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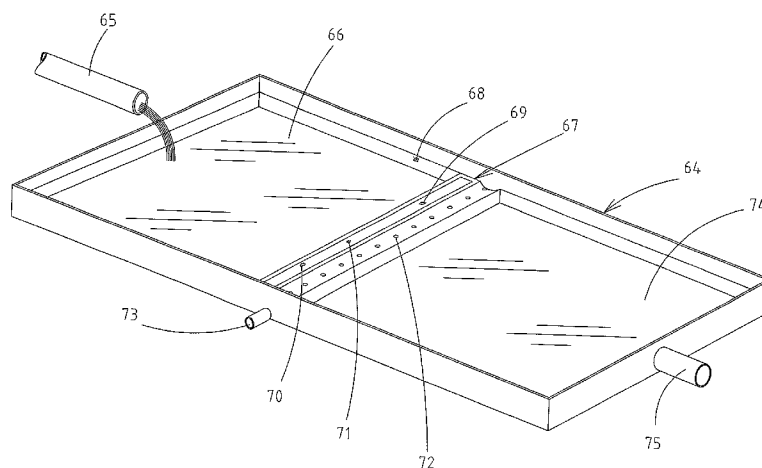
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(54) Title: SYSTEM FOR AUTOMATICALLY REMOVING SPOTS OF YOLK FROM THE ALBUMEN



(57) Abstract: This vision system, With a single camera it is possible to view the egg flow. The system is for automatically removing spots of yolk from the albumen. It Uses camera- based vision system and with the vacuum removes even the smallest spots of yolk present in the albumen. The albumen to be inspected arrives into the system, a wheeled inspected using camera vision system. The inspection is made on the central body of tank, and the separation plate has some holes in order to permit a correct aspiration of the yolk spot recognized by the camera vision system. The transparent pattern (28), by allowing the light produced by the lamp (36) to pass through it, illuminates the particles in transit, making them visible to the camera (22). An electrical command activates the electrovalve (53) and the yolk particle (61) is sucked up, passing through the series of holes (62) to the circular tube (54), kept under vacuum by the pump (24). In this way clean albumen is produced from the central suction tube (25) via the pump (23) and the albumen is sent via the delivery tube (63) to the collection place at the storage tanks.

INDUSTRIAL PATENT APPLICATION

Title of the invention: System for automatically removing spots of yolk from the albumen

A - DESCRIPTION

A1 - TECHNICAL FIELD

- (1) Egg breaking and separating machines may have scanners equipped with photocells and bulbs, fitted in pairs, which inspect the liquid in the relative egg white tray.

Sometimes it is a requirement to have clean egg white, without any traces of yolk.

- (5) In order to see whether these fragments of yolk are present, the photocells and the lamps are fitted close to the containers, which is why their lenses are prone to becoming dirty.

Other types of scanner are equipped with cameras that view the liquid of one or more than one container, and thus their lenses too may become dirty.

- (10) These devices are costly and difficult to manage and operate, they frequently require mechanical and electrical maintenance, such as cleaning their lenses, replacing bulbs, etc.

For safety reasons, the machines must be stopped while maintenance is carried out on them, and this means a considerable amount of lost production time.

- (15) Immediately after the stage of inspection performed by traditional "scanners", the albumen may be contaminated once again as a result of the yolk accidentally breaking after the inspection.

(1) Currently, in order to obtain albumen with minimal traces of yolk, a further inspection is carried out by conveying the albumen to be checked from one or several egg breaking units to a tank, where one or more operators check the albumen visually and remove any traces of yolk manually using a ladle or spoon.

(5) This is an exhausting task, as the operator must concentrate on the flow of liquid. Furthermore, the quality of the albumen obtained is not constant as it depends to a large degree on the operator's attention level. During this operation inexperience or inability on the part of the operator in removing yolk spots may lead to a significant quantity of albumen being eliminated. The subject of this application regards an

(10) inspection tank that is separate from the machine. It is easy to remove and move manually, as it is mounted on four wheels. In addition, it makes it possible to receive and check liquids from one or more machines.

The inspection system may be the only albumen inspection system on the egg breaker or may be used for an additional inspection for albumen from a machine fitted with a

(15) traditional vision-based system for checking the containers of liquid (or cups).

With a single camera it is possible to view the whole flow from a greater distance so in this way the lens does not become dirty.

The device under consideration in this patent application would make it possible to optimise and automate such an additional inspection of the albumen by reducing or

(20) eliminating human intervention and reducing the loss of clean albumen to a minimum.

