**Title:** METHOD FOR COATING FOOD PRODUCTS WITH FLAVOURING

Foodstuffs flavouring apparatus comprises an inlet, a screw conveyor arranged to convey flavouring from the inlet to a rotor disposed in a cylindrical chamber parallel to the axis of the screw conveyor, the rotor including one or more blades extending towards the wall of the chamber and the chamber including one or more apertures through which powdered flavouring carried to the chamber from the inlet by rotation of the screw conveyor is ejected in use of the apparatus. An electrostatic charging head located adjacent the outlet ensures adhesion of the flavouring to the foodstuff.
FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>AT</td>
<td>Austria</td>
<td>FI</td>
<td>Finland</td>
<td>MN</td>
<td>Mongolia</td>
</tr>
<tr>
<td>AU</td>
<td>Australia</td>
<td>FR</td>
<td>France</td>
<td>MR</td>
<td>Mauritania</td>
</tr>
<tr>
<td>BB</td>
<td>Barbados</td>
<td>GA</td>
<td>Gabon</td>
<td>MW</td>
<td>Malawi</td>
</tr>
<tr>
<td>BE</td>
<td>Belgium</td>
<td>GB</td>
<td>United Kingdom</td>
<td>NL</td>
<td>Netherlands</td>
</tr>
<tr>
<td>BF</td>
<td>Burkina Faso</td>
<td>GN</td>
<td>Guinea</td>
<td>NO</td>
<td>Norway</td>
</tr>
<tr>
<td>BG</td>
<td>Bulgaria</td>
<td>GR</td>
<td>Greece</td>
<td>NZ</td>
<td>New Zealand</td>
</tr>
<tr>
<td>BI</td>
<td>Benin</td>
<td>HU</td>
<td>Hungary</td>
<td>PL</td>
<td>Poland</td>
</tr>
<tr>
<td>BR</td>
<td>Brazil</td>
<td>IE</td>
<td>Ireland</td>
<td>PT</td>
<td>Portugal</td>
</tr>
<tr>
<td>CA</td>
<td>Canada</td>
<td>IT</td>
<td>Italy</td>
<td>RO</td>
<td>Romania</td>
</tr>
<tr>
<td>CF</td>
<td>Central African Republic</td>
<td>JP</td>
<td>Japan</td>
<td>RU</td>
<td>Russian Federation</td>
</tr>
<tr>
<td>CG</td>
<td>Congo</td>
<td>KP</td>
<td>Democratic People's Republic of Korea</td>
<td>SD</td>
<td>Sudan</td>
</tr>
<tr>
<td>CH</td>
<td>Switzerland</td>
<td>KR</td>
<td>Republic of Korea</td>
<td>SE</td>
<td>Sweden</td>
</tr>
<tr>
<td>CI</td>
<td>Côte d'Ivoire</td>
<td>LI</td>
<td>Lichtenstein</td>
<td>SK</td>
<td>Slovak Republic</td>
</tr>
<tr>
<td>CM</td>
<td>Cameroon</td>
<td>LK</td>
<td>Sri Lanka</td>
<td>SN</td>
<td>Senegal</td>
</tr>
<tr>
<td>CS</td>
<td>Czechoslovakia</td>
<td>LU</td>
<td>Luxembourg</td>
<td>SU</td>
<td>Soviet Union</td>
</tr>
<tr>
<td>CZ</td>
<td>Czech Republic</td>
<td>MC</td>
<td>Monaco</td>
<td>TD</td>
<td>Chad</td>
</tr>
<tr>
<td>DE</td>
<td>Germany</td>
<td>MG</td>
<td>Madagascar</td>
<td>TG</td>
<td>Togo</td>
</tr>
<tr>
<td>DK</td>
<td>Denmark</td>
<td>ML</td>
<td>Mali</td>
<td>UA</td>
<td>Ukraine</td>
</tr>
<tr>
<td>ES</td>
<td>Spain</td>
<td></td>
<td></td>
<td>US</td>
<td>United States of America</td>
</tr>
</tbody>
</table>
METHOD FOR COATING FOOD PRODUCTS WITH FLAVOURING

This invention relates to a method of flavouring food products. The invention also relates to apparatus for use in performance of the method.

