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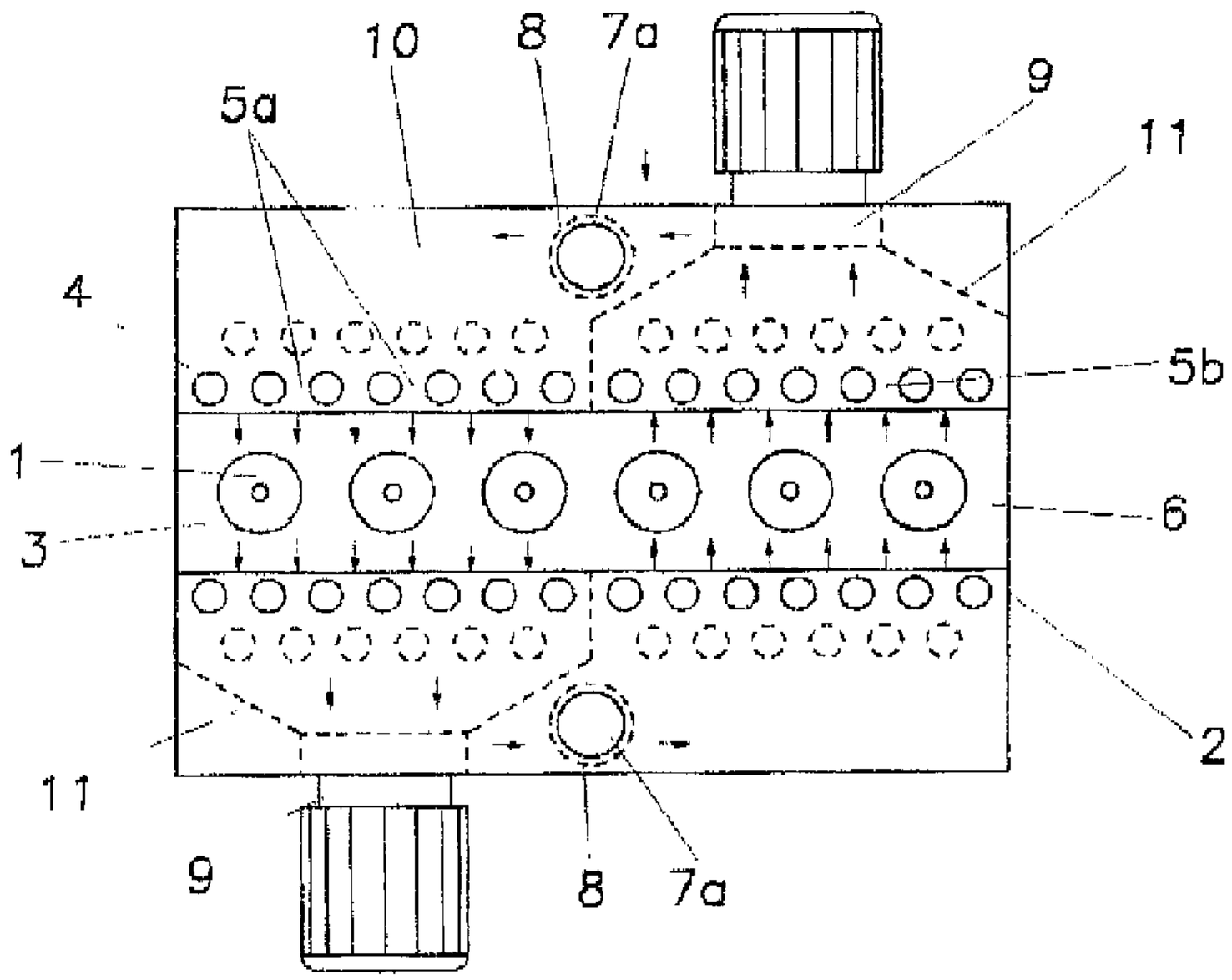
(54) Title: DEVICE FOR THE SURFACE TREATMENT OF HOLLOW GLASS BODIES



(57) Abrégé/Abstract:
The invention concerns a device for the surface treatment, in particular the final heat coating of hollow glass bodies, using a carrier gas enriched with coating materials. The device comprises a tunnel-shaped vaporisation hood with a conveyor belt which extends along the floor region of the hood and transports the hollow glass bodies, and with apertures along the sides and separated by spacer elements, these apertures being used for the alternate expulsion and drawing in of the carrier gas which flows around the hollow glass bodies and produces a metal oxide layer on the surfaces thereof. To prevent excessive heating of the spacer elements which would cause the coating materials to overheat and break down, and to prevent the build up of deposits and uneven speed distribution with the associated drawbacks, the intermediate elements are formed by tubular bodies which can be pressurized by a coolant stream (4).

