(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
15 January 2009 (15.01.2009)

PCT

(10) International Publication Number
WO 2009/009670 A4

(51) International Patent Classification:
C12N 7/00 (2006.01) *A61K 39/12* (2006.01)

(21) International Application Number:
PCT/US2008/069660

(22) International Filing Date: 10 July 2008 (10.07.2008)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/948,982 10 July 2007 (10.07.2007) US

(71) Applicant *(for all designated States except US)*: **SANOFI-PASTEUR, INC.** [US/US]; One Discovery Drive, Swiftwater, PA 18370 (US).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **CANTINEAU, Paul** [FR/FR]; 35 Domaine De Lile Au Moulin Avenue, Des Anciens Combattants D'Afrique Du Nord, F-27100 Le Vaudreuil (FR).

(74) Agent: **HECHT, Gary, A.**; Fox Rothschild LLP, 2000 Market Street, Philadelphia, PA 19103 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:
— *of inventorship (Rule 4.17(iv))*

Published:
— *with international search report*
— *with amended claims*

(88) Date of publication of the international search report:
12 March 2009

Date of publication of the amended claims: 4 June 2009

(54) Title: APPARATUS AND METHOD FOR HARVESTING BIOLOGICS FROM EGGS

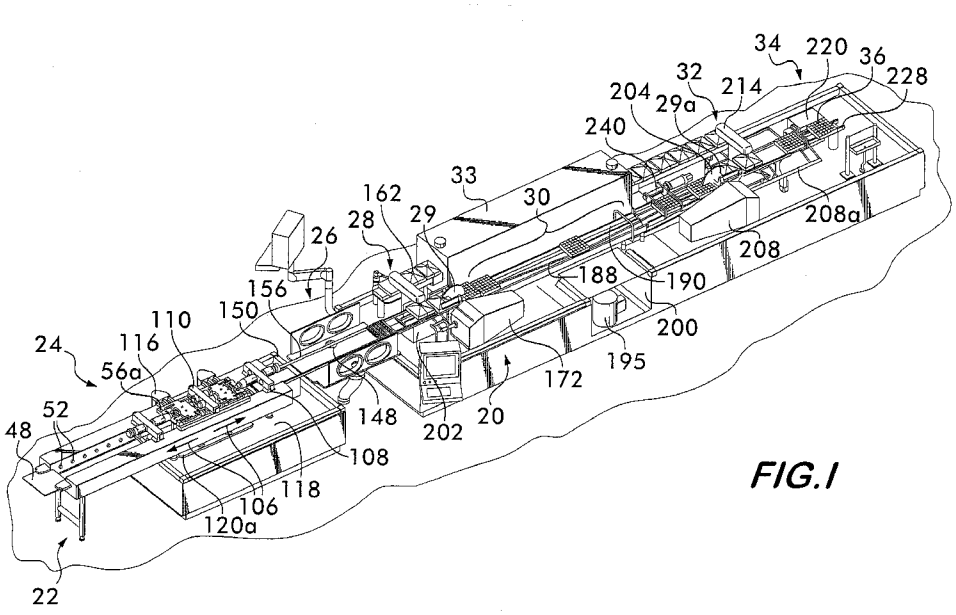

FIG.1

(57) Abstract: A method for harvesting biologies from eggs by which an egg is de-capped by positioning the egg in a reference opening so as to expose an upper section of the egg, then, while said egg is positioned within the reference opening, cutting the upper section of the egg by moving a cutter member over the reference opening through the egg, and then removing the debris formed from the cut upper section. The biologies can then be harvested in various ways such as by inverting the egg to allow the biologies to drain for collection. An apparatus for carrying out the method is also provided.

WO 2009/009670 A4

AMENDED CLAIMS
Received by the International Bureau on 27 March 2009 (27.03.2009)

1. A method for opening an egg; comprising:

(a) positioning the egg in a reference opening so as to expose a section of egg to be opened;

(b) while said egg is positioned within said reference opening, creating an opening in said exposed section of egg by moving a cutter member over said reference opening into said egg; and

(c) removing egg debris formed when opening said egg.

2. A method of opening an egg in accordance with claim 1 wherein step (c) is carried out by moving a cleaning member to push said egg debris towards a disposal opening.

3. A method of opening an egg in accordance with claim 1 or 2 wherein step (a) is carried out with use of a reference plate having said reference opening formed therein, said reference opening being configured to expose a predetermined approximate amount of said egg to be removed above said plate when said egg is within said reference opening.

4. A method of opening an egg in accordance with claim 3 wherein the cutter member of step (b) comprises a blade moveable over said reference opening into said egg.

5. A method of opening an egg in accordance with claim 4 wherein said blade is attached to a cutter plate, said cutter plate being moveable relative to said reference opening.

6. A method of opening an egg in accordance with claim 3 wherein step (c) is carried out by moving a cleaning member to push said debris towards a disposal opening formed in said reference plate.

7. A method of opening an egg in accordance with claim 1 wherein:

(a) said reference opening is formed in a reference plate;

(b) said step of creating an opening in said egg is carried out by moving a blade above said reference opening into said egg; and

(c) the step of removing said egg debris is carried out by moving a cleaning member to move said debris towards a debris removal opening adjacent to said reference opening in said reference plate.

8. A method of opening an egg in accordance with claim 7, further comprising the steps of:

lifting said egg from a tray and into said reference opening in said reference plate; and

lowering the opened egg back into said tray after said egg has been opened.

9. A method of colleting fluid from an egg in accordance with claim 8, further comprising the steps of:

inverting said tray so as to invert said opened egg in said tray and thereby position the opening in the egg to face downward so that said fluid can drain; and collecting said drained fluid.

