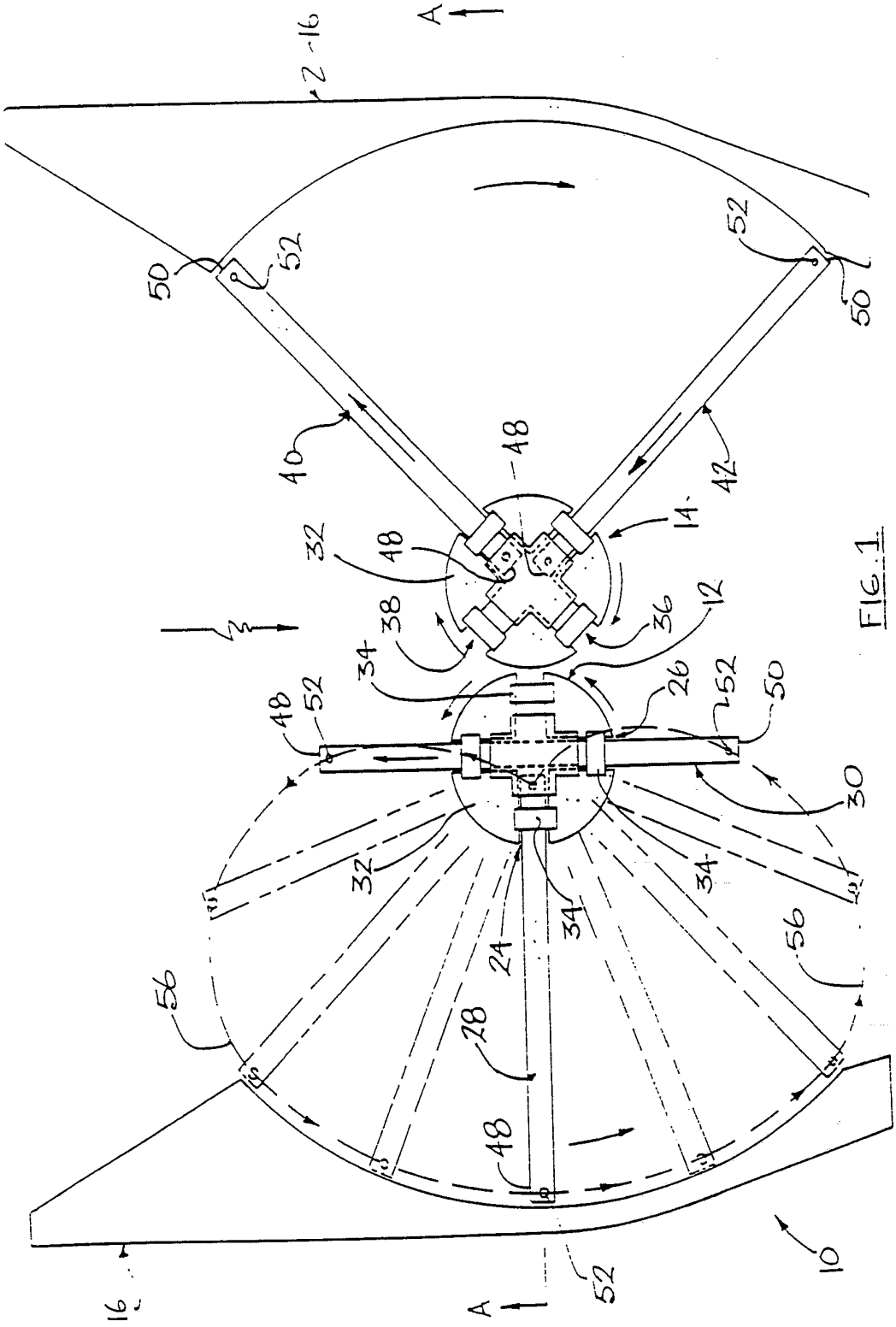
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FIG. 1