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ABSTRACT

The invention concerns a device for the surface treatment, in particular the final heat coating of hollow glass bodies, using a carrier gas enriched with coating materials. The device comprises a tunnel-shaped vaporisation hood with a conveyor belt which extends along the floor region of the hood and transports the hollow glass bodies, and with apertures along the sides and separated by spacer elements, these apertures being used for the alternate expulsion and drawing in of the carrier gas which flows around the hollow glass bodies and produces a metal oxide layer on the surfaces thereof. To prevent excessive heating of the spacer elements which would cause the coating materials to overheat and break down, and to prevent the build up of deposits and uneven speed distribution with the associated drawbacks, the intermediate elements are formed by tubular bodies which can be pressurized by a coolant stream (4).

DEVICE FOR THE SURFACE TREATMENT OF HOLLOW GLASS BODIES

The present invention relates to a device for the surface treatment, in particular for the final heat coating, of hollow glass bodies by means of a carrier gas enriched with coating materials, said device consisting of a tunnel-shaped vaporisation hood with a conveyor belt that extends along the floor region of the vaporisation hood and transports the hollow glass bodies, and with large side areas for the alternate ejection and induction of carrier gas that flows around the hollow glass bodies and forms a layer of metal oxide on the surfaces of these.

It is known that the surfaces of glass bottles can be coated in order to increase their strength. In order that this can be done, the glass bottles, which are at a temperature that is between 370°C and 750°C, are moved on the conveyor belt through the vaporisation hood, within which carrier gas that is enriched with coating material flows around them. The coating materials are metal compounds, in particular of tin, titanium, or zirconium, and these break down on the hot surface of the glass, where they form a thin layer of metal oxide. Known vaporisation hoods have side areas through which the carrier gas can be alternately ejected and drawn in. In a vaporisation hood that is known, for example from EP-OS 0 494 495, the side ejection and induction areas are formed by a plurality of channels that are arranged so as to be adjacent to each other and extend between an ejection chamber or an induction chamber and the tunnel-shaped

vaporisation hood, and which are relatively long. There are unobstructed areas between the channels that are closed off at the sides, above, and below; if so required, a coolant can be passed through these areas. Starting from the ejection chamber and the induction chamber, these channels widen out in a funnel shape towards the tunnel-shaped vaporisation hood.

Production of the individual channels, which are arranged so as to be adjacent to each other and are connected to each other, is costly. The ends of the channels that are proximate to the vaporisation hood are exposed to a high level of thermal radiation because of the hot glass bottles, and this can result in undesirable overheating of the channel ends and can thereby cause the coating material to break down on the hot metal surfaces. This entails increased consumption of the coating material and can also lead to the formation of deposits that interfere with the proper functioning of the vaporisation hood. It is of little help that the side walls of the channels can be cooled by a coolant flowing through the unobstructed areas, since this exerts no noteworthy cooling effect on the heating inner ends of the channels.

Efforts are made to achieve the highest possible flow velocity and the most even velocity profile in order to achieve effective and even application of the coating material on the surfaces of the glass vessels. However, there are limits to the unrestricted increase of the flow velocity because there is a danger that the glass bottles will be blown off the conveyor belt at locations where there is a higher local flow velocity. In the case of previously known

vaporisation hoods, the velocity of the flow acting on the glass bottles in the area of the expulsion and induction openings is relatively high, whereas it can sink to almost zero in the area of the spacer elements. This, too, results in increased consumption of costly coating materials.

In view of the above, it is the task of the present invention to so configure a device for the surface treatment of the type described in the introduction hereto that the costs formerly incurred for the production of the channels are eliminated, excessive heating of the metal parts of the induction and ejection areas that come into contact with the coating material in the carrier gas is avoided, so that overheating of the coating material and the breakdown of said coating material that is associated with this are both precluded. The formation of deposits is to be prevented and at the same time the velocity distribution of the carrier gas that is ejected is to be greatly improved.

