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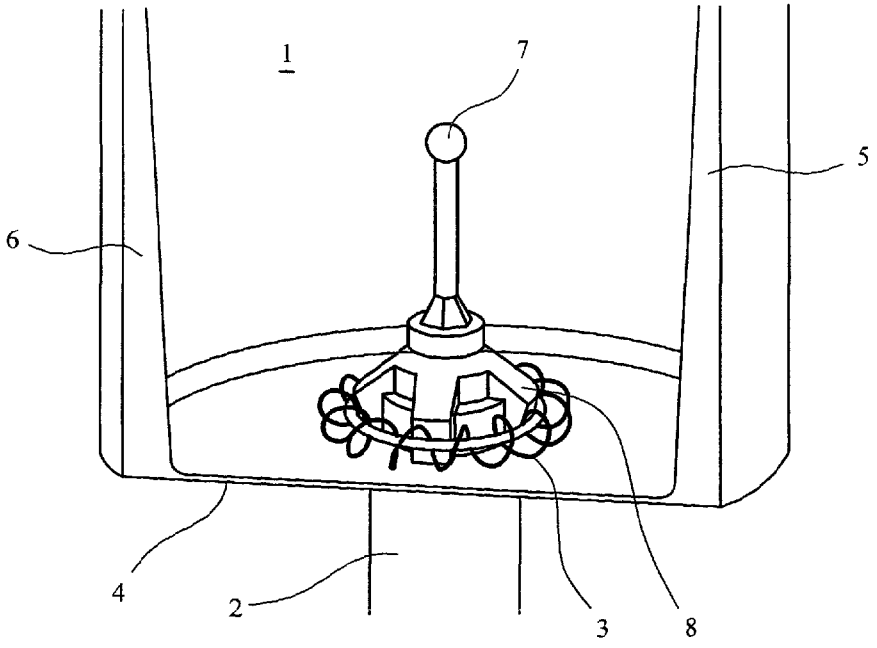

FIG. 1

(57) Abstract: A milk frother comprising a chamber 1 for receiving milk or a milk based liquid, drive means 2 adapted to drive a whisk 3, which whisk is adapted to rotate in the milk or milk based liquid to mix the milk or milk based liquid and to produce foam, the frother further comprising heating means 4 adapted to heat the milk or milk based liquid, wherein the frother is provided with an electronic control unit adapted to independently control the drive means and the heating means such that the heating means can be switched off a predetermined time before the drive means.

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Milk Frother

The invention relates to a milk frother and a drive mechanism for a milk frother.

Espresso based coffee drinks such as caffe latte and cappuccino have become increasingly popular and consumers want to be able to easily and reliably produce these drinks. Traditionally, baristas have been trained to use the steam generated by an espresso machine to heat and froth milk in a jug to produce the hot milk and froth required for these drinks. Producing the appropriate amount of hot milk and froth without burning the milk or damaging the jug requires some training or experience. Smaller espresso machines are also much harder to use to treat the milk.

A number of separate milk frothers have been produced which are suitable for home or small scale commercial use. EP1656866 discloses a frother with a tank to receive a milk-based liquid food with a magnetic beater. A magnetic beater driving system produces a magnetic field which drives the beater in rotation in the tank. The system, beater and a beater positioning unit break or prevent symmetrical circulation of the liquid around a median of vertical axis of the tank. Heating units are disposed in association with the tank for heating the liquid. This is used for preparing foam from a milk-based liquid food product.

GB2454421 discloses a device for frothing milk that is provided with a rotating heating element to be inserted in the milk. The device is provided with a whisk attachment for producing froth and a paddle attachment for producing a more creamy finish.

These devices share a number of problems. For example, the frothers (with internal elements and mains power) operate on fast speed so when using the whisk you get too much froth to milk, meaning you waste milk and energy but the paddle doesn't produce enough. Milk froth is moreover generally fairly tasteless.

Another problem with the known frothers having a whisk shaft powered from the lid of the frother is that when the milk is ready, the whisk is removed from the frother and is generally placed on a countertop, which results in some mess that needs to be cleaned up.

A further problem with the known frothers is that the milk tends to burn on the element as when the frother has frothed the milk, the user immediately pours the milk out and a small residue remains behind, which burns on the element. If this is not cleaned quickly, the burnt on residue becomes difficult to remove and also affects future performance. The standard approach to this has been to reduce the temperature to which the milk is heated to around 60 C but at this temperature, the frothed milk is not suitable for use in other beverages such as hot chocolate, which would require a higher temperature to be palatable.