A2 – BACKGROUND ART

(1) The device works as follows:

Figure 1 shows the egg breaker 10 and four tanks (11, 12, 13 and 14) for collecting discarded material, mixed material, albumen and yolk respectively. The albumen to be inspected arrives from the tank 13 via the tube 15 connected to it

(5) by means of the connector 16, and is let into the wheeled tank 17.

The separating plate 18 is positioned close to and firmly fixed to the centre of the tank. A bell 19 is positioned above this plate, and fixed to the tank by two supports 20 and 21. The camera 22 is situated above the bell, and inspects completely the plate 18 below it. The purpose of the bell is to direct the light from the lamp 36 fixed to the (10) plate 18 towards the camera (Fig. 2). Two pumps 23 and 24 are also connected to the tank 17, their purpose being, respectively, to draw the clean albumen through the tube 25 and the yolk separated from the albumen through the tube 26. The tank 17 can be moved easily from one machine to another as it is fitted with wheels 27.

The separation plate 18 is divided into two parts, as shown in Fig. 2: a central “body” (15) and an outer part 30. These are joined by a cover 31 and a series of screws 32-33.

The transparent piece 28 and the two seals are set between the two screws.

The extension of the cover 31 runs perimetrically (34) and in the opening 35 holds the ring-shaped lamp 36. The electric cable 38 that powers the lamp passes through the hole 37.

(20) The seals 39-40 form a seal, preventing the liquid 41 from getting onto the lamp. An additional seal 42 makes fast the cover 31 with the bottom 43, welded to the tank 17. The cover 31 is in turn fixed to the tank by means of the screws 44 positioned around

(1) it. In the central body 29 of the separation plate some holes (45, 46 etc.) have been made which have an elliptically shaped upper edge; in order to reduce further the residual space 47 between them, making it easier for the yolk fragments to enter.

A tube 25 is fixed by screws to the centre of the body 29 of the separation plate. This (5) tube passes through a hole 49 in the cover 31 and flows into a large flaring 51 which facilitates the entry of clean albumen.

Some small tubes 52 are fixed with screws (60) below the series of holes 45-46, and support the electrovalves 53 and the circular tube 54 by means of the small tubular supports 55. The yolk draw-off tube 26 (Fig. 1-2) is connected to the circular tube 54.

(10) Operation of the device is shown by the three drawings enclosed. If the albumen produced by the egg breaker 10 and collected by the tank 17 via the tank located on the machine 13 and the drain tube 15 contains traces of yolk as at 52-53, they will be intercepted by the separation plate 18.

The transparent pattern 28, by allowing the light produced by the lamp 36 to pass (15) through it, illuminates the particles in transit (as at 54-55), making them visible to the camera 22. An electrical command activates the electrovalve 53 and the yolk particle 61 is sucked up, passing through the series of holes 62 to the circular tube 54, kept under vacuum by the pump 24. In this way clean albumen is produced from the central suction tube 25 via the pump 23 and the albumen is sent via the delivery tube (20) 63 to the collection place at the storage tanks. After the particle has passed 61, the electrovalve 53 deactivates after a set time and closes the passage again.

Fig. 3 shows a variant of the circular plate 18.

In it one may note: the tank 64, into the first section of which the tube 65 pours the albumen; a straight separation plate 67, without additional details but very similar to the circular one; the yolk particles (68-71) sucked up and sent through the holes 72 to

- (1) the tube 73; the clean albumen collected in the second sector 74 and leaving the tube 75.

A3 – DISCLOSURE OF INVENTION

We would like to point out the aims and advantages of this device:

- 1) the system reduces the amount of labour required as it eliminates the need for an additional manual inspection by an operator.
- 2) less albumen lost as the system draws off less than is removed during a manual inspection;
- 3) the albumen obtained by means of this system is of a higher quality, as the automatic inspection is more effective and consistent than human inspection;
- 4) it is possible to move the tank 17 between different machines, thanks to the wheels 27;
- 5) the tank can remain stationary in one place and receive liquids from other machines;
- 6) the system reduces machine downtime because the camera 22 positioned above the bell 19 is further away than cameras and photocells currently used. For this reason lenses stay cleaner over time and are less likely to be reached by possible splashes from liquids being processed or during washes;
- 7) the system makes new egg breaking plants cheaper to manufacture, as building and operating a single device entails fewer costs than each machine having its own system.