According to the present invention, in order to solve this problem, in an apparatus of the type described in the introduction hereto it is proposed that the large side areas be divided up into a plurality of apertures by tubular bodies.

When the device is configured in this way, the tubular bodies impede the flow of carrier gas and this leads to more even distribution of the carrier gas across the whole ejection area. A unified velocity profile is formed just behind the tubular bodies. For this reason, the hollow glass bodies are no longer blown off the conveyor belt, even if the

volume of the circulating flow is relatively high. The danger of overheating and the associated breakdown of the coating material in the carrier gas are both avoided; no more deposits are formed on the metal parts that come into contact with the coating materials. The efficiency of the device is greatly increased by better utilization and lower consumption of the coating material. Since there are no more long and defined channels, the associated production costs are eliminated.

The tubular bodies may be of round, oval, and/or angular cross section and are preferably connected to a coolant line formed in part by channels located above and below the tunnel shaped vaporisation hood. The tubular bodies can be acted upon by a gas or liquid coolant stream.

At least one group of ejection and/or induction openings may be formed on one or both sides of the tunnel shaped vaporisation hood, with groups of ejection openings being arranged opposite to groups of induction openings.

At least one additional row of tubular bodies may be arranged behind a first row of tubular bodies and offset relative thereto.

The present invention will be described in greater detail below on the basis of one embodiment that is shown in greatly simplified form in the drawings appended hereto. These drawings show the following:

Figure 1: A plan view of a device according to the present invention;

Figure 2: A side view of the device shown in Figure 1.

Figures 1 and 2 show a device used for the final heat coating process for glass bottles 1 that are only indicated in the drawing; this device comprises a tunnel-shaped vaporisation hood 2 and a conveyor belt 3. The glass bottles 1 are transported through the vaporisation hood 2 by

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the conveyor belt 3. The side limits of the hood 2 are formed by a plurality of tubular bodies 4 that define the apertures 5a, 5b that serve to expel or draw in a carrier gas that is enriched with coating material, pending on the configuration of the vaporisation hood 2, and thereby form ejection

apertures 5a or induction apertures 5b.

In the embodiment that is shown, the tubular bodies 4 are of circular cross section and extend to the whole height of the tunnel-shaped vaporisation chamber 6. At their upper and lower ends, the tubular bodies 4 become relatively flat channels 7 above and below the tunnel-shaped vaporisation chamber 6. A fan 8 is connected to the lower channel 7, by means of which room air can be drawn in and expelled from below through the lower channel 7, the tubular bodies 4, and the upper channel 7 to an upper outlet aperture 7a. This stream of air, which flows through the tubular bodies 4 and which is also referred to as a stream of coolant, cools the carrier gas, which is enriched with coating material, that is flowing through the ejection and induction apertures 5a, 5b between the tubular bodies 4. This carrier gas is delivered, for example, by a fan 9, which is only indicated in the drawings, into a pressure chamber 10, from which it then flows through the ejection apertures 5a into the tunnel-shaped vaporisation chamber 6. This carrier gas is also cooled by the air flowing in the channels 7 to which the pressure chamber 10 and an induction chamber 11 are adjacent. Then the carrier gas that is flowing out of the ejection apertures 5a that are opposite is drawn in through the induction apertures 5b that are formed in the area of the induction chamber 11 between the tubular bodies 4 and this carrier gas is then passed once again through the fan 9 and into the pressure chamber 10 to act once again of the tunnel-shaped vaporisation chamber 6.

In the embodiment that is shown, two fans 9 with the pressure chamber 10 and the induction chamber 11 are arranged offset to each other so that two areas, each with a plurality of ejection and induction apertures 5a, 5b, are formed opposite each other.