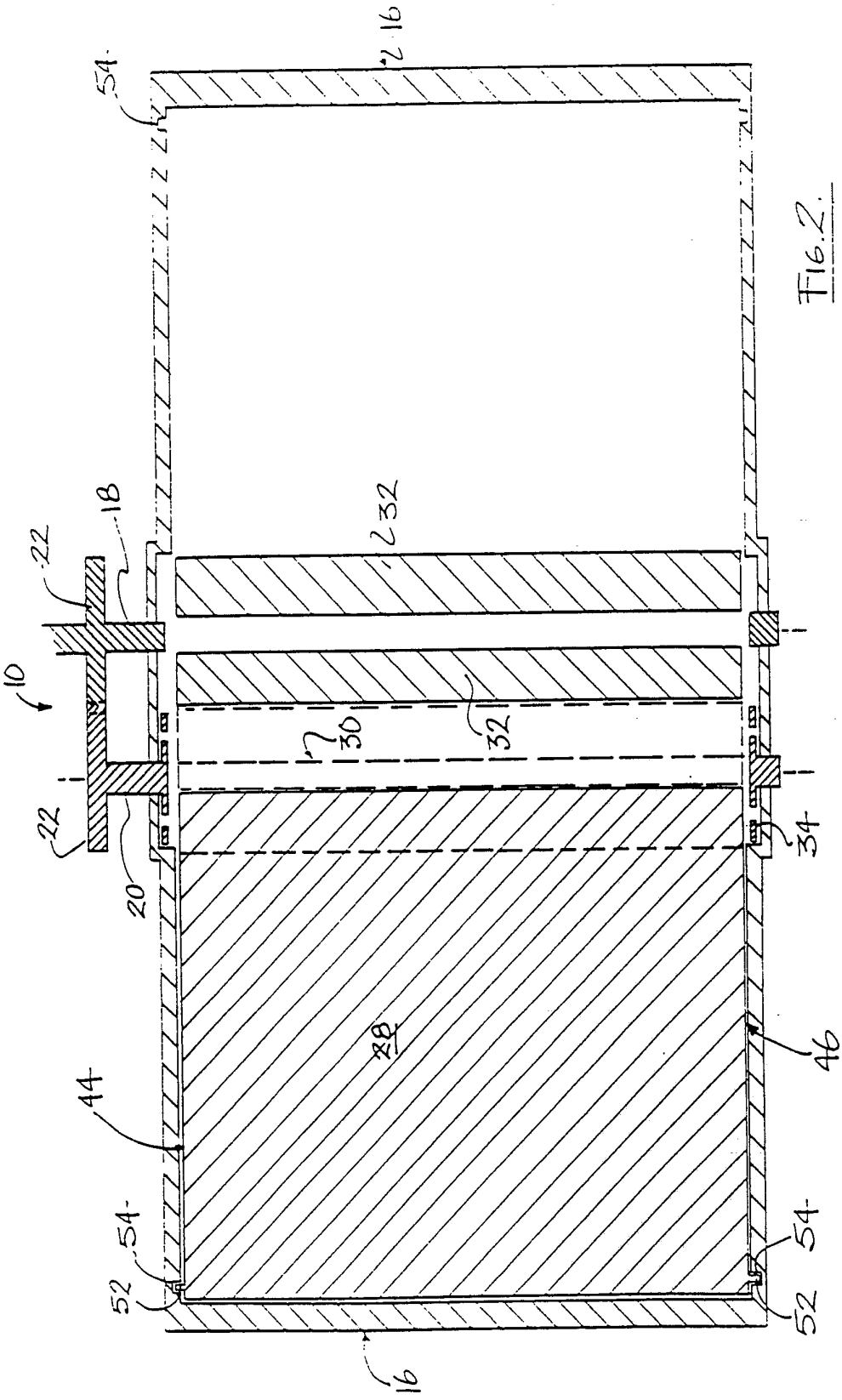

Fig. 2.