A4 - BRIEF DESCRIPTION OF THE DRAWINGS

Fig.1 – perspective view of egg breaker and wheeled tank;

Fig.2 – perspective cross-section view of circular separation plate;

Fig.3 – perspective view of tank with rectangular separation plate.

B – CLAIMS

CLAIM 1 - The system of removal of albumen contaminated by the yolk by means of drawing off the liquid from below;

CLAIM 2 - the shape of the separation/draw-off plate which in addition to being ring-shaped may also be rectangular, square, elliptical, polygonal and assume any geometry (see Fig.3);

CLAIM 3 - the light emitted by the lamp 36, which instead of shining from below, can also shine from above and be positioned next to the camera;

CLAIM 4 - the absolute novelty of the inspection tank 17 insofar as it is separate from the egg breaking machine;

CLAIM 5 - the possibility of inspecting the albumen from several egg breaking machines;

CLAIM 6 - its application for inspection by a single camera.

Fig.1

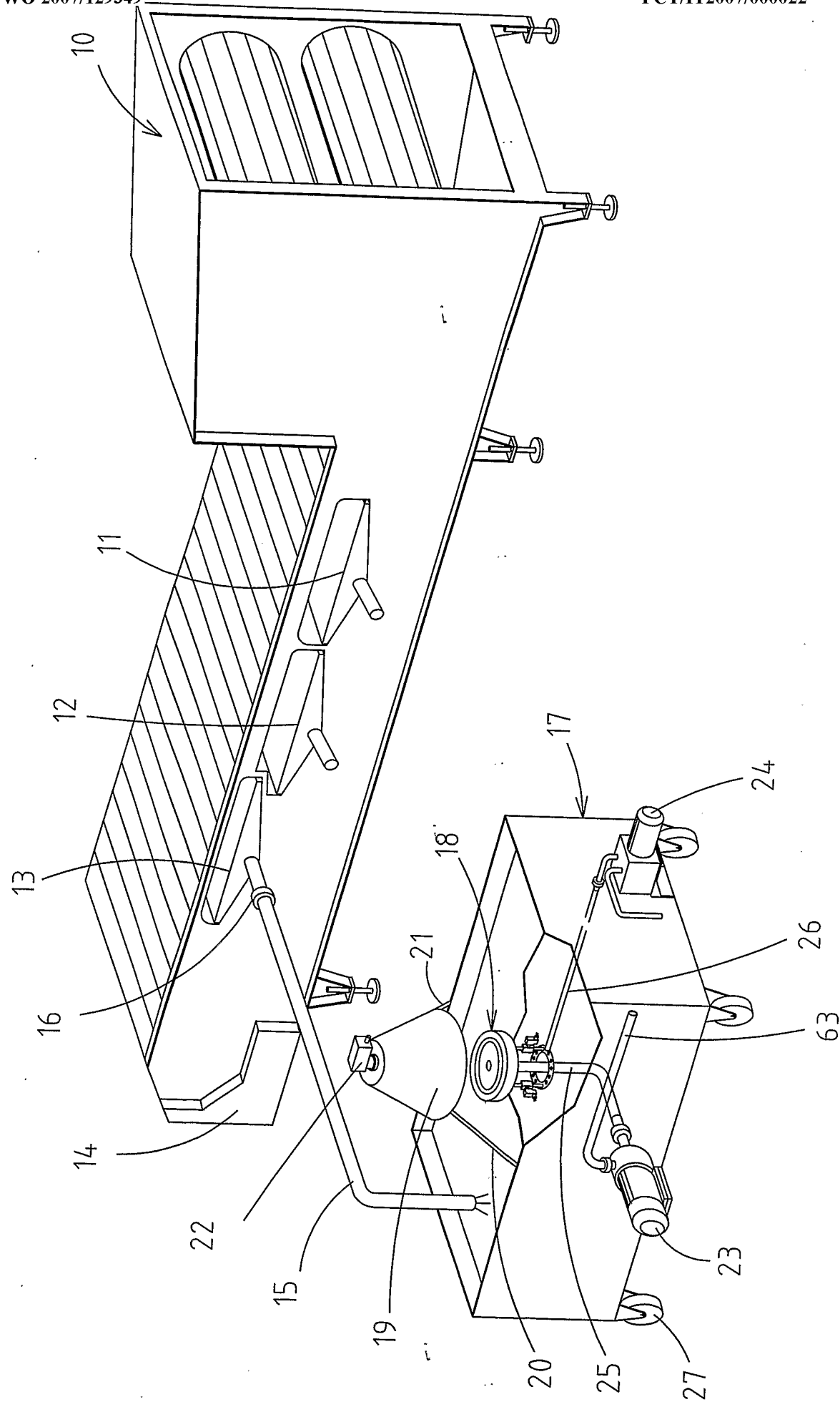


Fig.2 . .