Snack foods and other food products are manufactured in enormous quantities. Flavouring compounds are usually provided in extremely concentrated form and require homogenous dilute application to avoid adverse consumer reaction. Conventional manufacturing processes have involved application of powdered flavouring using a screw conveyor or vibrating doctor. Such arrangements do not achieve homogenous distribution of the flavouring. It has often been necessary to dilute the flavouring with a carrier such as flour to reduce the incidence of agglomerations. Adherence of the flavouring whether or not in the presence of a carrier, to the foodstuff is poor. Deposits of concentrated flavouring accumulate on the apparatus and must be removed regularly. This is both wasteful and time consuming.

The problem of poor adhesion is particularly significant in automatic weighing machines which are used for packaging snack foods and like products. These machines which operate at high speeds become inaccurate when deposits of flavouring occur. It has been necessary to stop production so that weighing machines can be cleaned manually on an hourly basis. Furthermore the powdered flavouring has been found to occlude the seals of bags into which the products are placed. This reduces shelf life. Moreover the powdered flavouring forms airborne dust which contaminates adjacent apparatus and is unpleasant for personnel.

Electrostatic powder deposition apparatus is well established, for example for polymer coatings. Despite the problems mentioned above, electrostatic flavouring applicators have not generally been used. Previous proposals have involved use of an airborne flow of charged flavouring. This has the drawback of increasing airborne contamination in the vicinity of the apparatus, particularly when applied to hot foodstuffs, for example when freshly emergent from a fire when convection currents may occur.
According to a first aspect of the present invention a foodstuffs flavouring dispenser comprises an inlet, a screw conveyor arranged to convey flavouring from the inlet to a rotor disposed in a cylindrical chamber parallel to the axis of the screw conveyor, the rotor including one or more blades extending towards the wall of the chamber, the chamber including one or more apertures through which powdered flavouring carried to the chamber from the inlet by rotation of the screw conveyor is ejected in use of the dispenser by rotation of the rotor.

According to a second aspect of the present invention a method of flavouring a food product comprises the steps of introducing a powdered flavouring to a dispenser including an inlet, a screw conveyor, a rotor disposed in a cylindrical chamber having an axis parallel to the axis of the screw conveyor, the rotor including one or more blades extending towards the wall of the chamber, the chamber including one or more apertures through which powdered flavouring carried to the chamber from the inlet by the screw conveyor is ejected by rotation of the rotor, allowing the flavouring to pass from the said apertures adjacent an electrostatic charging head to induce an electric charge thereon, and allowing the charged flavouring to contact the food product.

The cylindrical chamber may be coaxial with the screw conveyor. Alternatively the outlet of the conveyor may include an axially extending aperture remote from the inlet, the chamber being disposed in parallel juxtaposition to the aperture, the chamber having an outlet arranged so that powdered flavouring passing from the aperture is ejected from the outlet by rotation of the rotor. The rotor may be coupled to the screw conveyor and arranged to be driven by rotation of the conveyor.

In a preferred embodiment, particularly wherein the chamber is coaxial with the conveyor, the rotor may be integral with the screw conveyor. Alternatively the rotor may be engaged to the conveyor by a linkage such as a chain, intermeshing gears or a friction drive, for example a belt.
Alternatively the rotor may be driven independently for example by an air motor or other motor.

In a further preferred embodiment a plurality of rotors may be provided, a first rotor being integral with the screw conveyor and a second rotor being disposed below and in parallel juxtaposition to the first rotor. The first rotor serves to distribute flavouring to the second rotor and the latter can run at a higher speed to ensure efficient distribution of the flavouring. The second rotor may be disposed in a casing having inlet and outlet apertures. Alternatively the second rotor may be free standing, that is without any casing. One or more further second rotors may be provided as convenient.

The rotor may preferably include 2 to 6 radially extending blades, more preferably 3 such blades. The blades may be laminar, extending axially of the rotor. Alternatively the blades may be curved or arranged in parallel arrays in a herringbone configuration. The blades are preferably parallel.

Preferred apparatus further comprises an electrostatic charging head. Preferably there is also provided means for providing a predetermined supply of powdered flavouring to said inlet.