As a variation of the embodiment discussed above, it is possible for the tubular bodies 4 to be of a cross section that is other than the one shown. For example, it is possible for them to be of oval, angular, or rectangular cross section. However, cross sections that permit the tubular bodies 4 to be cut from tubular stock are advantageous. If the carrier gas cannot be sufficiently cooled by the stream of coolant that passes through the tubular bodies 4, it is possible to arrange at least one additional row of tubular bodies 4 behind the tubular bodies 4 that are arranged in a row although the tubular bodies 4 of one row should be offset relative to the tubular bodies 4 in the other row. In addition, it is possible to arrange a plurality of suction and pressure chambers 10, 11 as well as chambers that are not connected to a fan 9 on each side of the vaporisation hood 2. Each suction and pressure chamber 10, 11 then lies opposite a non-pressurized chamber. There is no positive circulation in such a configuration, however.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A device for the surface treatment, in particular for the final heat coating, of hollow glass bodies by means of a carrier gas enriched with coating materials, said device consisting of a tunnel-shaped vaporisation hood with a conveyor belt that extends along the floor region of the vaporisation hood and transports the hollow glass bodies, and with large side areas for the ejection and induction of carrier gas that flows around the hollow glass bodies and forms a layer of metal oxide on the surfaces of these, characterized in that the large side areas are divided up into a plurality of apertures (5a, 5b) by tubular bodies (4).

2. A device as defined in Claim 1, characterized in that the tubular bodies (4) are of round, oval, and/or angular cross section.

3. A device as defined in Claim 1 or Claim 2, characterized in that the tubular bodies (4) are connected to a coolant line.

4. A device as defined in Claim 3, characterized in that at least part of the coolant line is formed by channels (7) that are formed above and/or below the tunnel-shaped vaporisation hood (2).

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5. A device as defined in Claim 3 or Claim 4, characterized in that the coolant line and the tubular bodies (4) are acted upon by a coolant stream that is in the form of gas or liquid.

6. A device as defined in at least one of the Claims 1 to 5, characterized in that at least one group of ejection and/or induction openings (5a, 5b) is formed at least on one side of the tunnel-shaped vaporisation hood (2).

7. A device as defined in Claim 6, characterized in that a group of ejection openings (5a) is arranged opposite a group of ejection openings (5a) and a group of induction openings (5b) is arranged opposite a group of induction openings (5b).

8. A device as defined in Claim 6, characterized in that a group of ejection openings (5a) is arranged opposite a group of induction openings (5b).

9. A device as defined in at least one of the Claims 1 to 8, characterized in that at least one additional row of tubular bodies (4) is arranged behind a first row of tubular bodies (4).

10. A device as defined in Claim 9, characterized in that the tubular bodies (4) of one row are arranged so as to be offset relative to the tubular bodies (4) of the other row.

11. A device as defined in at least one of the Claims 1 - 10, characterized in that the circulating volume stream of the carrier gas can be matched to the requirement of the

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different hollow glass bodies by changing the speed of at least one fan (9).

