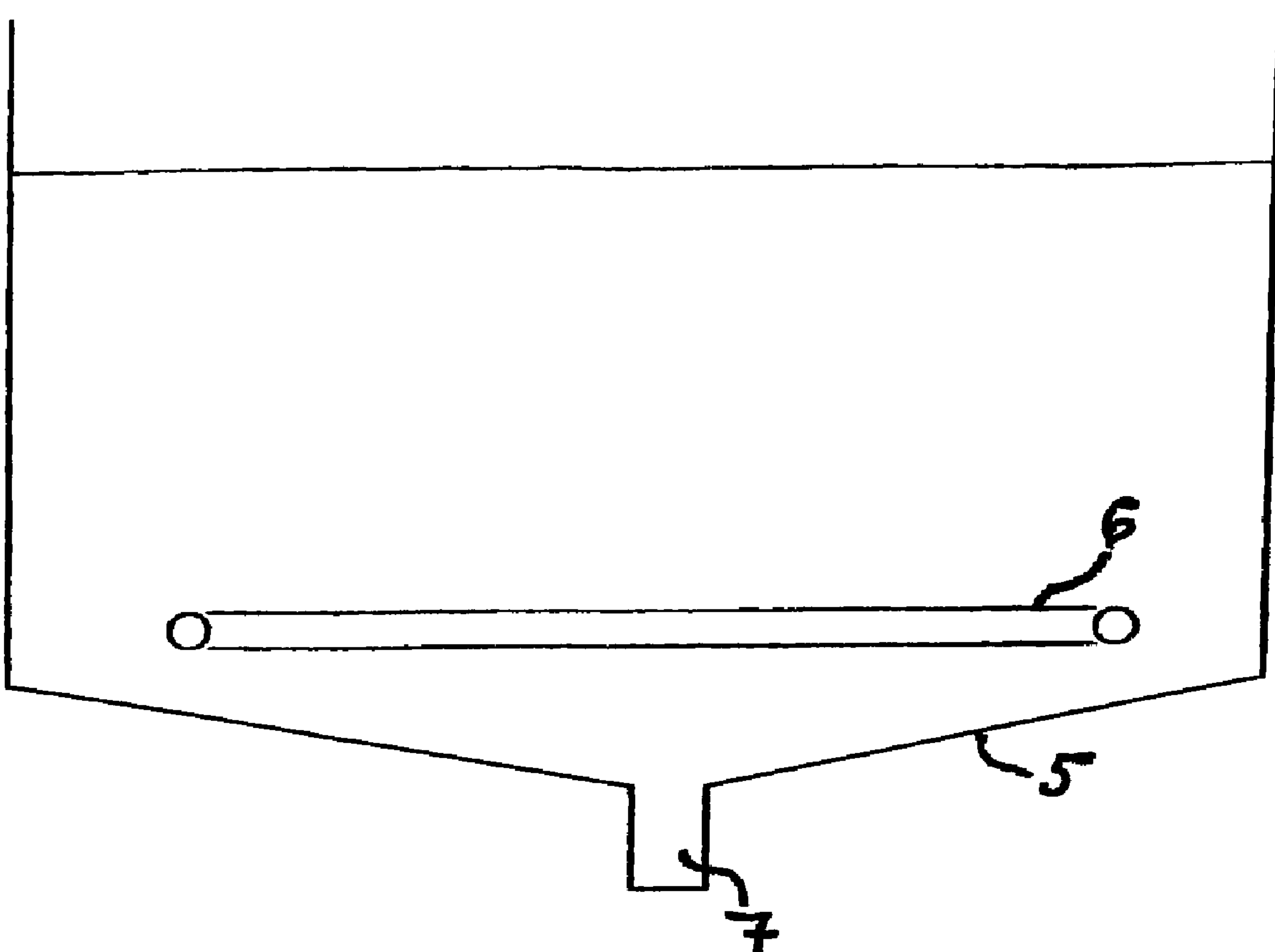




(86) Date de dépôt PCT/PCT Filing Date: 2004/12/17
(87) Date publication PCT/PCT Publication Date: 2005/07/14
(45) Date de délivrance/Issue Date: 2010/05/18
(85) Entrée phase nationale/National Entry: 2006/05/17
(86) N° demande PCT/PCT Application No.: HU 2004/000121
(87) N° publication PCT/PCT Publication No.: 2005/063099
(30) Priorité/Priority: 2003/12/31 (HU P0304122)