In embodiments wherein the screw and rotor are coaxial the rotor is preferably integral with the screw conveyor. Rotation of the rotor and screw conveyor is preferably arranged so that rotation of the paddle ejects powder at a velocity sufficient to cause it to pass through the electrostatic field.

The rotor may be arranged to be driven at the same speed as the screw conveyor but is preferably driven at a higher speed to ensure efficient dispersal of the flavouring into the electrostatic field. A lower rotational speed for the screw conveyor is preferred to reduce degradation or caramelization of the flavouring due to heating of the screw conveyor.

Location of the rotor alongside the downstream end of the screw conveyor has advantages that the length of the apparatus is minimised. Powdered flavouring is discharged from the screw conveyor along the full length of the rotor and the rotational
speed of the rotor relative to the screw conveyor may be adjusted as desired.

Use of the method and apparatus of this invention confers many advantages. Use of electrostatic deposition enhances the application of the flavouring to the food product. No airborne flow of flavouring is created. The application of charge to the powdered flavouring has the advantage that any flavouring which becomes dislodged from the food product or which is not securely attached to it retains its charge and can be picked up by contact with further food product.

The food products may be disposed or arranged to pass through in an inclined rotating drum so that they tumble past the supply of charged flavouring.

Rotation of the rotor at high speed, for example 300 to 1750 rpm allows the dispenser to be controlled to accurately respond to any variation in the volume or amount of material applied at the inlet.

The outlet from the chamber may comprise a multiplicity of slots which may have the same or different dimensions as convenient.

The invention finds particular application in "on machine flavouring". "On machine flavouring" in contrast to "on line flavouring" refers to application of the flavouring to the product using apparatus attached directly to the weighing apparatus. This greatly facilitates commercial production of food products. Use of the apparatus in accordance with this invention can result in a 20% saving of flavouring material and can overcome any necessity to stop production hourly to clean the automatic weighing machine.

The invention may further provide foodstuff flavouring apparatus comprising a vessel through which foodstuff can pass during manufacture, an electrostatic charging head disposed in said vessel and a dispenser in accordance with a preceding aspect of this invention arranged so that flavouring ejected from said outlet passes adjacent the electrostatic charging head to induce an electrostatic charge thereon. The vessel may comprise a drum or other chamber, for example including an
endless belt.

Preferred apparatus comprises a flavouring drum wherein flavouring is applied to a foodstuff; a detector arranged to generate a signal indicative of the amount of foodstuff passing through the drum in use; a feeder responsive to said signal adapted to release a controlled amount of flavouring to the screw conveyor of the dispenser to apply flavouring to the foodstuff in the drum to provide a flavoured foodstuff incorporating a predetermined amount of flavouring. The detector may comprise a weighing cell, mass flow monitoring system, optical imaging system or other detector known to those skilled in the art.

The drum is preferably arranged to rotate in use. In preferred embodiments of the invention the chamber of the dispenser is adjustable so that the angular disposition of the outlet relative to the drum may be controlled. This allows the flavouring ejected from the dispenser to be directed towards the foodstuff bed within the drum, minimising wastage.

The apparatus provides a controllable system which is responsive to variations in the amount and composition of the foodstuff. For example in preparation of potato chips the moisture content of the potatoes employed may vary. When they are fried the moisture is replaced with oil so that the oil levels in the product resultant from the frier may vary. In practice the frying time may be varied to compensate for oil variation. This results in variation in product through-put. The present invention can accommodate such variations maintaining a consistent level of application of flavouring. A rapid response to any variation in product through-put is important. In preferred embodiments of the invention the velocity of the screw conveyor is constant and is maintained to afford a high through-put. The delivery of flavouring from the feeder can then be modulated to control the amount of flavouring applied.

The invention is further described by means of example but not in any limitative sense with reference to the accompanying drawings, of which:
Figure 1 is a cross sectional view of a dispenser in accordance with this invention.

Figure 2 is an end elevation of a rotor for use in the apparatus as shown in Figure 1;

Figure 3 is a side elevation of a typical snack foods production line incorporating apparatus in accordance with this invention; and

Figure 4 is a cross sectional view of an alternative dispenser.

