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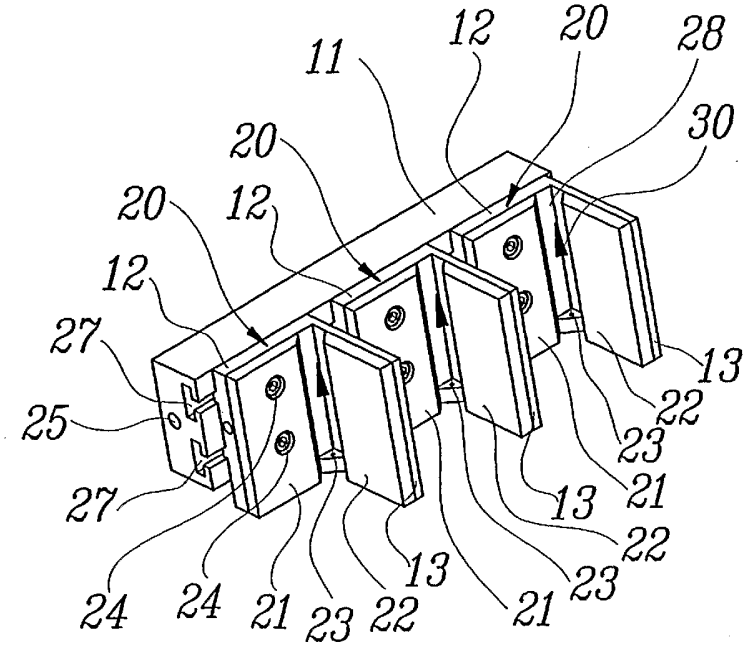
(54) **Title:** TRANSFERRING ELEMENT OF A PUSHER MECHANISM OF A GLASS FORMING MACHINE



(57) **Abstract:** A transferring element of a pusher mechanism of a glass forming machine comprising at least one jaw (20) with a base (12) and an arm (13) while a nozzle (23) for feeding of pressurized air from a central source (31) leads to the area of the jaw (20). The nozzle (23) is arranged in the lower part of the corner between the base (12) and the arm (13) and is directed upwards, parallel to the arm (13).

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Transferring element of a pusher mechanism of a glass forming machine

Technical Field

The invention concerns a transferring element of a pusher mechanism of a glass forming machine comprising at least one jaw with a base and an arm while a nozzle for feeding of pressurized air from a central source leads to the area of the jaw.

Background Art

Pusher mechanism of a glass forming machine is used to move formed glass products or groups of products from the fixed dead plate of the glass forming machine to a moving conveyor belt. For this purpose the pusher mechanism is provided with a transferring element the task of which is to grasp glass products on the dead plate of the glass forming machine and to transfer them to a moving conveyor belt along a pre-defined path.

Depending on the number of glass products that are to be transferred at the same time the transferring element of the pusher mechanism of the glass forming machine is equipped with the corresponding number of jaws. Each jaw has its base from which the arm for grasping the products protrudes. The arm usually forms an angle of 90° with the base.

Document US 5,527,372 discloses a transferring element of a pusher mechanism provided with jaws comprising of several arms that protrude from a common base. The arms represent integral parts of the base and this is why they cannot be rearranged. Each arm is equipped with a nozzle for directing pressurized air horizontally against the product in such a way that a greater part of the flowing air is routed over the surface of the transferred product horizontally along the corner between the arm and base of each jaw. A smaller part of the flowing air is routed over the surface of the product horizontally on the opposite side of the product. The flowing air that flows round the product in the horizontal direction exerts a

force on the product that holds the product in the corresponding jaw. This solution only uses horizontal flowing along the product to exert the retaining force.

A disadvantage of this solution is the limited area of the product that can be actively used for the exertion of the retaining force. The size of this active area depends on the horizontal dimension of the product and not on its vertical dimension.

