



(51) International Patent Classification:

B29C 49/64 (2006.01) B29K 67/00 (2006.01)
B29C 49/68 (2006.01) F27D 7/02 (2006.01)
H05B 3/00 (2006.01) F27D 7/04 (2006.01)
B29C 49/06 (2006.01) B29C 35/08 (2006.01)

(21) International Application Number:

PCT/PL2015/000209

(22) International Filing Date:

23 December 2015 (23.12.2015)

(25) Filing Language:

English

(26) Publication Language:

English

(71) Applicant: STM SPÓŁKA Z OGRANICZONĄ
ODPOWIEDZIALNOŚCIĄ [PL/PL]; ul. Piaskowa 12,
78-520 Złocieniec (PL).

(72) Inventor: KARASZEWSKI, Waldemar; ul. Parkowa
8H/1, 81-549 Gdynia (PL).

(74) Agent: POMIANEK, Grażyna; Kancelaria Patentowo-
Prawna Grażyna Pomianek, ul. Subisława 23 C lok. 7,
80-354 Gdańsk (PL).

(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, BN, BR, BW, BY, BZ, CA, CH, CL, 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, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, 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, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

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(54) Title: POWER SAVING DEVICE FOR HEATING PET PREFORMS WITHIN THE PROCESS OF CONTAINERS BLOW MOLDING, ESPECIALLY BOTTLES

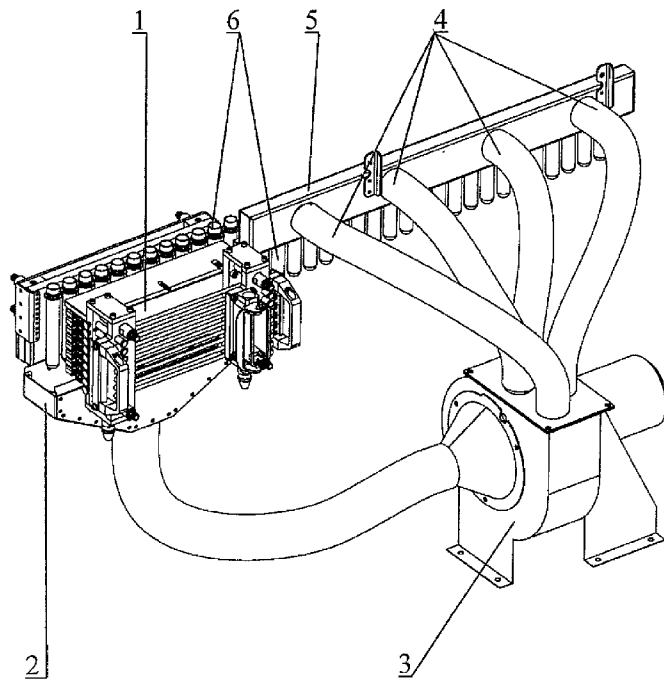


Fig.1

(57) Abstract: Device for heating PET preforms in the process of containers blow molding, especially bottles, comprising a furnace (1) equipped with a preform primary heating zone. The furnace (1) has a cover (2), to which a means (3) for inducing hot air flow is attached from the zone of primary heating of the preforms to at least one nozzle (5) for initial heating of the preforms, located upstream the furnace (1) inlet, wherein the means (3) for inducing hot air flow from the zone of primary heating of the preforms to the nozzle (5) is connected with such a nozzle (5) using at least one conduct (4).



Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *of inventorship (Rule 4.17(iv))*

Published:

- *with international search report (Art. 21(3))*

- 1 -

Power saving device for heating PET preforms within the process of containers blow molding, especially bottles

The subject of the invention relates to a power saving device for heating PET preforms within the process of containers blow molding, especially bottles.

In state of the art solutions, preforms, within the process of blow molding bottles or different containers of plastic, are heated using, among other things, tunnel furnaces, wherein lamps emitting infrared radiation are used as heating elements. Preforms loaded into the heating furnace are at ambient temperature. A side effect of this process is the heating of the air inside the furnace, which must be evacuated outside the blowing machine; therefore large amounts of energy are consumed.

US Patent 7,838,805 discloses a preform heating device, where the produced heat is supplied to the preform over a very short period of time, in this way saving energy. The device comprises a coil where the focused magnetic flux heats up a ring of material of very high electric resistance, inside of which, with no contact; the preform is located and subjected to heating by radiation and convection of hot air.