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PATENT AGENTS

Fig.1

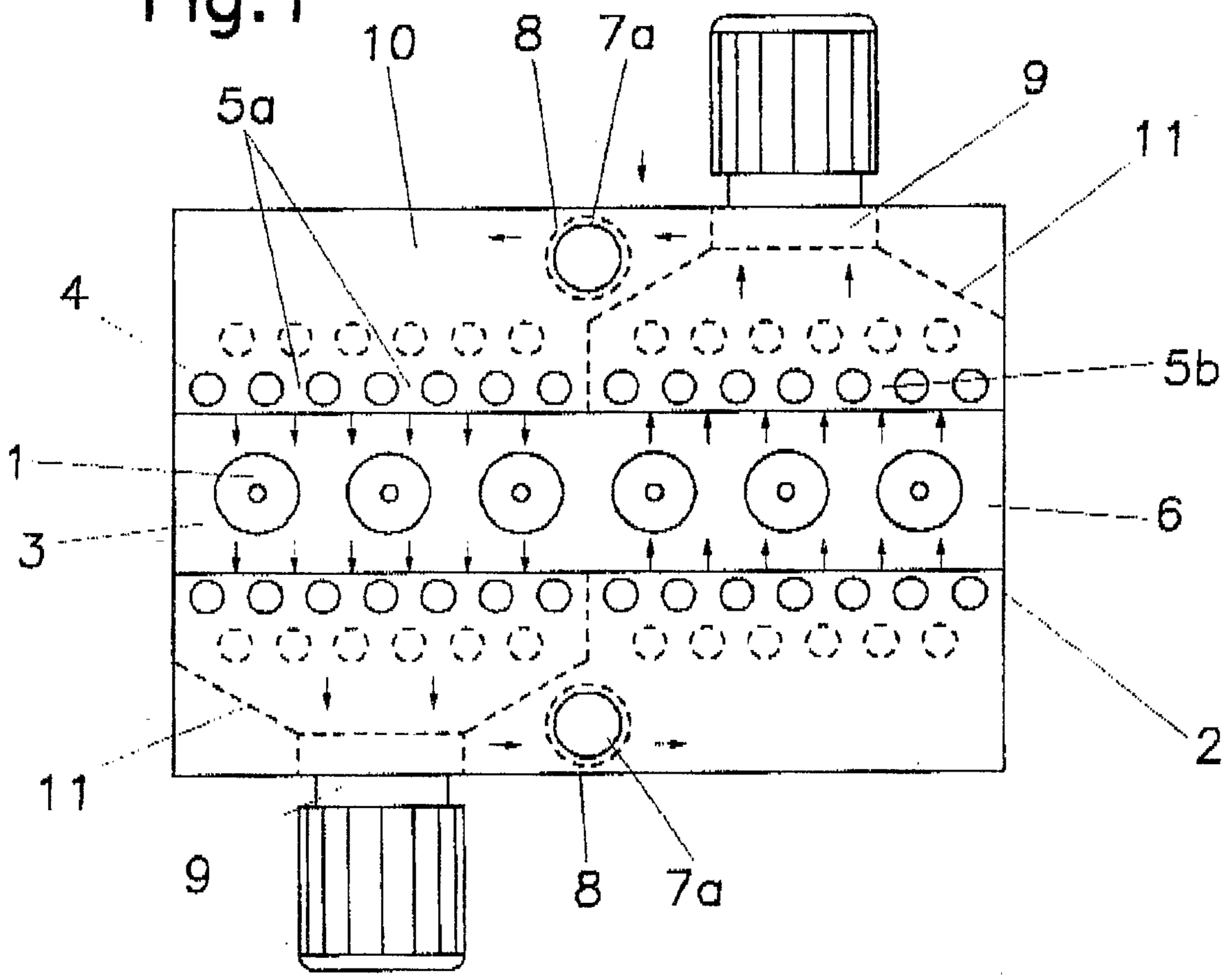
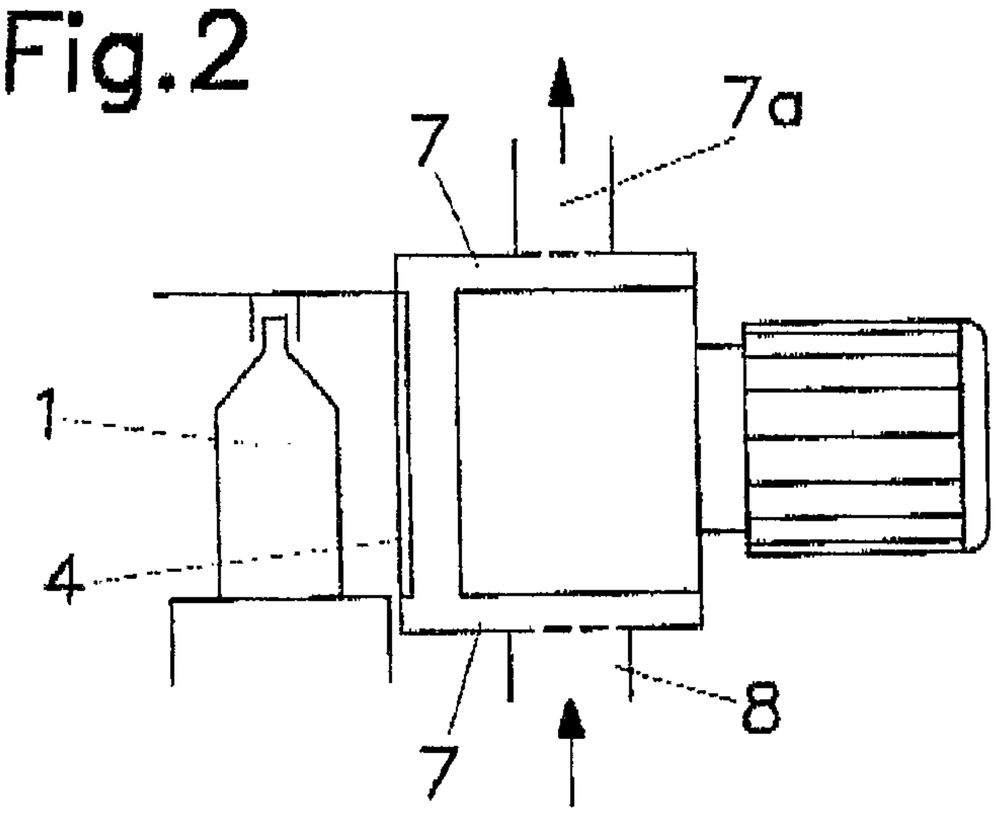