The apparatus in Figure 1 comprises a cylindrical barrel 1 containing a screw conveyor 2 mounted on the shaft 3. A rotor 5 coaxial with and integrally connected to the screw conveyor 2 is contained within a cylindrical chamber 4 and is sealed to the barrel 1 by means of an adjustable flange 13. The flange allows the orientation of the aperture to be adjusted without rotation of the whole dispenser so that the direction of the flow of flavouring may be controlled to omit variations in operating conditions. The rotor 5 incorporates three radially extending paddles which are directed towards the wall of the chamber 4 and preferably brush against it as the rotor is turned. An outlet defined by an axial slot 12 or alternatively an array of slots arranged in axially spaced relation along one side of the chamber 12, is directed towards one or more electrostatic charging heads 7 arranged to generate an electric field 11. A motor 6 having a dynamic brake is mounted on a support 10 to cause rotation of the shaft 3, conveyor 2 and rotor 5. Food products 9 disposed within a rotating drum or carried on a conveyor 8 are located beyond the charging region 11 so that charged flavouring falls onto the products 9. In alternative embodiments of the invention a plurality of slots may extend axially along the wall of the chamber. The slot or slots may have parallel sides providing a constant width. In a further embodiment the sides of a slot or slots may diverge in a direction away from the screw feed to facilitate even spatial distribution of flavouring into the electrostatic field.

Powdered flavouring applied to the inlet of the screw
conveyor 14, for example from a conventional flavouring metering apparatus (not shown) is carried by rotation of the screw conveyor 2 to the chamber 4. Rotation of the rotor 5 causes the flavouring material to be ejected from the slots 12, through the electrostatic charging region 11 and onto the food product 9.

The electrostatic charging head 7 preferably includes an integral power supply. This serves to avoid a necessity for HT lines external of the apparatus. Conventional HT lines employ aqueous copper sulphate containing conductors. These afford a toxicity hazard when cut and there is a risk of the conductor freezing in cold conditions. The present invention allows use of a 24 volt or other low voltage supply.

In preferred embodiments of the invention the chamber 4 may be rotatable to allow the slots to be positioned to compensate for changes in the location of the product bed caused by variations in the speed and direction of rotation of either the rotor 5 or of the flavouring drum (now shown). When the drum rotates the position of the bed of foodstuff it varies dependent on the rate of rotation, direction of rotation, size and weight of the foodstuff. Adjustment of the direction of ejection of the flavouring from the dispenser minimises wastage.

Figure 2 is an end elevation showing the construction of a preferred rotor which comprises a body 21 and three radial projections 22 disposed on a shaft 20.

The screw conveyor 2 and barrel 1 may be composed of stainless steel or like metal although the chamber 4 and rotor 5 are preferably composed of insulating plastic material, for example acetyl resin.

Charging head 7 may be arranged to charge at any convenient voltage, for example 90 KVA negative charge, the product being at earth potential.

The conveyor 8 may comprise a tumble drum arranged to deliver the product to a dedicated, integral weigh head for dispensing precise quantities to a bag forming apparatus.

The screw conveyor and rotor may be driven by a motor
attached to the shaft 3 either directly or using a toothed belt or other coupling. The motor having a dynamic brake to prevent overrun is preferred. This allows the apparatus to be precisely controlled to regulate the quantity of flavouring applied to the food product.

Figure 3 illustrates a typical snack food production line incorporating an electrostatic dispenser in accordance with the present invention. A supply of food products from an infeed conveyor or chute 36 leads to a flavour drum 33. The drum 33 is arranged to rotate to cause mixing of the flavouring and food product. A bucket elevator 32 carries the flavoured food product to a weighing machine 31 and bag maker 30. An electrostatic dispenser 35 in accordance with the embodiment described with reference to Figure 1, supplied by a volumetric feeder 34, incorporates a plurality of outlet slots 37 through which powdered flavouring is released to an electrostatic head (not shown) within the drum 33. The electrostatic dispenser is conveniently inserted into the drum above the food product.

The arrangement confers several advantages over prior art arrangements. Flavouring is usually added to the food product as a percentage of the weight of the latter. The rate of feed of the flavouring into the drum 33 is controlled to take account of variations in the quantity of the food product. The weight of food product is usually measured by means of a weighing cell (not shown) situated immediately prior to the flavouring drum, or by use of a mass flow monitoring system on the infeed conveyor or infeed chute. The rate of supply of a volumetric feeder 34 is preferably dependent on signals from the weighing cell indicative of the weight of unflavoured product supplied to the drum.