Polish Patent PL188008 discloses a preform heating device for plastic bottles blowing, especially PET polycarbonates, which has at least two heating chambers separated with a thermal insulation internal jacket with a central base, wherein, in each heating chamber in the central base, a row of mandrels is provided of similar or different dimensions, which are rotary and movable to any direction in relation to the base.

The object of the invention is to develop structural solutions in order to allow for a reduction of the consumption of electrical energy used to heat

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preforms in the process of containers blow molding, especially bottles, and more accurate heating over a shorter period of time for the selected zones of a preform.

A device for heating PET preforms within a process of containers blow molding, especially bottles, comprising a furnace equipped with a zone for primary heating of the preforms, according to the invention is characterised in that the furnace has a cover, to which a means for inducing hot air flow is attached from the zone of primary heating the preforms to at least one nozzle for initial heating of the preforms, located upstream the furnace inlet, wherein the means for inducing hot air flow from the zone of primary heating of the preforms to the nozzle is connected with such nozzle using at least one conduct.

Preferably, the furnace cover is located under the primary preform heating zone.

Preferably, the furnace is a continuous furnace, and the zone of primary preform heating comprises two rows of lamps emitting infrared radiation, wherein the lamps are positioned symmetrically in relation to each other along the longitudinal axis of the furnace, between which the preforms are moved, positioned upside down.

Preferably, the nozzle for initial heating of the preform is located along the longitudinal axis of the furnace, along which the preforms are moved towards the furnace, positioned upside down.

Preferably, the nozzle for initial heating of the preforms is located at the proper height in relation to the area of preforms which require heating to a higher temperature than other areas of the preforms.

In the case of preforms for bottles blowing, the nozzle for initial heating of the preforms is located just below a flange separating the threaded part of the preform from the part subject to blowing.

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Preforms during the process of heating in the device according to the invention are positioned upside down.

The solution according to the invention allows for a reduction of the consumption of energy used for primary heating of the preforms by 8-16%, depending on the type and weight of the preform. The best technological and power saving effects are achieved using a continuous furnace for primary heating of the preforms.

Further benefits and advantages of the present invention will become apparent after a careful reading of the detailed description with appropriate reference to the accompanying drawings.

In the drawings:

Fig. 1 presents a perspective view of the device.

Fig. 2 is a side view, from the nozzle side.

Fig. 3 is a side view, from the opposite side, different to that in fig. 2.

Fig. 4 is a bottom view.

Fig. 5 is a top view.

Fig. 6 is a side view, from the side of the primary heating zone of the furnace.

Fig. 7 is a side view, from the side of the initial heating zone of the furnace.

The exemplary device according to the invention comprises a continuous furnace 1 equipped with a zone for primary heating of the preforms. The zone of primary preform 6 heating comprises two rows of lamps emitting infrared radiation, wherein the lamps are positioned symmetrically in relation to the longitudinal axis of the furnace 1, between which the preforms 6 are moved.

The furnace 1 has a cover 2 positioned upstream the primary preform heating zone, to which a fan 3 is installed using a duct, in order to induce the flow of hot air from the primary preform heating zone to nozzles 5 for

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initial heating of the preforms, which is located upstream the furnace 1 inlet, along the longitudinal axis. The preforms are moved to the zone of primary heating in the furnace 1 along the nozzles 5. Preforms subject to heating are positioned vertically, upside down. The fan 3 is connected with a nozzle 5 using four conducts 4 of the same cross-section. Nozzle 5 is located at the proper height in relation to the area of preforms which require heating to a higher temperature than other areas of the preforms.

Hot air from the primary zone of preforms heating in the furnace 1 is drawn continuously by the fan 3 and transported via ducts 4 and blown using a nozzle 5 to a dedicated area of the preform 6 that requires more heat. In the case of preforms for making PET bottles, the nozzle is located, in relation to preforms subject to initial heating, just below the preform flange towards its apex, separating the threaded part of the preform from the part subject to blowing.

Preforms located along the production line section, upstream the inlet to the continuous furnace 1, are subject to initial heating using hot air and a nozzle 5, which is drawn continuously from inside of the furnace. Initially, the heated preforms 6 are introduced to the zone of primary heating in the continuous furnace 1. Preforms subject to heating are positioned upside down, and during the heating process in the continuous furnace, they turn around upon their own axis in order to obtain a consistent temperature around the perimeter.