10. A method of collecting fluid from an egg in accordance with any one of claims 1, 2, 7, 8 or 9, wherein step (a) comprises: accordance with any one of claims 1 to 9, wherein step (a) comprises

(a)(1) lifting said egg towards said reference opening with an arm that engages the bottom of said egg and moves said egg upwardly;

(a)(2) after step (a)(1), reversing the movement of said arm before said egg is lifted into said reference opening, said reversing movement being sufficient to unweight said egg and allow it to realign itself via gravity;

(a)(3) after step (a)(2), lifting said egg into said reference opening for the step of creating an opening in said egg.

11. The method of collecting fluid in accordance with claim 9 further comprising the step of perforating an allantoic membrane in said egg prior to the step of collecting said drained fluid.

12. A method of collecting fluids from eggs, comprising:

(a) providing multiple eggs;

(b) moving at least a portion of said multiple eggs upwardly into reference openings, each of said reference openings being configured to expose a predetermined approximate amount of egg to be removed for opening said eggs;

(c) moving a cutter member into said eggs to create openings in said eggs;

(d) inverting said opened eggs to allow said fluid from within said eggs to drain therefrom; and

(e) collecting said drained fluid.

13. The method of claim 12 further comprising:

removing egg debris created during said opening step.

14. The method of claim 12 or 13 further comprising:

providing a retaining member for each opened egg to retain embryos within said eggs when said eggs are inverted.

15. The method of claim 12 or 13 wherein:

step (a) includes providing said multiple eggs in a tray;

step (b) includes moving said portion of eggs from said tray to said reference openings;

step (d) includes the step of moving said opened eggs back to said tray; and

step (e) includes inverting said tray so as to invert said eggs therein.

16. The method of claim 12 or 13 further comprising:

after step (d), placing a drainage pan over said tray of eggs to form a tray/pan assembly, and

step (e) includes inverting said tray/pan assembly so that said fluids drain into said drainage pan.

17. The method of claim 15 wherein step (b) includes moving each of said eggs from said tray into said reference openings with arms, said arms moving from

underneath said tray upwardly and through said tray to obtain said eggs and move them into said reference openings.

18. The method of claim 12 or 13 further comprising the step of:
moving a wiper member to move said egg debris into a debris removal opening.

19. An apparatus for de-capping an egg, comprising:
a reference plate having at least one reference opening therethrough, said opening being configured for receiving said egg therein from a lower side of said plate and for stopping further upward movement of said egg within said opening when an upper egg section to be cut extends from said opening above said first plate;
a cutter member positioned above said reference plate, said cutter member being moveable across said reference opening so as to create an opening in said upper egg section; and
a cleaning member moveable above said reference plate for removing egg debris.

20. An apparatus for de-capping an egg in accordance with claim 19, wherein:
said reference plate includes a debris opening adjacent to said reference opening; and
said cleaning member is configured to move said egg debris towards said debris opening.

21. An apparatus for de-capping an egg in accordance with claim 19 or claim 20, wherein:
said cutter member includes at least one blade which is reciprocal between a precut position where said blade is adjacent to said reference opening, and a post cut position where said blade has moved over said reference opening to create said opening in said egg.

22. An apparatus for de-capping an egg in accordance with claim 19 or 20 further comprising a lifter arm positioned below said reference opening and configured for

holding an egg, said lifter arm being moveable to move an egg upward into said reference opening, and moveable downward to remove said egg from said reference opening.

23. An apparatus for de-capping an egg in accordance with claim 22 wherein said lifter arm is magnetically coupled to a coupler piston, said lifter arm moving in response to movement of said coupler piston.

24. An apparatus for collecting fluid from multiple eggs, comprising:
at least one de-cap apparatus in accordance with claim 19;
a invert unit for inverting said eggs to face downward to allow said fluid to drain therefrom;
a drainage trough for collecting draining fluids from said inverted eggs; and
a transport system for moving said multiple eggs from said de-cap station to said invert station and to said drainage trough.

25. The apparatus of claim 24 further comprising a tray for holding said multiple eggs, said tray being moveable through said apparatus via said transport system.

26. The apparatus of claim 25 further comprising a drainage pan configured to fit over said tray to form a tray/pan assembly, said pan having a drainage opening through which fluid can drain, and said invert unit being configured to invert said tray/pan assembly so as to invert the eggs therein.

27. The apparatus of claim 26 wherein said drainage pan includes retaining members configured to perforate an allantoic membrane within said eggs and positioned to hold embryos within said eggs when said eggs are inverted.

28. The apparatus of any one of claim 25 to 27 further comprising:
multiple egg lifter arms for moving said eggs from said tray to said de-cap apparatus, said arms being configured for holding the eggs and are attached to an actuator to move said arms between said tray and said de-cap apparatus; and a pick and place device for placing a drain pan on top of said tray to form a tray/pan unit.

29. An apparatus for collecting fluid from multiple eggs, comprising:

at least one de-cap apparatus in accordance with claim 19;

at least one tray configured for holding said multiple eggs therein;

lifting arms configured to hold said eggs, said arms being operable to lift said eggs from said tray and move them to said de-cap unit and then return said eggs to said tray;

a drainage pan configured to be combined with said tray to form a tray/pan assembly;

a invert unit for inverting said tray/pan assembly so that the openings of said eggs therein face downward to allow said fluid to drain therefrom;

a drainage trough for collecting draining fluids from said inverted eggs, said inverted tray/pan assembly being moveable over said trough; and

a transport system for moving said tray and tray/pan assembly through said apparatus.