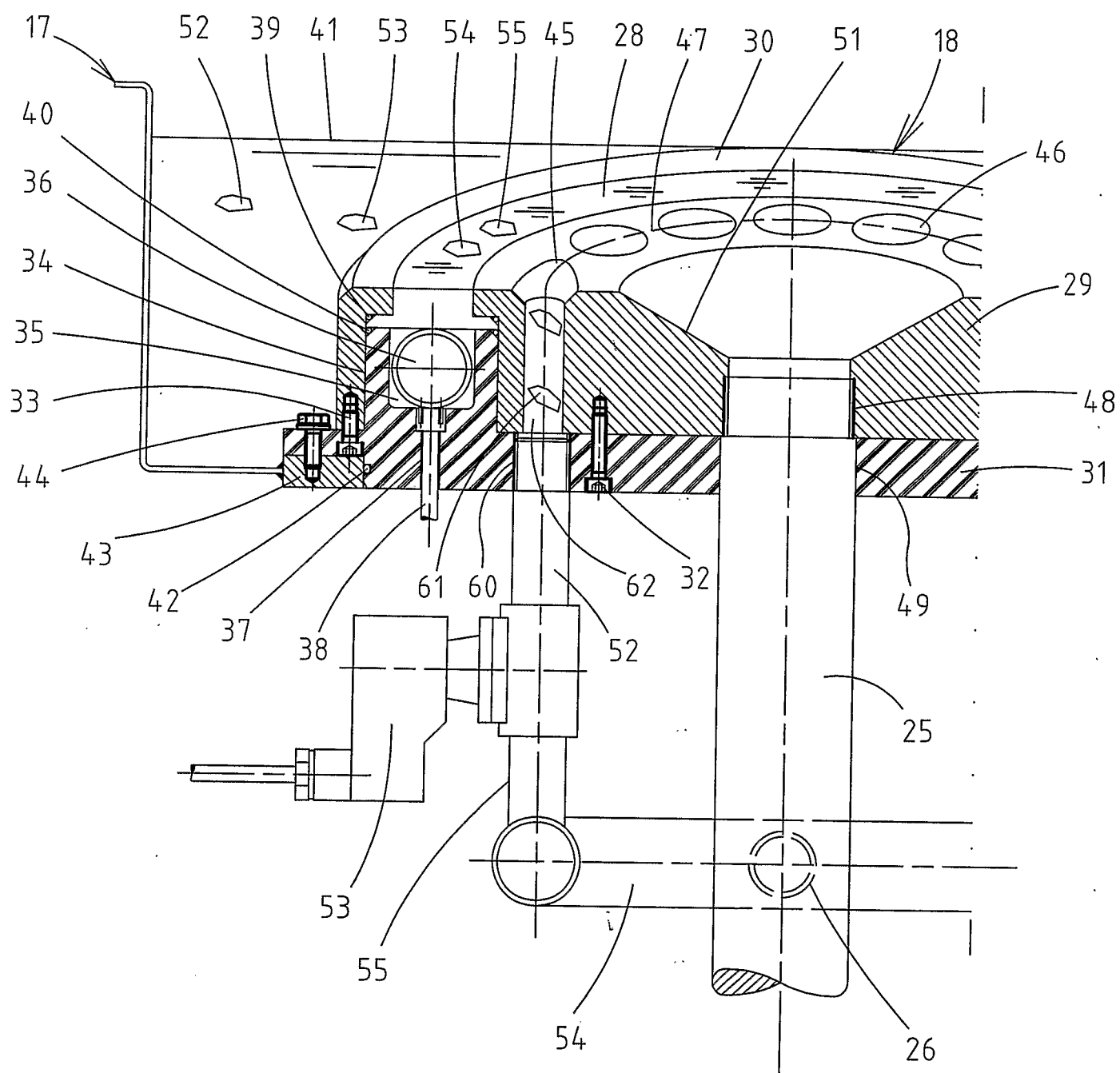
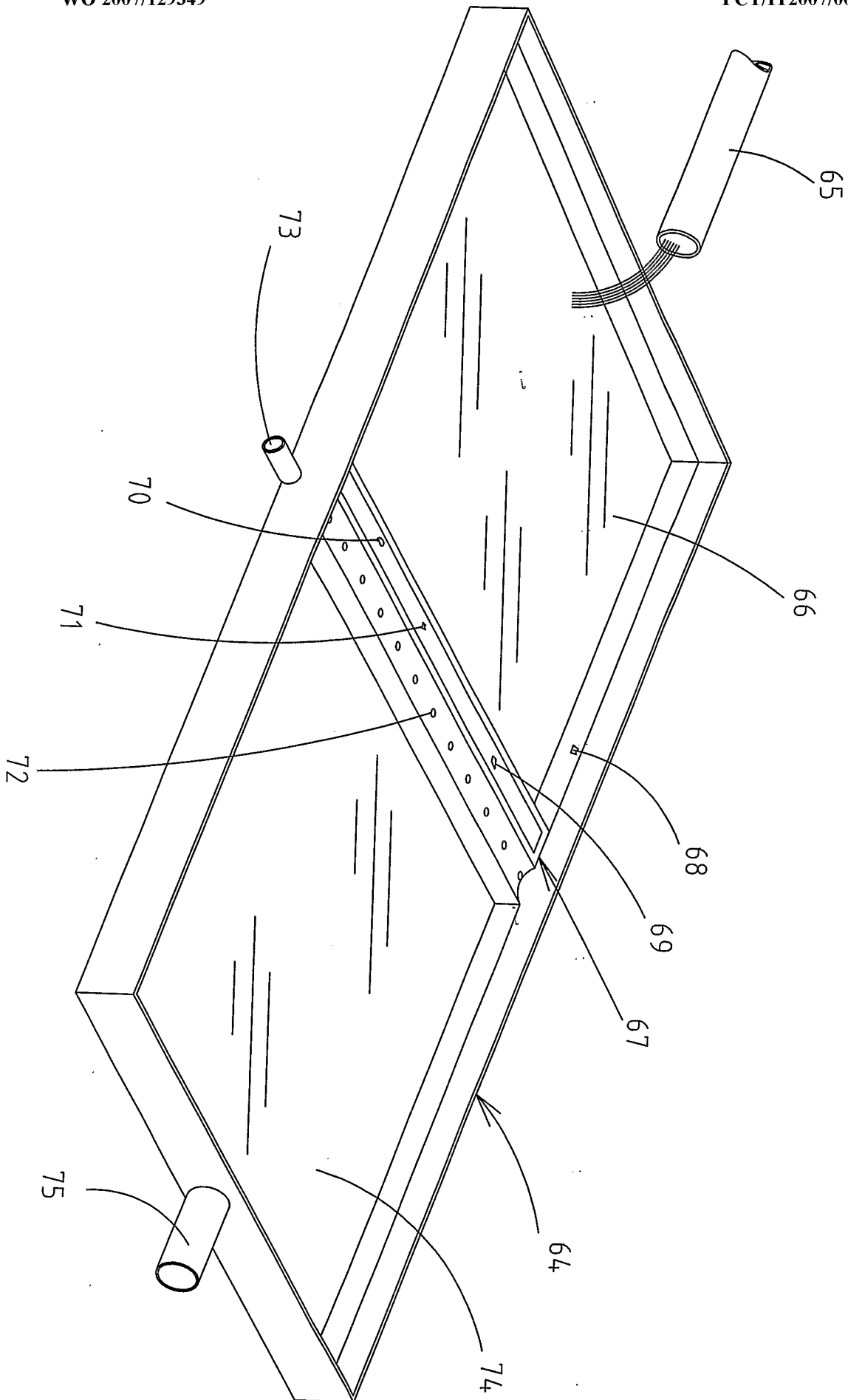


Fig.3



INTERNATIONAL SEARCH REPORT

International application No
PCT/IT2007/000022

A. CLASSIFICATION OF SUBJECT MATTER

INV. A23J1/09 A47J43/14

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)

A23J 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, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 622 469 A (AKIYAMA HIROKAZU [JP]) 11 November 1986 (1986-11-11) abstract	1-6
X	EP 1 297 769 A2 (COENRAADTS MASCHF B V [NL]) 2 April 2003 (2003-04-02) claim 1; figure 1	1-6
X	NL 1 010 910 C2 (COENRAADTS MASCHF BV [NL]) 30 June 2000 (2000-06-30) claims 9-16; figure 1	1-6
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A	US 5 858 434 A (THOMAS LESLIE PHILIP [US]) 12 January 1999 (1999-01-12) claim 1	1-6

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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