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Claims

1. A device for heating PET preforms within the process of containers blow molding, especially bottles, comprising a furnace equipped with a zone for primary heating of the preforms, **characterised in that** the furnace (1) has a cover (2), to which a means (3) for inducing hot air flow is attached from the zone of primary heating of the preforms to at least one nozzle (5) for initial heating of the preforms, located upstream the furnace (1) inlet, wherein the means (3) for inducing hot air flow from the zone of primary heating of the preforms to the nozzle (5) is connected with such a nozzle (5) using at least one conduct (4).
2. The device according to claim 1, **characterised in that** the furnace (1) cover (2) is located under the primary preform heating zone.
3. The device according to claim 1 or 2, **characterised in that** the furnace (1) is a continuous furnace, and the zone of primary preform heating comprises two rows of lamps emitting infrared radiation, wherein the lamps are positioned symmetrically in relation to the longitudinal axis of the furnace (1), between which the preforms (6) are moved.
4. The device according to claim 2, **characterised in that** the nozzle (5) for initial heating of the preforms (6) is located along the longitudinal axis of the furnace (1).
5. The device according to claim 1 or 4, **characterised in that** the nozzle (5) for initial heating of the preforms is located at the proper height in relation to the area of preforms which require heating to a higher temperature than other areas of the preforms.
6. The device according to claim 5, **characterised in that** the nozzle (5) for initial heating of the preforms in the bottles manufacturing process is located just below the flange of the preforms towards its apex, wherein the

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flange separates the threaded part of the preform from the part subject to blowing.

7. Method of heating the preform in the devices according to claim 1 to 6, **characterised in that** the preforms are positioned upside down.