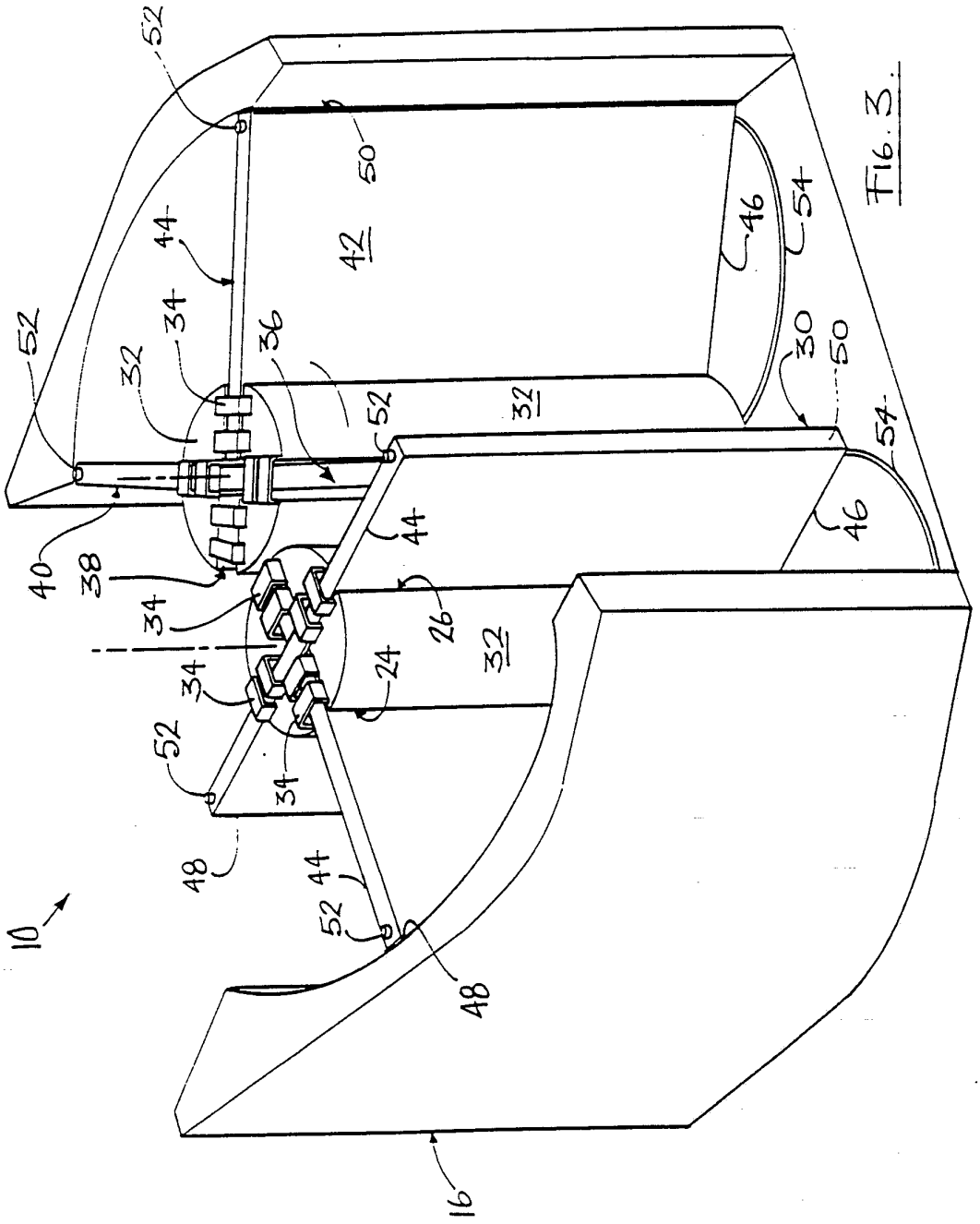

Fig. 3.