The present invention therefore seeks to provide a milk frother that is easier to use but more closely replicates the performance of an espresso machine.

According to a first aspect of the invention there is provided a milk frother comprising a chamber for receiving milk or a milk based liquid, drive means adapted to drive a whisk, which whisk is adapted to rotate in the milk or milk based liquid to mix the heating milk or milk based liquid and to produce foam, the frother further comprising heating means adapted to heat the milk or milk based liquid, wherein the frother is provided with a control adapted to independently control the drive means and the heating means such that the heating means can be switched off a predetermined time before the drive means.

According to a second aspect of the invention there is provided a milk frother comprising a chamber for receiving milk or a milk based liquid, drive means adapted to drive a whisk, which whisk is adapted to rotate in the milk or milk based liquid to mix the heating milk or milk based liquid and to produce foam, the frother further comprising heating means adapted to heat the milk or milk based liquid, wherein an inner surface of the chamber is provided with a fin, which fin is adapted to disrupt co-axial circulation of the milk or milk based liquid.

Preferably, the chamber is provided with one or more fins adapted to cause the milk or milk based liquid to fold in on itself. Preferably, the frother is provided with an interlock to ensure that it only operates when the lid is in the closed position.

Preferably, the fin is located towards the upper part of the chamber and is spatially separated from the bottom of the chamber. Preferably or alternatively, the fin is angled from the top to the bottom.

According to a third aspect of the invention there is provided a stirrer for a frother, which stirrer is provided with an annular winding having a plurality of loops around its circumference, wherein the annular winding is wound such that each loop of the winding is located at a distance of between 3.5 to 15% of the diameter of the annular winding from the equivalent point on the winding of the adjacent loop.

Preferably the loops are located at a distance of 5-9% from the equivalent point on the winding of the adjacent loops, more preferably approximately 7.5%

An exemplary embodiment of the invention will now be described in greater detail with reference to the drawings in which:

Fig. 1 shows a cross section of the milk frother
Fig. 2a-c shows various whisk/stirrer designs
Fig. 3 shows a tool adapted to hold the three whisks

Figure 1 shows a cross section of a milk frother having a tank 1 having a generally circular outer and inner circumference for receiving milk to be frothed. A magnetic drive means 2 is provided below the lower surface of the tank 1, which drive means 2 is adapted to impart a drive to a stirrer 3 located in the tank without a mechanical connection member intruding through the wall of the tank 1. The stirrer 3 is supported on a male or female connector on the base of the tank 1 to ensure that it remains centred and that the drive mechanism can impart drive to the stirrer.

A heating plate 4 is located beneath the base of the tank 1, which heating plate is adapted to heat the milk in use. First 5 and second fins 6 are provided and which protrude from the circular inner circumference towards the centre of the tank 1 and extend the full height of the tank 1. In use, the first 5 and second fins 6 act to improve the whisk action by making the liquid fold back in on itself whilst permitting the stirrer to be located co-axially with the median vertical axis of the tank 1. In preferred embodiments, the ratio of the distance of the apex of the fin normal to the interior circumference and the interior circumference to the radius of the jug should be between 1/5 and 1/12. The fin also has a curved face leading to the apex, so that a tangent from the apex points substantially to the vertical axis of the tank 1.

The frother is provided with control means adapted to control the actuation of the heating plate and also, independently, the actuation of the magnetic drive means. The control means can be either a single ECU or independent PCB's.

In use, the control means are adapted to turn off the heating plate a predetermined time before the stirrer stops stirring so that the residual heat of the plate can be removed by the action of the stirrer passing the milk over it for the predetermined period of time. The length of time will depend on both the dimensions of the tank, the speed of the stirrer and the desired temperature of the milk. Typically the predetermined length of time will need to be around 10s. This particular arrangement has the attraction of permitting the milk to be heated to a higher temperature than would otherwise be possible but by the time the milk is poured from the frother the base of the tank will have cooled sufficiently that any residual milk that is left in contact with the tank will not burn. For example, in a frother of the invention it is possible to heat the milk to 75 C, which is suitable for making hot chocolate, whereas in prior art devices, the milk is only heated to around 60 C as any higher temperature would result in unacceptable levels of milk burning on the surface of the frother.