(51) Cl.Int./Int.Cl. *A47J 37/12* (2006.01)
(72) Inventeur/Inventor:
KOVACS, LASZLO, HU
(73) Propriétaire/Owner:
KOVACS, LASZLO, HU
(74) Agent: GOWLING LAFLEUR HENDERSON LLP

(54) Titre : RECIPIENT A FRIRE POUR FRITEUSE
(54) Title: FRYING VESSEL FOR DEEP FRYER APPARATUS



(57) Abrégé/Abstract:

Frying vessel for a deep fryer apparatus, the frying vessel is closed with a bottom part from the bottom and with side wall from the side, a substantially horizontally formed electric heating element (6) which is immersed in the frying oil and is in direct contact with



(57) **Abrégé(suite)/Abstract(continued):**

the same is placed within the vessel, and at the bottom part of the vessel an outlet (7) is provided. The bottom part of the vessel comprises a downwardly narrowing fun-nelled portion (5), and the outlet (7) is formed in the funnelled portion (5).

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

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
14 July 2005 (14.07.2005)

PCT

(10) International Publication Number
WO 2005/063099 A1

(51) International Patent Classification⁷: **A47J 37/12**

(21) International Application Number:
PCT/HU2004/000121

(22) International Filing Date:
17 December 2004 (17.12.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
P0304122 31 December 2003 (31.12.2003) HU

(71) Applicant and

(72) Inventor: **KOVÁCS, László** [HU/HU]; Normafa u.
49-51., H-1121 Budapest (HU).

(74) Agent: **SBG & K PATENT AND LAW OFFICES**; An-
drássy út 113., H-1062 Budapest (HU).

(81) Designated States (*unless otherwise indicated, for every
kind of national protection available*): AE, AG, AL, AM,

AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,
ZW.

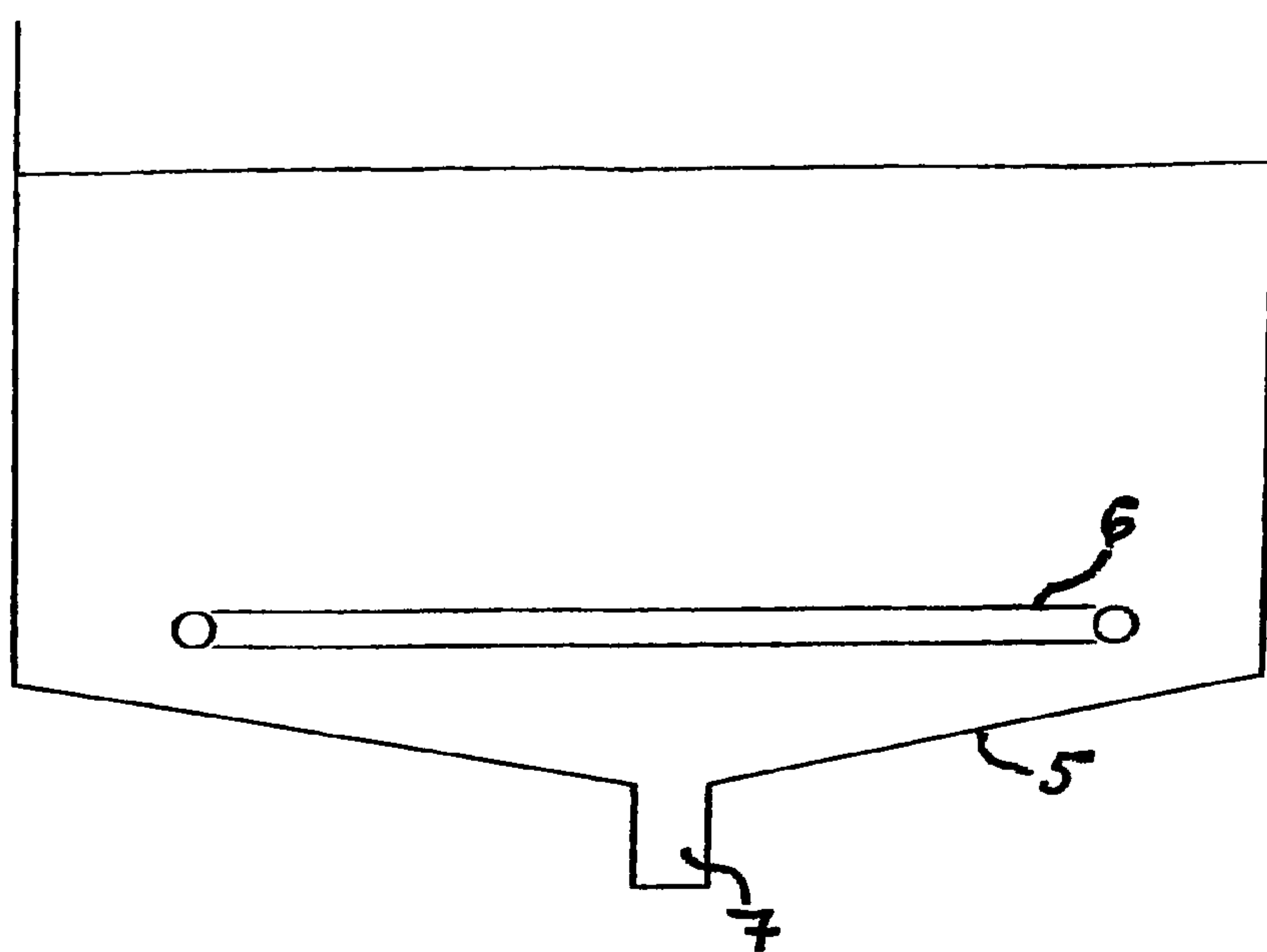
(84) Designated States (*unless otherwise indicated, for every
kind of regional protection available*): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO,
SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN,
GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