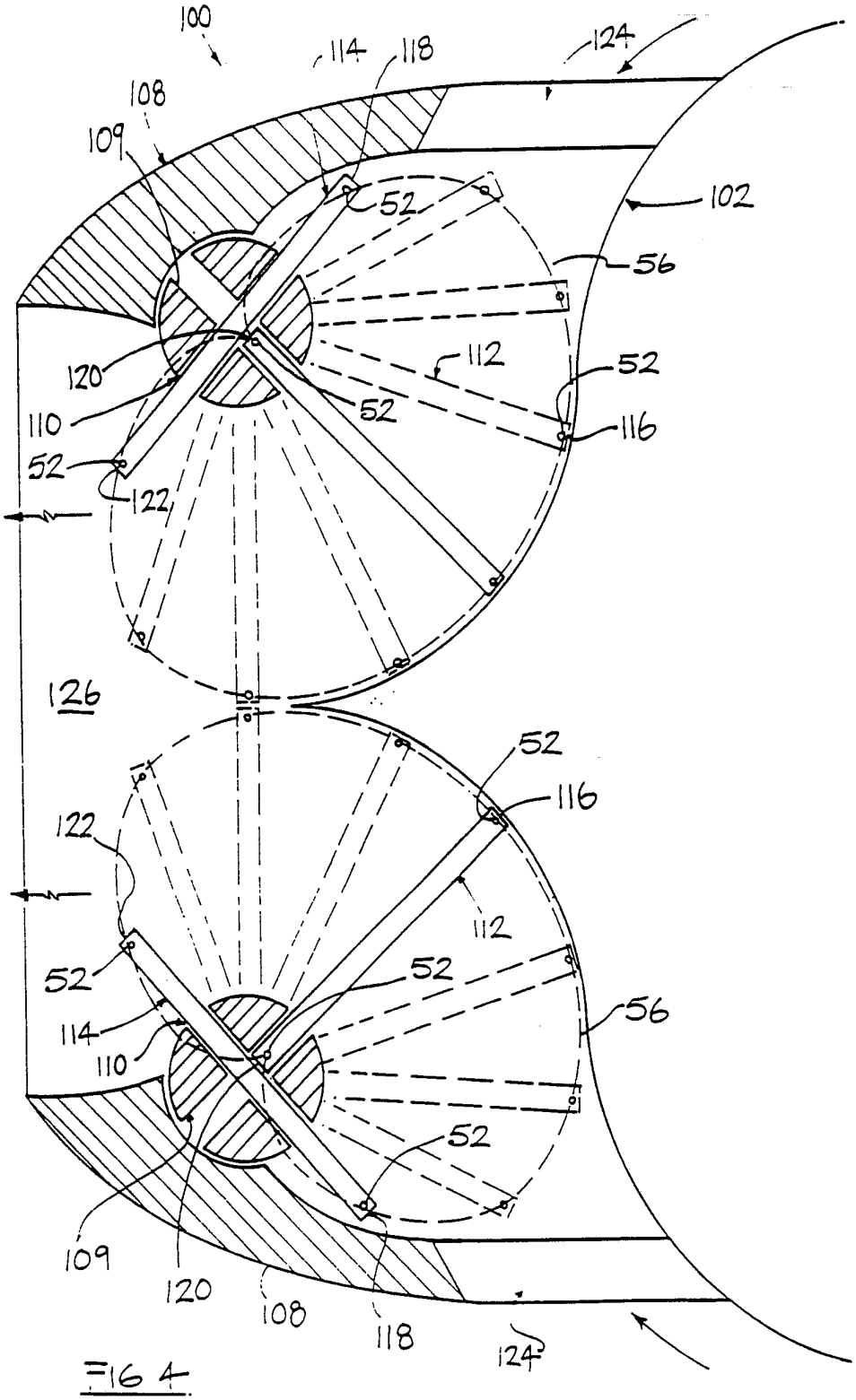
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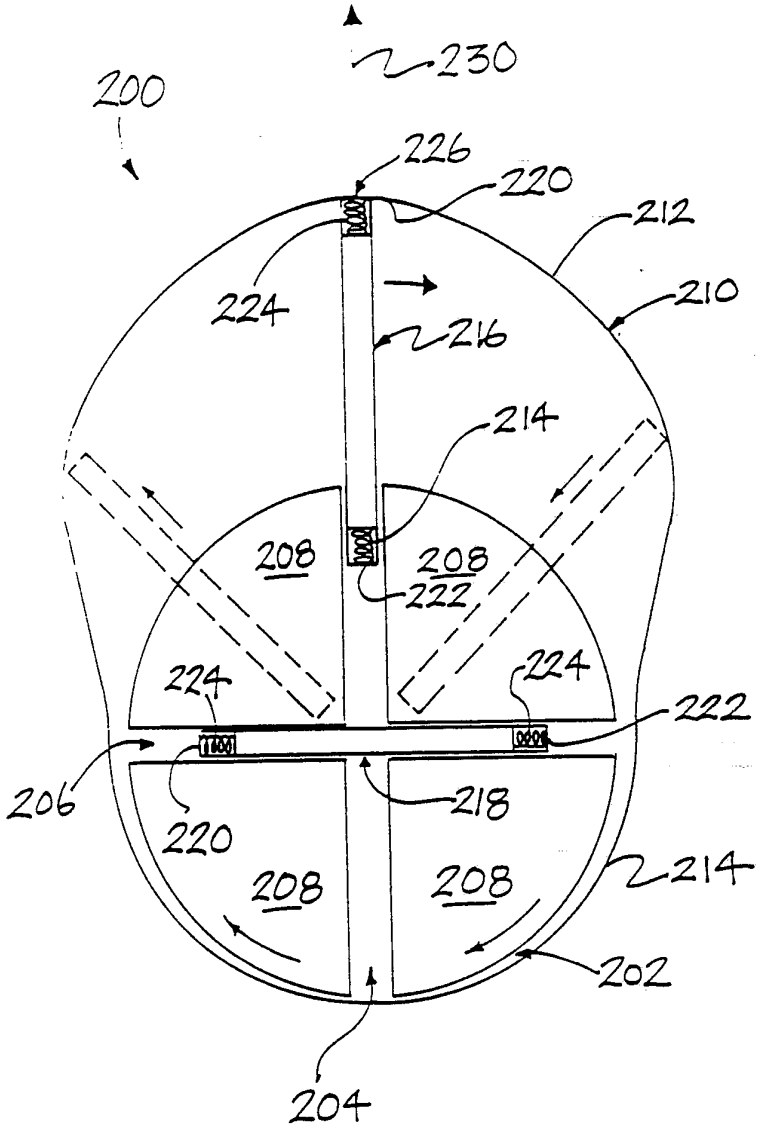
FIG 4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F16.5.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU92/00568