Figures 2a to 2c show three stirrer attachments. The stirrer attachments are designed to positively engage with the spindle 7 of the stirrer. The first stirrer as shown in Figure 2a comprises two opposed winged arms and is adapted to simply stir the milk if no froth is desired.

Figure 2b shows the second stirrer which comprises a support 8 having four protruding arms 9, which arms in turn support a horizontally disposed ring about which is wound a loosely wound wire having approximately three windings between each arm. This stirrer is adapted to produce a 50/50 mix of froth and milk. In a typical embodiment the diameter to the interior edge of the winding will be approximately 21.5mm and to the exterior edge will be 34mm and the stirrer will have a total of 14 windings. The ratio of the separation of adjacent loops of the winding to one another with respect to the diameter should be around 7.5% to produce an ideal mix.

Figure 2c shows the third stirrer which comprises the support 8 having four protruding arms 9, which in turn support a horizontally disposed ring about which is wound a more tightly wound wire having approximately 15 to 18 windings, with a total

of around 70 windings, between each arm. This stirrer is adapted to produce a full froth. The separation between each loop of the winding is around 1.5%

Although the support 8 has been described as having 4 arms, it could be provided with two or three arms.

The lid of the frother can be provided with an interlock mechanism 21 adapted to engage when the lid is closed. The interlock mechanism is connected to a spring loaded rod biased towards the lid with a microswitch 22 at the lower end.

In use, the operator will press the on/off switch . This causes the heating plate to heat the milk and the magnetic drive to rotate the whisk.

A further advantageous aspect of the invention is the provision of a single draft shaft adapted to receive one of a plurality of stirrers. As different types of stirrer can ideally be used for making different types of froth but the magnetic drive means is comparatively expensive. The single drive shaft addresses this problem by providing a slow thread with a direction of rotation in the opposite direction to the direction of rotation of the stirrer. The slow thread facilitates the insertion and removal of the stirrer from the shaft and by opposing the direction of the thread to the direction of the rotation of the stirrer, actuation of the stirrer will force the stirrer down in the frother to its correct position.

In a further embodiment, the rotary switch is adapted to control the speed of the motor. In a simple embodiment, the motor can have three speeds: slow, medium and fast and is adapted to impart these speeds to the whisk. The whisk will therefore also have slow, medium and fast speeds. The slow setting produces more milk than froth, the medium setting produces substantially equal amounts of froth and milk and the fast setting produces more froth than milk.

Caffe latte or hot chocolate will typically require mostly milk with a little froth (i.e. slow setting); cappuccino requires 1/3 coffee, 1/3 milk and 1/3 froth (i.e. medium setting) and noisette requires only froth with the espresso coffee (i.e. fast setting).

In a further embodiment, the motor is provided with an auto-pulse cycle so that the on/off cycle is modified to create the required differential in froth. In this case, the "slow setting" will have fewer cycles than the "medium setting", which in turn has

fewer than the "fast setting". It would also be possible to use both an auto-pulse cycle and differential speed settings. One attraction of the auto-pulse cycle is that the mixing volume in the inner chamber is increased as a vortex does not fully form.

Furthermore the shape of the milk container does not necessarily have to be round as a more beak shape will also assist in mixing with or without the need of the side fins and make pouring easier.

Figure 3 shows a tool adapted to hold the three whisks shown in Figures 2a to 2c. Experience has shown that consumers often lose multiple attachments. The tool comprises an arcuate ribbon 30 having a centrally located circular opening 31 adapted to fit over the spindle of the drive means. An upstanding peg 32, 33 is located at each end of the ribbon, with the peg being dimensioned so that the whisks can sit securely on the pegs. In the storage position, the ribbon will sit on top of the whisk mounted on the spindle but when the frother is in use, the ribbon can sit on the worktop. In this manner the whisk attachments can be safely stored such that they are unlikely to be lost.

Claims

1. A milk frother comprising a chamber for receiving milk or a milk based liquid, drive means adapted to drive a whisk, which whisk is adapted to rotate in the milk or milk based liquid to mix the milk or milk based liquid and to produce foam, the frother further comprising heating means adapted to heat the milk or milk based liquid, wherein the frother is provided with an electronic control unit adapted to independently control the drive means and the heating means such that the heating means can be switched off a predetermined time before the drive means.