As an alternative to using a weighing cell or mass flow monitoring system, an on line full colour optical image and sorting process system may be installed immediately after the flavour drum. In this case by optically scanning the flavoured product and detecting colour variation a signal is sent to the volumetric feeder 34 to vary the rate at which the flavouring is dispensed to the electrostatic applicator. The
optical equipment should be preset to given shade parameters to directly reflect the required flavour level. Should any of the flavoured product deviate from the specification an automatic defect removal unit would reject the product thus enhancing overall quality of the flavoured products.

The screw of the flavouring dispenser preferably runs at a constant high speed so that it may cope with any rate of flavouring material supplied to it. The flavouring material is dispensed rapidly by the screw feed and is arranged to arrive within the drum 33 simultaneously with the arrival of the food product from the weighing cell. Accurate levels of supply of the flavouring and uniform dispersion of it without formation of flavour agglomerates are achieved. Adhesion of the flavouring to the foodstuff is enhanced reducing the incidence of formation of deposits on the weighing machine and fouling of the bags formed by the bag maker 30.

Figure 4 is a cross sectional view of alternative apparatus in accordance with this invention. A barrel 40 carries a screw conveyor 47 mounted on a rotatable shaft. A first rotor 41 integral with the screw conveyor delivers flavouring through an axially extending aperture 45 to a second, lower rotor 43. A second rotor 43 mounted on an axle 44 is arranged for rotation parallel to the first rotor 41 adjacent the downstream end of the screw 47. Gears disposed on the axles 41, 44 respectively drive the rotor 43 as the screw 47 turns. The relative speed of the rotor 43 may be adjusted by selection of appropriately sized gears. Casing 46 which is optional, has inlet and outlet apertures to allow the flow of flavouring to be directed toward the foodstuff. Flavouring passing from the aperture 45 at the end of the screw 47 falls into the inlet 46 of the cylinder chamber 42. The rotor 43 causes the flavouring to be ejected by rotation of the rotor into the vicinity of the charging head as described with reference to Figure 1.

In use of the apparatus flavouring carried by the screw 41 falls from the end of the screw 41 onto the rotor 46 and is expelled through the aperture 47 into the vicinity of the
electrostatic charging head.

The apparatus may be used for application of a wide variety of flavourings onto various foodstuffs. Flavourings may include vitamins or salt and other nutrients. Foodstuffs may be for human or animal consumption. Coatings may be applied during manufacture of battered or breadcrumb products. This avoids the need for impregnation of batter or breadcrumb coatings before frying with resultant contamination to the frying oils.
CLAIMS

1. A foodstuffs flavouring dispenser comprising an inlet, a screw conveyor arranged to convey flavouring from the inlet to a rotor disposed in a cylindrical chamber parallel to the axis of the screw conveyor, the rotor including one or more blades extending towards the wall of the chamber, the chamber including one or more apertures through which powdered flavouring carried to the chamber from the inlet by rotation of the screw conveyor is ejected in use of the dispenser by rotation of the rotor.

2. A dispenser as claimed in claim 1 wherein the cylindrical chamber is coaxial with the screw conveyor.

3. A dispenser as claimed in claim 1 wherein the outlet of the conveyor includes an axially extending aperture remote from the inlet, the chamber being disposed in parallel juxtaposition to the aperture, the chamber having an outlet arranged so that powdered flavouring passing from the aperture is ejected from the outlet by rotation of the rotor.

4. A dispenser as claimed in any preceding claim wherein the rotor is coupled to the screw conveyor and arranged to be driven by rotation of said conveyor.

5. A dispenser as claimed in claim 4 wherein the rotor is integral with the screw conveyor.

6. A dispenser as claimed in claim 4 wherein the rotor is engaged to the conveyor by a chain, intermeshing gears or a friction drive.