*For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.*

(54) Title: **FRYING VESSEL FOR DEEP FRYER APPARATUS**



(57) Abstract: Frying vessel for a deep fryer apparatus, the frying vessel is closed with a bottom part from the bottom and with side wall from the side, a substantially horizontally formed electric heating element (6) which is immersed in the frying oil and is in direct contact with the same is placed within the vessel, and at the bottom part of the vessel an outlet (7) is provided. The bottom part of the vessel comprises a downwardly narrowing funnelled portion (5), and the outlet (7) is formed in the funnelled portion (5).

WO 2005/063099 A1

FRYING VESSEL FOR DEEP FRYER APPARATUS

The invention relates to a frying vessel for a deep fryer apparatus, where the frying
5 vessel is closed with a bottom part from the bottom and with side wall from the side, a
substantially horizontally formed electric heating element for being immersed in the fry-
ing oil and for being contact with the same is placed within the vessel, and at the bottom
part of the vessel an outlet is provided for draining off at least the used frying oil.

In the technology of the food industry there are known methods for deep fat frying,
10 especially for frying different kinds of food stuff in hot frying oil, when the frying oil is
filled in a container which is at least closed from the bottom and the oil in the container
is kept on appropriate temperature by means of an electric heating element, and the
food stuff prepared for frying (e.g. potato, potato products, dough or different kinds of
15 meat and meat products) is placed in the hot oil and is held there for a certain period of
time. Examples of these methods especially for providing fried potato products are
taught by the applicant of the present invention in U.S. Pat. No. 5,759,601 and U.S. Pat.
No. 5,974,951. In these solutions a substantially horizontally positioned electric heating
unit in direct contact with the frying oil is located in the lower part within the frying ves-
sel. Generally, frying takes place above the heating unit when the product placed in a
20 frying basket is immersed in the hot oil. In a preferred embodiment the bottom part of
the frying vessel is equipped with an outlet which makes removal of the used exhaust oil
possible. Then the vessel is refilled with fresh oil.

Irrespective of the benefits of the solutions proposed for controlling the process of
frying a disadvantage of this method is that tiny pieces, fragments, crumbs, morsels etc.
25 which unavoidably break off during frying settle and accumulate at the bottom of the
vessel, and as they are very small they become burnt easily due to the relative near-
ness of the heating unit, thereby deteriorate the quality of the oil. Then the oil gets
spoiled in a short time.

Usually, a pump is used for draining off and refilling of the oil. It means a further
30 disadvantage since the pump as a mechanical machine part may get plugged with the
oil containing the aforementioned small fragments, and especially when the apparatus
is not used for a relatively long time, it may obstruct the pump to such an extent that it
needs to be disassembled to make it ready for operation again.

The aim of the present invention is to provide an apparatus in which deterioration
35 of the oil caused by the small burnt fragments can be eliminated, since these small

- 2 -

burnt fragments can be removed in a simple manner without the need for a delicate piece of machinery as a pump.

5 The invention on the one hand is based on the realization of the fact that the temperature of the oil (which under normal frying conditions gets mixed merely as a result of static convection of heat) measured at different height levels significantly decreases in a narrow range vertically under the operating heating element. At the same time, the temperature above the heating element is equalized which is necessary for good quality frying.

10 On the other hand, in the range under the heating element, most of the fragments falling off from above will automatically roll down to the bottommost point of the frying vessel if the bottom part of it is inclined. Thus they will get further from the heating element, and due to the rapidly decreasing temperature it will get burnt to a lesser extent. A further advantage is that collection and removal of these fragments from the frying oil will be easier. Finally, by circulating the oil in two directions and by blowing air from beneath, fragments which still get stuck can be broken up from the inclined bottom part.