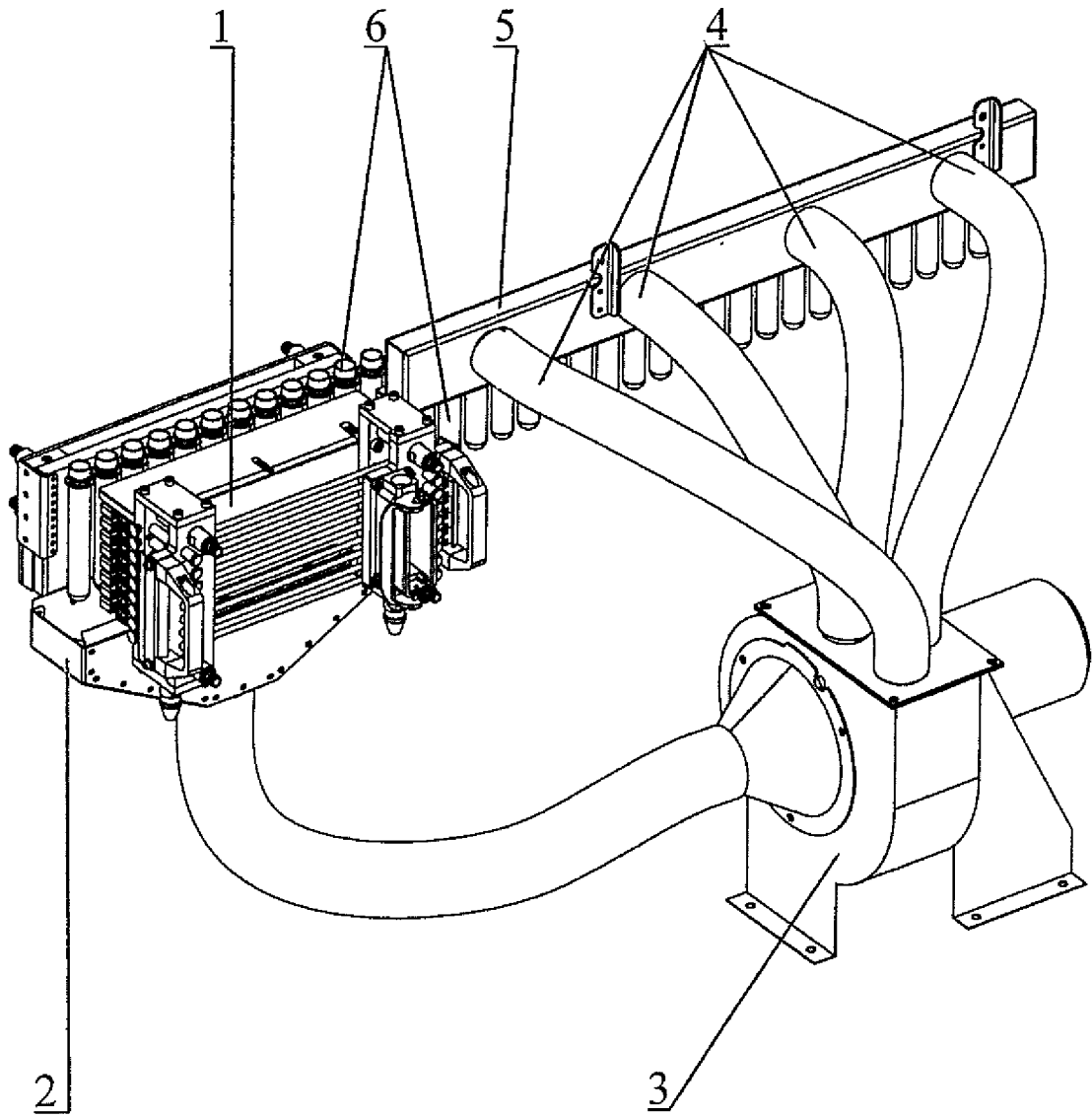


Fig.1

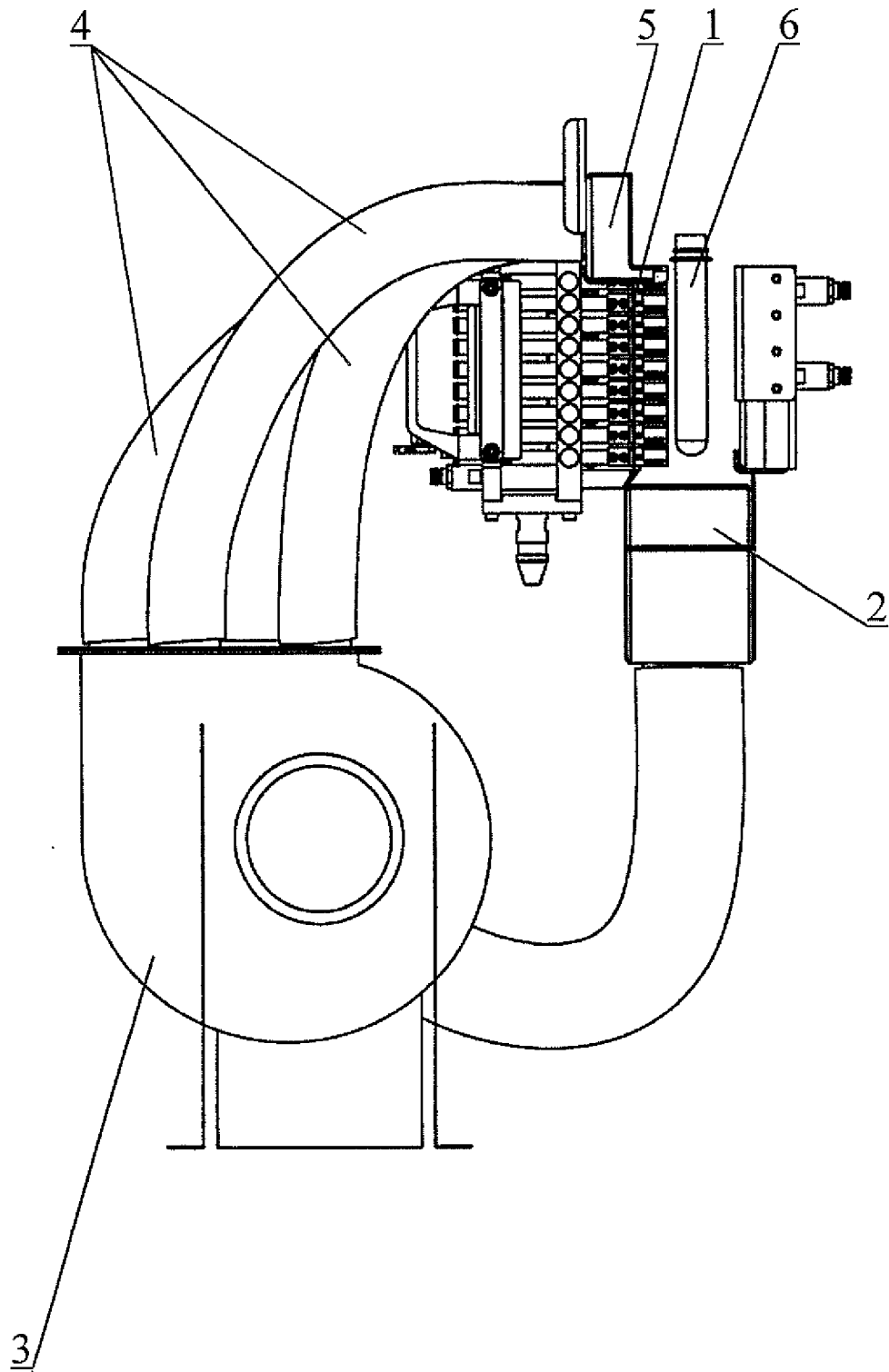


Fig.2

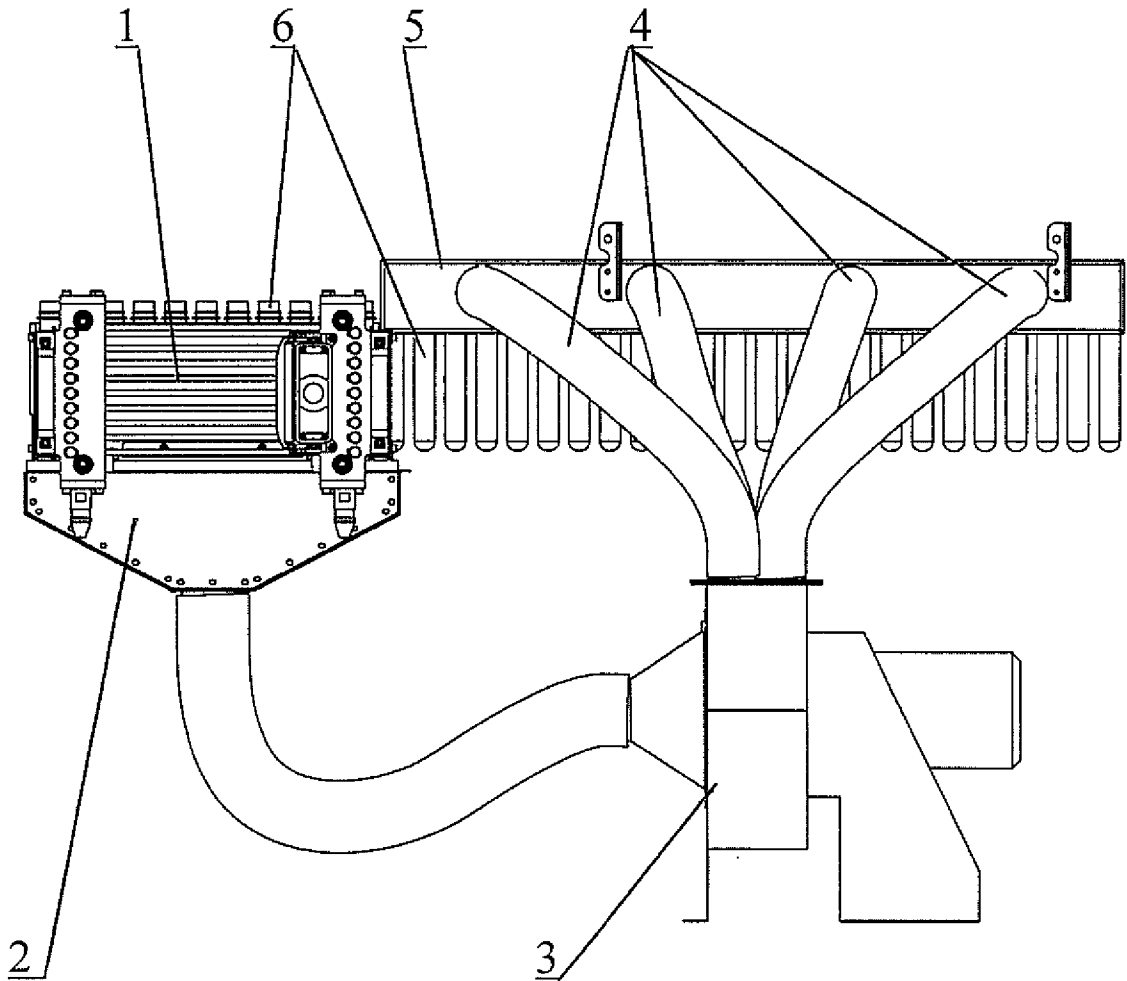


Fig.3

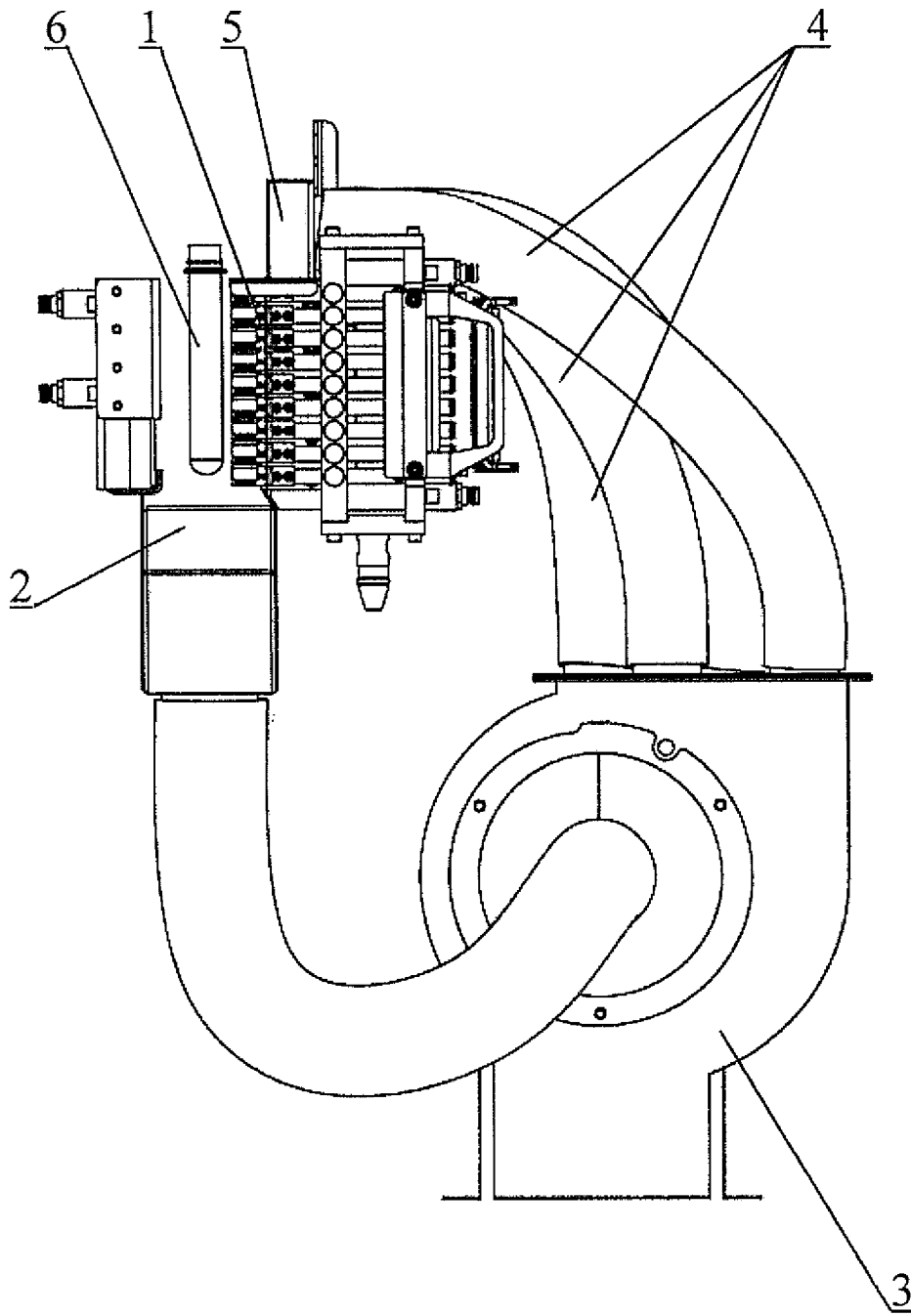


Fig.4

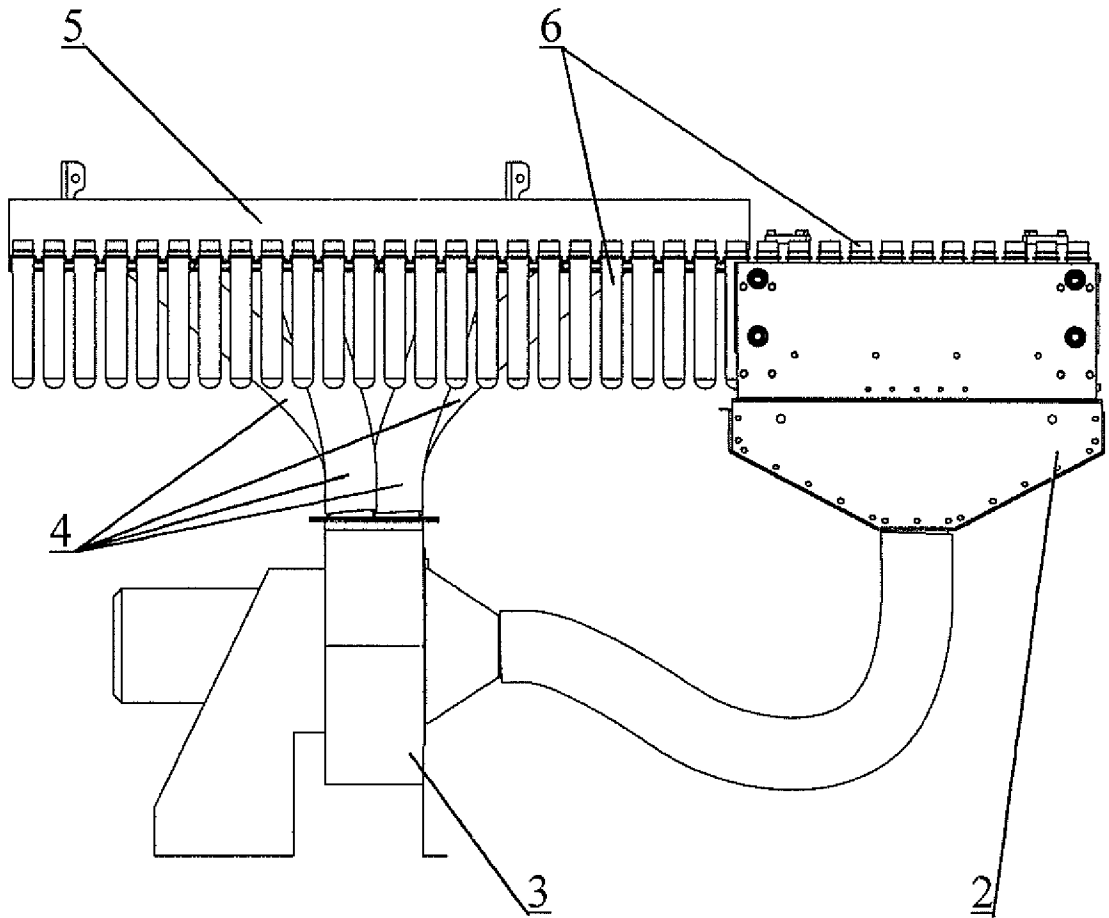


Fig.5

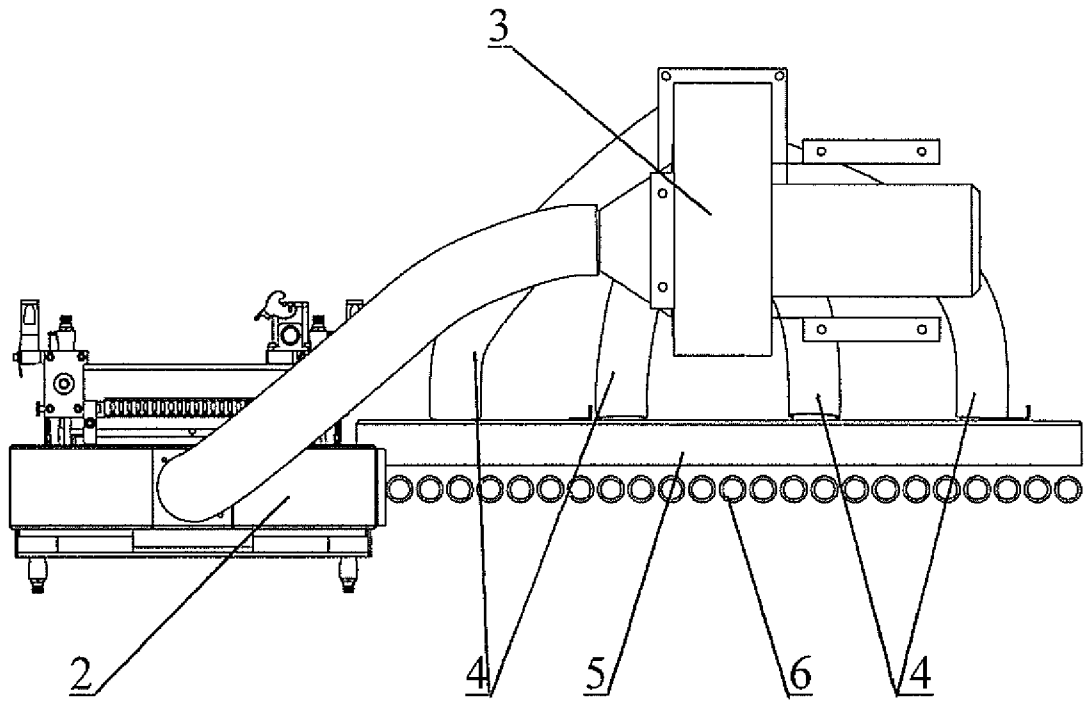


Fig.6