2. A milk frother according to Claim 1, wherein an inner surface of the chamber is provided with a fin, which fin is adapted to disrupt co-axial circulation of the milk or milk based liquid.

3. A milk frother according to Claim 1 or Claim 2, wherein the chamber is provided with one or more fins adapted to cause the milk or milk based liquid to fold in on itself.

4. A milk frother according to any one of Claims 1 to 3, wherein the frother is provided with an interlock to ensure that it only operates when the lid is in the closed position.

5. A milk frother according to any one of Claims 2 to 4, wherein the fin is located towards the upper part of the chamber and is spatially separated from the bottom of the chamber.

6. A milk frother according to any one of Claims 2 to 5, wherein the fin is angled from the top to the bottom.

7. A milk frother according to any one of Claims 1 to 6, wherein there is provided a stirrer for a frother, which stirrer is provided with an annular winding having a plurality of loops around its circumference, wherein the annular winding is wound such that each loop of the winding is located at a distance of between 3.5 to 15% of the diameter of the annular winding from the equivalent point on the winding of the adjacent loop.

8. A milk frother according to Claim 7, wherein the loops are located at a distance of 5-9% from the equivalent point on the winding of the adjacent loops.

9. A milk frother according to Claim 7, wherein the loops are located at a distance of 7.5% from the equivalent point on the winding of the adjacent loops.

10. A milk frother according to any one of Claims 1 to 9, wherein predetermined time in dependence on the dimensions of the tank, the speed of the stirrer and the desired temperature of the milk.