15 In one example embodiment the frying vessel for a deep fryer apparatus according to the invention is a vessel provided with a bottom part having a downwardly narrowing funnelled portion, and the outlet is formed in the funnelled portion.

20 Further details and advantageous embodiments of the invention will now be described with reference to the accompanying drawings in which:

Figure 1 is a diagram showing the change in temperature plotted against time when the deep fryer apparatus is filled with oil, the heating element is in operation and the temperature is measured at several points in different heights;

25 Figure 2 is a schematic drawing of one embodiment of the frying vessel according to the invention;

Figure 3 is a schematic drawing of another embodiment of the frying vessel according to the invention; and

Figure 4 is a schematic drawing of one embodiment of the drain tank according to the invention.

30 The diagram of Figure 1 shows the change in temperature plotted against time when the heating element of a customary deep fryer apparatus is in operation and the frying vessel of the apparatus is filled with oil. Graph 1 shows the temperature measured (starting from switching on the apparatus) in the oil at a medium height above the

- 3 -

heating element, graph 2 shows the temperature measured in the vicinity of the surface. Graph 4 shows the change in the temperature of the foodstuff placed in the oil in a frying basket at a later point of time. In the same diagram, graph 3 shows the temperature of the oil measured in the apparatus below the heating element. It is distinctly visible
5 that graph 3 changes much more slowly than any of the others, and it becomes stable at a relatively low value.

In Figure 2 an example embodiment of the frying vessel according to the invention is shown schematically. The frying vessel is closed at the sides by a wall and it has a bottom part which is formed differently from the conventional one. Within the frying ves-
10 sel a horizontally shaped heating element 6 is located which is in direct contact with the frying oil and is typically operated by electric power. Supporting elements of the heating element 6 and means of the electric power supply are not shown. The bottom part is shaped as a downwardly narrowing funnel 5. An outlet 7 is formed at a lower part of the funnel 5. In this example the entire bottom part forms the downwardly narrowing funnel
15 5, however, it is possible to form this funnel only at a portion of the bottom part, the remainder may be for example flat, similarly to a conventional bottom design. Still, it is advantageous when at least the portion of the bottom part being directly below the essentially horizontally formed heating element 6 comprises the downwardly narrowing funnelled portion 5.

Funnelled portion 5 may be formed so that it is funnel-shaped in one dimension, for example when only two opposed inclined planes are used for the bottom part. Then outlet 7 forms a longitudinal channel, which also may be inclined. Funnelled portion 5 may be formed so that it is funnel-shaped in two dimensions, and within this the bottom part may also be formed from plane surfaces, for example it may be pyramidal, or the
20 vessel may be round, in which case funnelled portion 5 is a cone.

The embodiment shown in Figure 3 is similar to the one shown in Figure 2, but in this case funnelled portion 5 is formed asymmetrically. The advantage of this embodiment is that on the area where the most fallen off fragments (crumbs) can be found, for example at the point of insertion of the basket, the greater inclination of the respective
30 bottom part will contribute to gathering these fragments at the bottom.

In Figures 2 and 3 outlet 7 is formed at the bottommost point of the funnelled portion 5. It is noted that a crumb bag may be placed at the bottommost point, and outlet 7 itself may be formed slightly above it.

- 4 -

In Figure 4 outlet 7 is provided with a stopcock 10. Under the stopcock 10 a filter 9 for filtering out the fragments (crumbs) is applied, which is removable and can be emptied. The vessel is in communication with a drain tank 8 through filter 9. Drain tank 8 can be hermetically closed and opened by means of one or more air ducts 11 (only one is shown in Figure 4) which end in the closed space being above the filling level of oil 12 when the tank is filled with oil. Drain tank 8 should be located so that the aforementioned filling level of oil 12 of the tank is lowered in relation to the location of outlet 7, stopcock 10 and filter 9, thereby draining off the frying oil becomes possible in a simple manner due to gravitation when stopcock 10 is opened. It is possible to raise pressure in the tank higher than atmospheric pressure by introducing compressed air "A", by means of which filtered frying oil may be fed back to the frying vessel via the same route. To this, filter 9 should be removed beforehand or at least it should be emptied. The system then operates as a communicating vessel controlled by pressure, and the exhausted frying oil can be filled or drained off without the need of a pump. By circulating the oil in two directions and by blowing air from beneath through air duct 11, fragments which still get stuck can be broken up from the inclined bottom part, particularly from the part being in the vicinity of outlet 7.