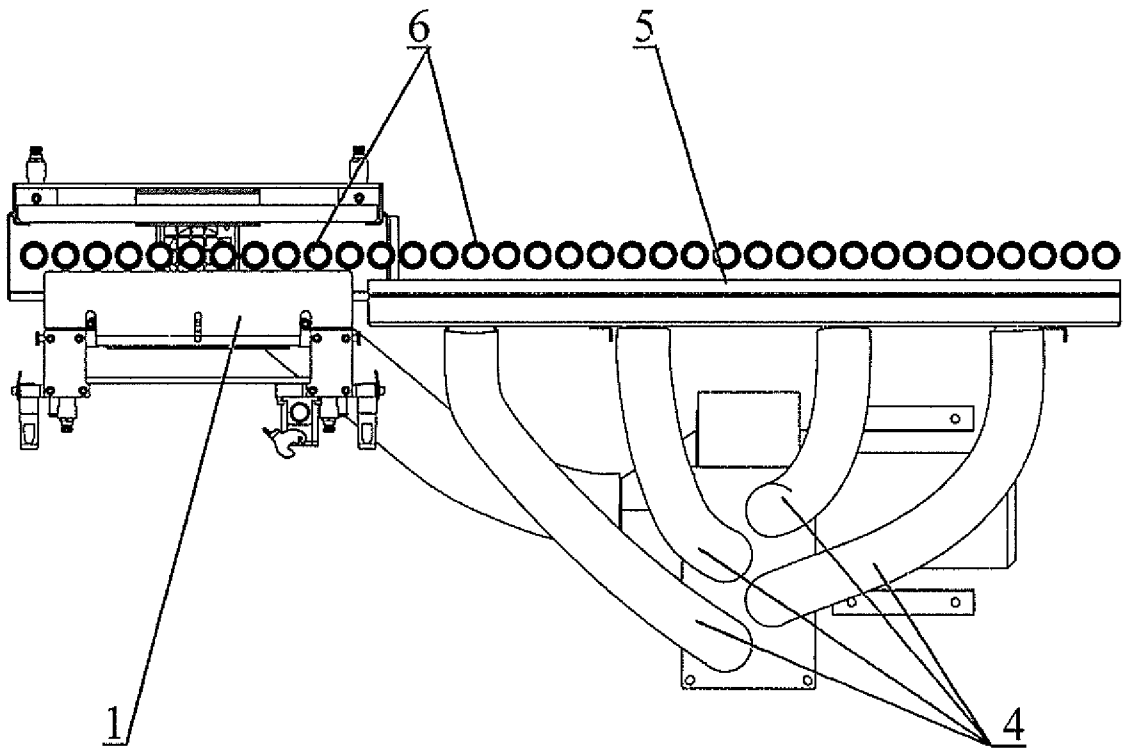


Fig.7

INTERNATIONAL SEARCH REPORT

International application No
PCT/PL2015/000209

A. CLASSIFICATION OF SUBJECT MATTER
 INV. B29C49/64 B29C49/68 H05B3/00
 ADD. B29C49/06 B29K67/00 F27D7/02 F27D7/04 B29C35/08

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)
 B29C B29K F27D H05B

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 practicable, 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 5 718 853 A (INGRAM RONALD WILLIAM [CA]) 17 February 1998 (1998-02-17) column 4, lines 41-54; claims 7,8; figures 4,5 column 6, line 61 - column 7, line 46 column 8, lines 33-52 -----	1-7
A	WO 2014/132199 A1 (SIPA PROGETTAZIONE AUTOMAZ [IT]) 4 September 2014 (2014-09-04) claims 1-9; figure 5 -----	1-7
A	EP 0 593 033 A1 (NISSEI ASB MACHINE CO LTD [JP]) 20 April 1994 (1994-04-20) column 8, line 11 - column 9, line 8; claims 1,3,6; figure 2 -----	1-7

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 7 September 2016	Date of mailing of the international search report 16/09/2016
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Foulger, Caroline
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/PL2015/000209

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