Fig.2



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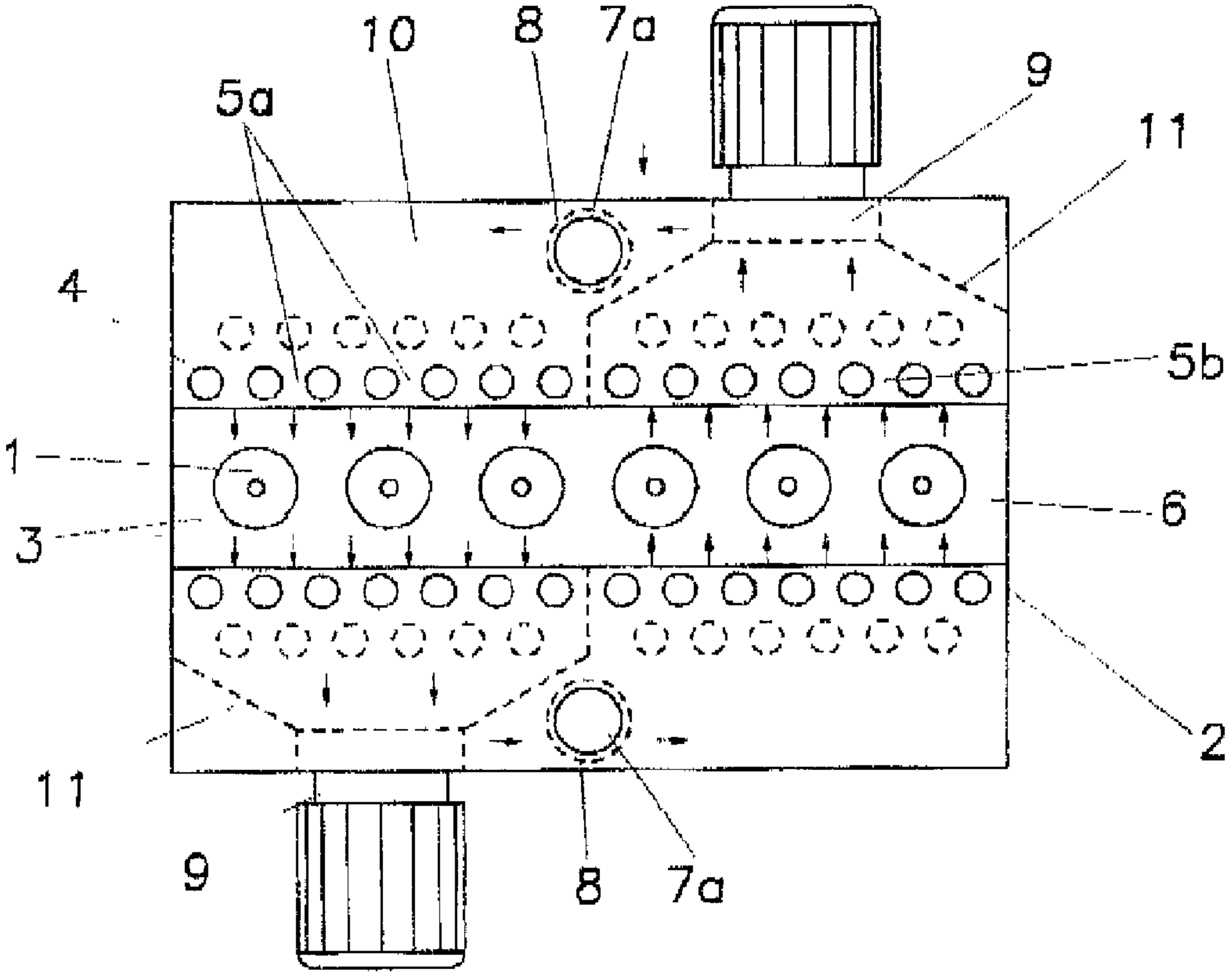
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