Claims

1. Frying apparatus comprising a frying vessel and a drain tank (8), said frying vessel is closed with a bottom part from the bottom and with side wall from the side, a substantially horizontally formed electric heating element for being immersed in the frying oil and for being in contact with the same is placed within said vessel, and at the bottom part of said frying vessel an outlet is provided for draining off at least the used frying oil from the frying vessel, said bottom part of said frying vessel comprises a downwardly narrowing funnelled portion (5), and said outlet (7) is in said funnelled portion (5), characterized in that said drain tank (8) is in communication with said frying vessel through a filter (9), said tank (8) can be hermetically closed and opened by means of one or more air ducts (11) which end in a closed space being above the filling level of oil (12) when said drain tank (8) is filled with oil, and said drain tank (8) is located so that said filling level of oil (12) of the tank is lower in relation to the location of the said outlet (7), and a pressure (A) higher than the atmospheric pressure is introduced at least through one air duct (11) for feeding the frying oil back into the frying vessel via a pipe.
2. Frying apparatus according to claim 1, characterized in that said frying vessel is connected with the bottom of said drain tank (8) via a pipe.
3. Frying apparatus according to any one of claims 1-2, characterized in that said outlet (7) is provided with a stopcock (10) for closing or opening said pipe.
4. Frying apparatus according to any one of claims 1-3, characterized in that said filter (9) is removable and can be emptied.
5. Frying apparatus according to any one of claims 1-4 characterized in that said bottom part in its entirety forms said downwardly narrowing funnelled portion (5).
6. Frying apparatus according to any one of claims 1-5 characterized in that at least a portion of said bottom part being directly below the substantially horizontally formed heating element (6) forms said downwardly narrowing funnelled portion (5).
7. Frying apparatus according to any one of claims 1-6 characterized in that said funnelled portion (5) is formed so that it is funnel-shaped in one dimension.

8. Frying apparatus according to any one of claims 1-6 characterized in that said funnelled portion (5) is formed so that it is funnel-shaped in two dimensions.
9. Frying apparatus according to any of one of claims 1-8 characterized in that said bottom part is formed from plane surfaces.
10. Frying apparatus according to claim 9 characterized in that said bottom part has a shape of a pyramid or a cone.
11. Frying apparatus according to any one of claims 1-10 characterized in that said funnelled portion (5) is formed asymmetrically.
12. Frying apparatus according to any one of claims 1-11 characterized in that said outlet (7) is formed at the bottommost point of said funnelled portion (5).