11. A milk frother according to any one of Claims 1 to 10, wherein the predetermined time is approximately 10s.

12. A milk frother substantially as describe herein, with reference to and as illustrated in, the accompanying drawings.

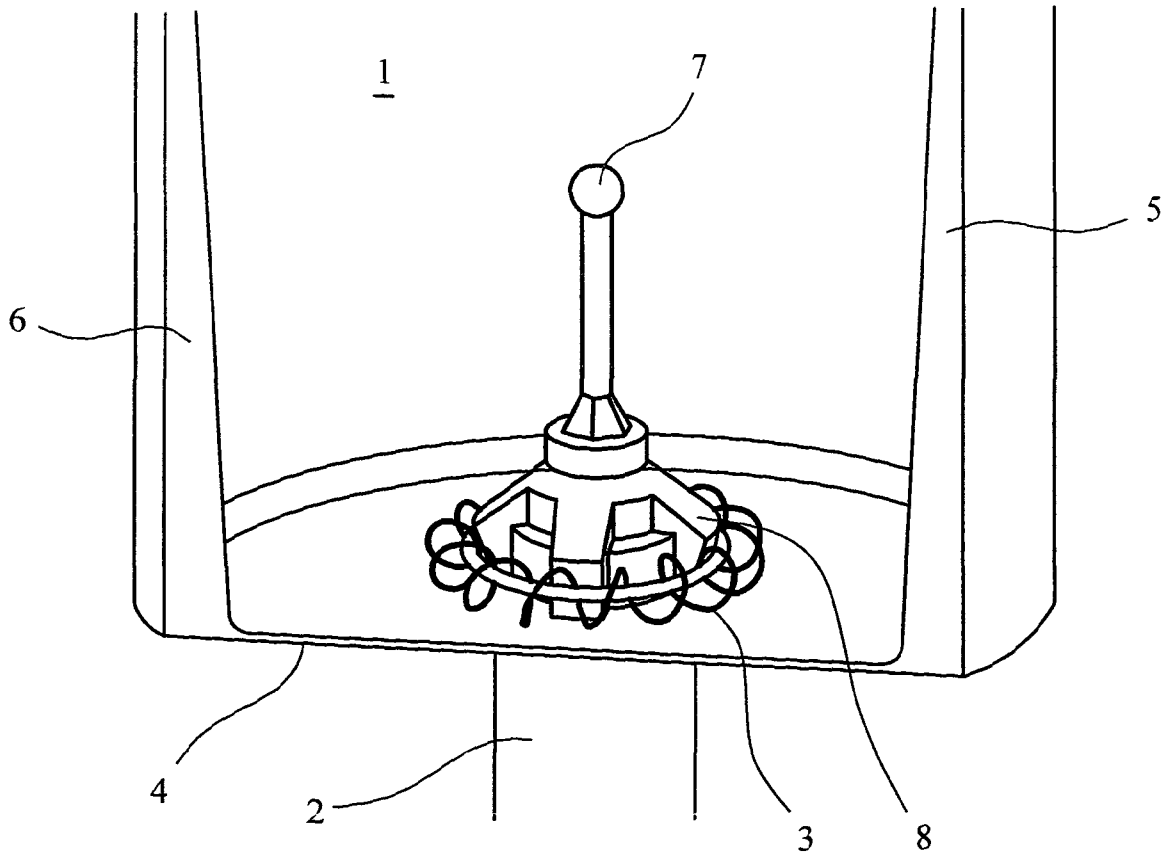

FIG. 1

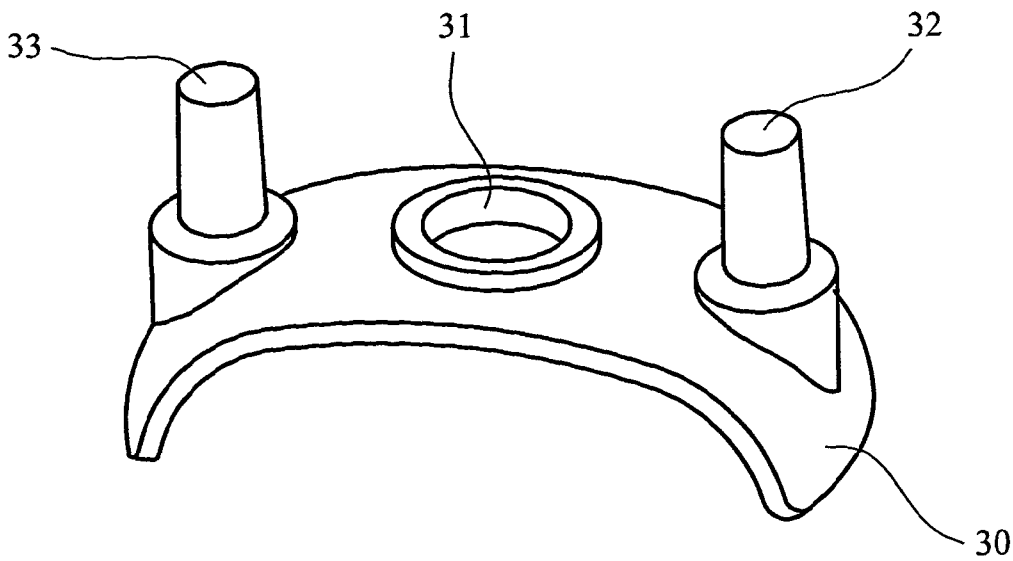

FIG. 3

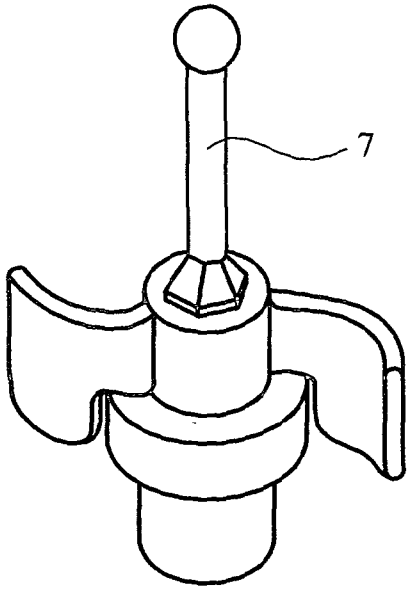

FIG. 2a

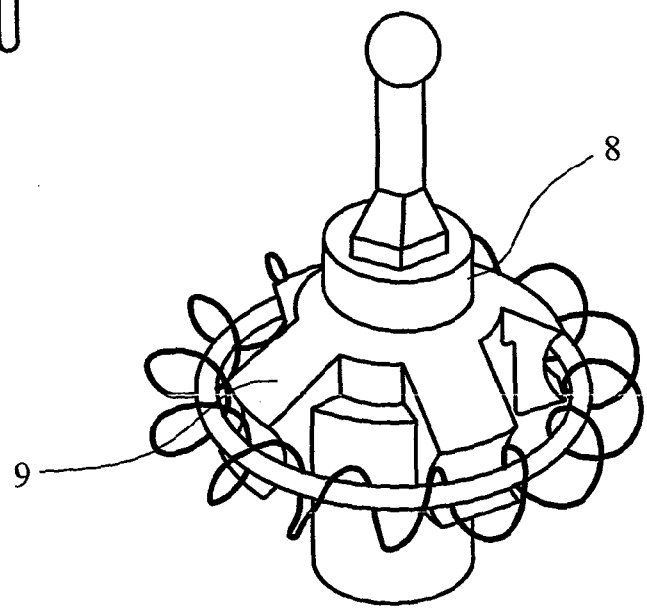

FIG. 2b

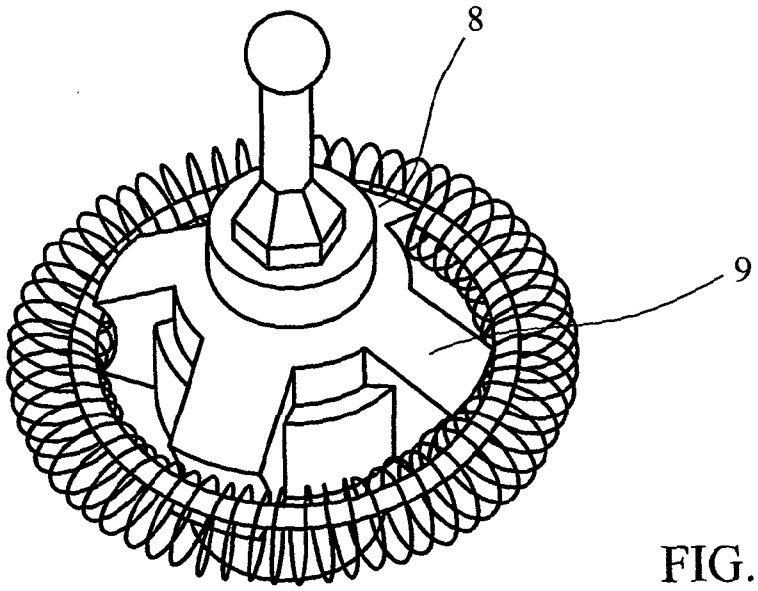

FIG. 2c

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2011/001698

A. CLASSIFICATION OF SUBJECT MATTER
INV. A47J43/046
ADD.

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)
A47J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2008/142154 A1 (NESTEC SA [CH]; KRAEUCHI FRANK [CH]; HELF GERD [DE]; BECKER DIETMAR [D]) 27 November 2008 (2008-11-27)	1,7-12
Y	abstract; figure 1 page 14, line 13 - line 20 page 24, line 27 - line 38	2-6
Y	US 5 323 973 A (FERRARA JR DANIEL A [US]) 28 June 1994 (1994-06-28) abstract; figures 6,8 column 1, line 50 - column 1, line 55 column 2, line 50 - line 54 column 1, line 67 - column 2, line 2 column 3, line 23 - column 3, line 29	2-6

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