7. A dispenser as claimed in any preceding claim wherein the rotor includes two to six radially extending blades.

8. A dispenser as claimed in any preceding claim wherein the angular orientation of the outlet is adjustable.

9. Foodstuff flavouring apparatus comprising a vessel through which foodstuff can pass during manufacture, an electrostatic charging head disposed in said vessel and a dispenser as claimed in any preceding claim arranged so that flavouring ejected from said outlet passes adjacent the
electrostatic charging head to induce an electrostatic charge thereon.

10. Foodstuff flavouring apparatus as claimed in claim 9 comprising:
   a flavouring drum wherein flavouring is applied to a foodstuff;
   a detector adapted to generate a signal indicative of the amount of foodstuff passing through the drum in use;
   a feeder responsive to said signal adapted to release a controlled amount of flavouring to the screw conveyor of said dispenser to apply flavouring to the foodstuff in the drum to provide a flavoured foodstuff incorporating a predetermined amount of flavouring.

11. Apparatus as claimed in claim 10 wherein the detector is selected from: a weighing cell, a mass flow monitoring system or an optical imaging system.

12. Apparatus as claimed in any of claims 10 or 11 wherein the drum is arranged to rotate in use, the chamber of the dispenser being adjustable so that the angular disposition of the outlet relative to the drum may be controlled.

13. Apparatus as claimed in any of claims 10 to 12 wherein the velocity of passage of flavouring through the conveyor in use is greater than the velocity of release of flavouring from the feeder.

14. A method of flavouring a food product comprising the steps of:
   introducing a powdered flavouring to a dispenser including an inlet, a screw conveyor and a rotor disposed in a cylindrical chamber parallel to the axis of the screw conveyor, the conveyor being arranged to convey flavouring from the inlet to the rotor, the rotor including one or more blades extending towards the wall of the chamber, the chamber including one or more apertures through which powdered flavouring carried to the chamber by the screw conveyor is ejected by rotation of the rotor;
   allowing the flavouring to pass from said apertures adjacent an electrostatic charging head to induce an electric
charge thereon; and allowing the charged flavouring to contact the food product.
**INTERNATIONAL SEARCH REPORT**

**Classification of Subject Matter**
(if several classification symbols apply, indicate all)

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 A23P1/08; A21C9/04; B05B13/02; B05B5/08

**FIELDS SEARCHED**

<table>
<thead>
<tr>
<th>Classification System</th>
<th>Classification Symbols</th>
</tr>
</thead>
<tbody>
<tr>
<td>Int.Cl. 5</td>
<td>A23P; A21C; B05B</td>
</tr>
</tbody>
</table>

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

**DOCUMENTS CONSIDERED TO BE RELEVANT**

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of Document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to Claim</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>NL,A,7 206 892 (KOPPENS MACHINEFABRIEK N.V.) 27 November 1973</td>
<td>1-5,7</td>
</tr>
<tr>
<td>Y</td>
<td>see figure 3</td>
<td>9,14</td>
</tr>
<tr>
<td>Y</td>
<td>see page 3, paragraph 4 - page 4, paragraph 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DE,A,1 454 204 (VEB MASCHINEN- UND APPARATEBAU STRALSUND) 6 March 1969</td>
<td>9,14</td>
</tr>
<tr>
<td></td>
<td>see claim 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>see figure 1</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>US,A,4 614 162 (P.J. RYAN) 30 September 1986</td>
<td>10,11</td>
</tr>
<tr>
<td></td>
<td>see claims 1,5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>see figures 1-10</td>
<td></td>
</tr>
</tbody>
</table>

**Certification**

Date of the Actual Completion of the International Search: 18 SEPTEMBER 1992

Date of Mailing of this International Search Report: 30. 09. 92

International Searching Authority: EUROPEAN PATENT OFFICE

Signature of Authorized Officer: VUILAMY V. M. L.
ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. GB 9201420
SA 62813

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDF file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information. 18/09/92

<table>
<thead>
<tr>
<th>Patent document cited in search report</th>
<th>Publication date</th>
<th>Patent family member(s)</th>
<th>Publication date</th>
</tr>
</thead>
<tbody>
<tr>
<td>NL-A-7206892</td>
<td>27-11-73</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>DE-A-1454204</td>
<td>06-03-69</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>US-A-4614162</td>
<td>30-09-86</td>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>

For more details about this annex: see Official Journal of the European Patent Office, No. 12/82