1/3

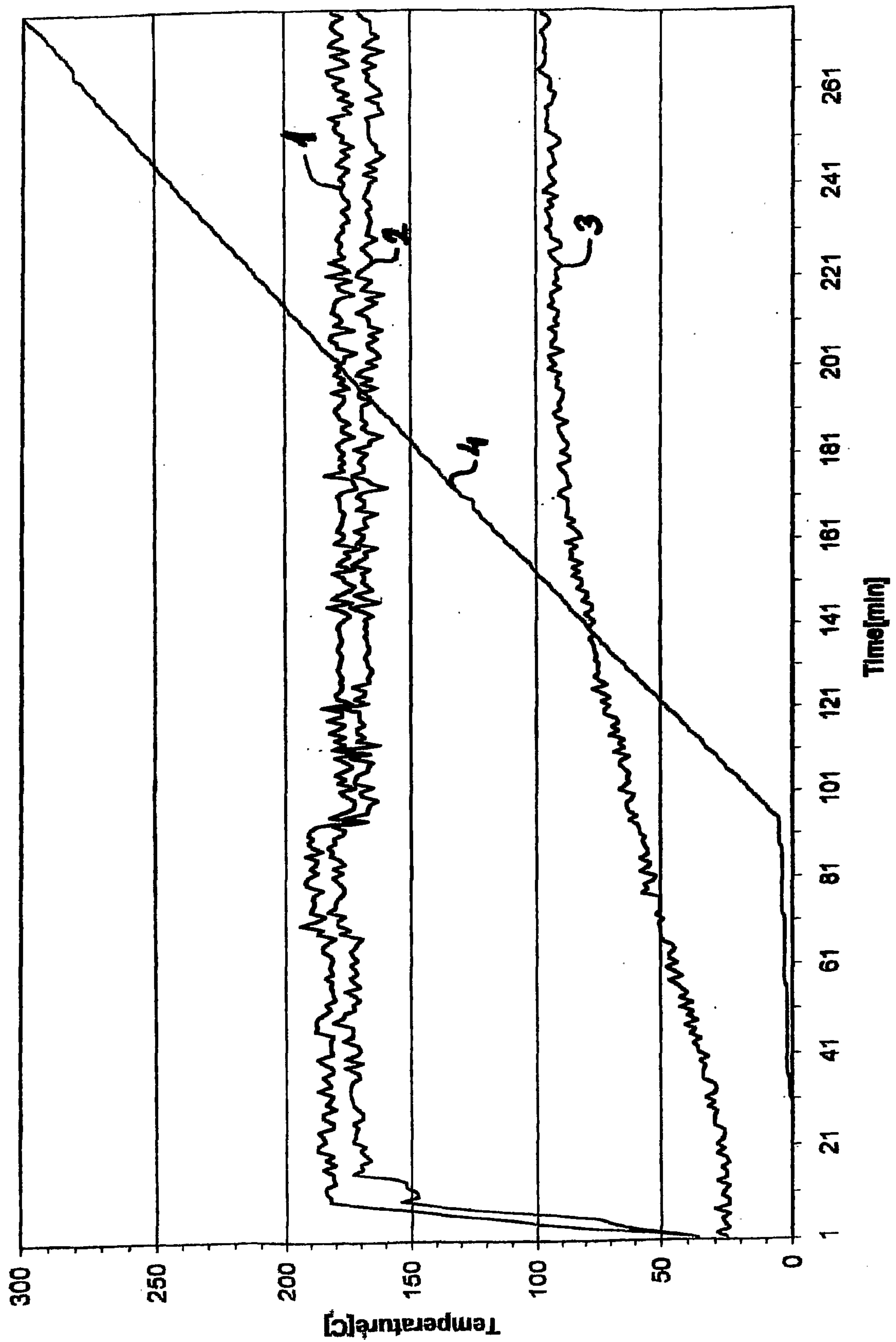


Fig. 1

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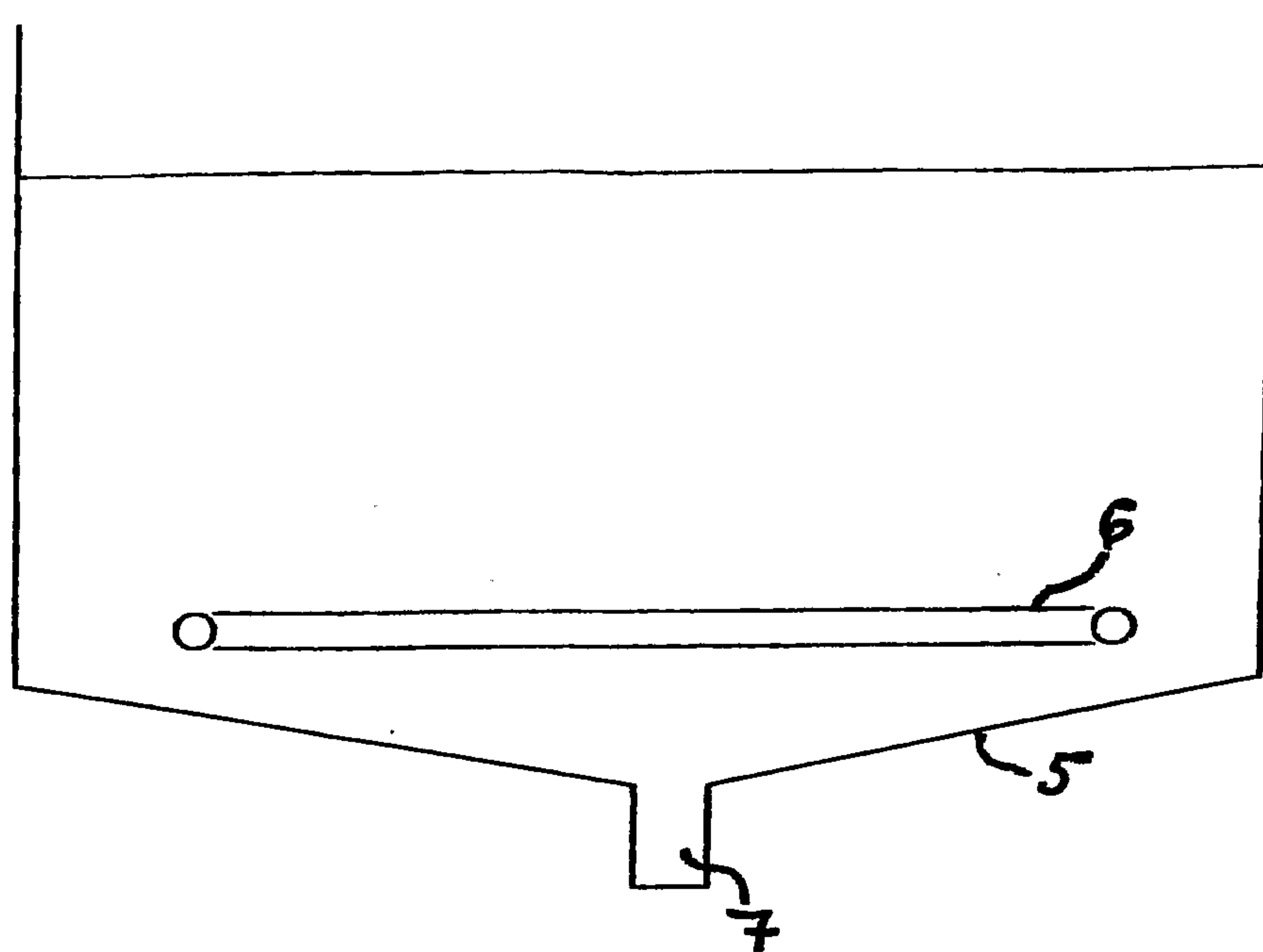