A. CLASSIFICATION OF SUBJECT MATTER
Int. Cl.[5] F04C 18/344, 2/344, F01C 1/344

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC F04C 18/344, 17/18, 2/344, F01C 1/344, 1/34

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
AU : IPC as above

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DERWENT

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
X,P	Patents Abstracts of Japan, M 1245, page 167, JP,A, 4-27790 (SHIGERU SENDAI) 30 January 1992 (30.01.92) abstract	1,9
X	Patents Abstracts of Japan, M1007, page 94, JP,A, 2-130283 (KOZABURO NITTA) 18 May 1990 (18.05.90) abstract	1-5, 9

[X] Further documents are listed in the continuation of Box C.

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Date of the actual completion of the international search	Date of mailing of the international search report
3 December 1992 (03-12-92)	15 DEC 1992 (15-12-92)
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200 WODEN ACT 2606 AUSTRALIA Facsimile No. 06 2853929	Authorized officer C. M. WYATT Telephone No. (06) 2832538

INTERNATIONAL SEARCH REPORT

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate of the relevant passages	Relevant to Claim No.
X Y	EP, A, 333391 (J.S.MASKINFABRIK A/S) 20 September 1989 (20.09.89) figures 1 and 2 column 1, line 40-column 2 line 4; column 4 lines 10-22.	1-3, 9 4-5
Y	EP, A, 29753 (S.A.R.L. MOTECO) 3 June 1981 (03.06.81) figures 1 and 2	4-5
X	GB, A, 1517881 (WIBAU GmbH) 19 July 1978 (19.07.78) figure 1; page 3, lines 30-47	1, 3-5, 9
X Y	GB, A, 995984 (BRODRENE GRAM A/S) 23 June 1965 (23.06.65) figure 1; page 1 lines 28-73 figure 2; page 1, lines 74-86	1-3, 9 4-5
Y	Patents Abstracts of Japan, M 715, page 98, JP, A, 63-29084 (EAGLE IND CO LTD) 6 February 1988 (06.02.88) abstract	4-5
X	GB, A, 707837 (BOLLIGER) 21 April 1954 (21.04.54) figure 1; page 1, lines 25-41	1, 6, 9
X	US, A, 2046873 (GARRISON) 7 July 1936 (07.07.36) figure 1; column 1, line 53-column 2, line 52	1-2, 9
A	AU, B, 10312/83 (552849) (MACHINEFABRIEK C. RIJKAART B.V.) 21 July 1983 (21.07.83) page 7, line 5-page 8, line 3	

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
EP	333391	DK	1441/88				
EP	29753	FR	2458675				
GB	1517881	AT	535/76	BE	840676	CA	1061643
		CH	620020	DE	2601347	DK	89/77
		ES	455039	FR	2338399	US	4123205
AU	10312/83	CA	1201622	EP	83955	JP	58122383
		NL	8200095	US	4584934		