[X] See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 February 2012	05/03/2012

Name and mailing address of the ISA/	Authorized officer
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INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2011/001698

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2 284 155 A (LANDGRAF MYRON J) 26 May 1942 (1942-05-26) figures 1,4,6 page 1, line 40 - page 1, line 50 -----	1-12
A	EP 2 130 470 A1 (SEB SA [FR]) 9 December 2009 (2009-12-09) figure 3 -----	2,3,5,6

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/GB2011/001698

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2008142154 A1	27-11-2008	AU 2008252932 A1	27-11-2008
		CA 2686464 A1	27-11-2008
		CN 101686766 A	31-03-2010
		EP 2152127 A1	17-02-2010
		EP 2174575 A1	14-04-2010
		EP 2174576 A1	14-04-2010
		JP 2010527671 A	19-08-2010
		KR 20100017155 A	16-02-2010
		US 2010192785 A1	05-08-2010
		WO 2008142154 A1	27-11-2008
US 5323973 A	28-06-1994	CA 2118980 A1	21-10-1994
		US 5323973 A	28-06-1994
US 2284155 A	26-05-1942	NONE	
EP 2130470 A1	09-12-2009	AT 510480 T	15-06-2011
		CN 201617715 U	03-11-2010
		EP 2130470 A1	09-12-2009
		ES 2366998 T3	27-10-2011
		FR 2932077 A1	11-12-2009