Fig. 2

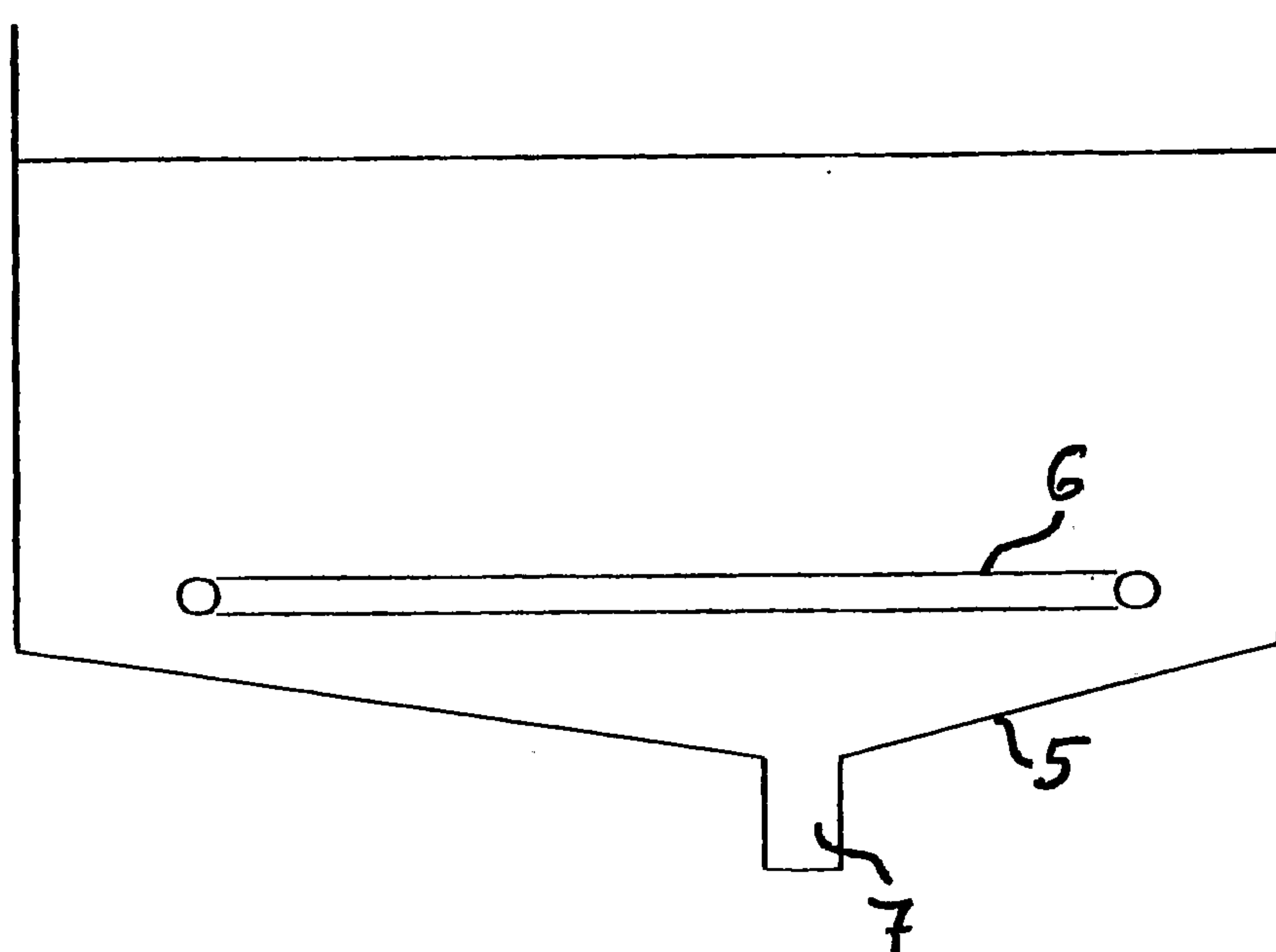


Fig. 3

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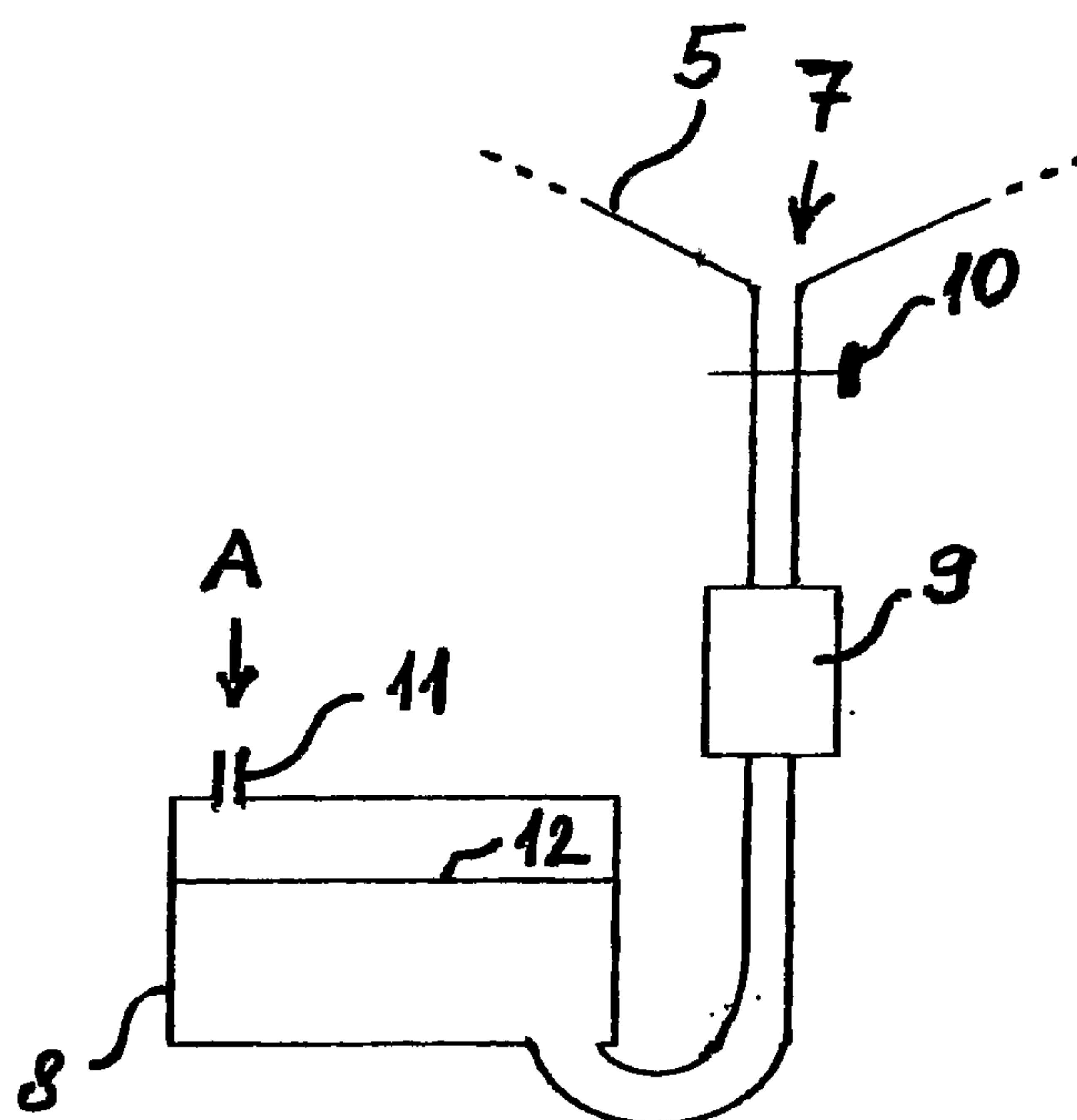


Fig. 4