Another disadvantage of this solution is the impossibility of adjusting the position of the arms to adapt the transferring element to product changes, i.e. changing sizes and shapes of transferred products. Desired changes can only be achieved through replacement of the whole transferring element produced exclusively for a particular product type.

The solution according to the above-mentioned document US 5,527,372 has been used as the basis for another known embodiment of the transferring element of a pusher mechanism, which is published in document US 5,733,354. This solution also uses pressurized air to exert retaining force onto the product. Each jaw is equipped with two nozzles that act exclusively in the horizontal direction and they are routed in such a way that the stream of pressurized air leaving the nozzles can consequently push the product into the jaws. The jaws and their holder form one whole. This transferring element is mainly designed for smaller products.

The solution according to the document US 5,733,354 has the same disadvantages as the solution of document US 5,527,372. This means that the area of the product that can be used for exertion of retaining force only depends on the horizontal dimension of the product and not on its vertical dimension. Another disadvantage also comprises in the double number of required nozzles of pressurized air.

Disclosure of Invention

The above-mentioned shortcomings are negated by a transferring element of a pusher mechanism of a glass forming machine comprising at least one jaw with a base and an arm while a nozzle for feeding of pressurized air from a central source leads to the area of the jaw according to the invention, the principle of which comprises of the fact that the nozzle is arranged in the lower part of the corner between the base and the arm and is directed upwards, parallel to the arm

The advantage of the transferring element according to this invention is the possibility to exert a much greater retaining force than in the case of the known mechanisms with horizontal blowing.

To facilitate easy adaptation of the transferring element to various products it is advantageous if the jaw is mounted on a holder in an adjustable way.

In a preferred embodiment, the holder is equipped with at least one horizontal clamping form groove in which a nut of a clamping bolt is installed in an adjustable way to ensure adjustable clamping of the jaw to the holder.

In another preferred embodiment, the nozzle is connected to a distribution channel in the jaw, which is connected to a distribution channel in the holder via a distribution space.

To reduce negative impacts of hot products to the jaw, the jaw base is equipped with a replaceable lateral contact insert and the jaw arm is equipped with a replaceable front contact insert.

Brief Description of Drawings

The invention will be described in detail with the use of drawings where fig. 1 schematically presents an embodiment of the transferring element according to the invention. In figs. 2 and 3 this transferring element is presented together with a dead plate and conveyor belt, including representation of transferred glass products. Fig. 4 presents detail of an embodiment of one jaw of the transferring

element. Fig. 5 presents the transferring element with various alternatives of design of the jaw. Fig. 6 shows the transferring element with examples of the shape of transferred products. Fig. 7 presents a schematic graphic representation of the area that pressurized air acts on.

Modes for Carrying Out the Invention

The pusher mechanism of a glass forming machine is used to transfer formed glass products 2 or groups of products 2 from the fixed dead plate 1 of the glass forming machine on a moving conveyor belt 3. Various design alternatives of the pusher mechanism are well-known and they will not be described in detail since the invention deals with the transferring element of the pusher mechanism only. This is why it is just the transferring element 10 of the pusher mechanism that is displayed in the drawings.

Figs. 1 to 3 present a transferring element 10 designed for transferring three products 2 (glass bottles) at the same time from the fixed dead plate 1 to the conveyor belt 3 which moves in the direction indicated by the arrow 41 (see fig. 2). Fig. 2 also shows the direction 42 of the movement of products 2 during transferring.

The transferring element 10 according to figs 1 to 3 comprises of a holder 11 that has two clamping form grooves 27 arranged in parallel above each other for adjustable installation of the jaw 20. In the clamping form grooves 27 there are square nuts 29 (see figs. 3 and 4) into which fixing bolts 24 are screwed that hold the jaws 20 in a selected place on the holder 11 after tightening.

Each jaw 20 has a base 12 and an arm 13 arranged in a perpendicular way to it. The base 12 of the jaw 20 is equipped with a replaceable lateral contact insert 21 and the arm 13 of the jaw 20 is equipped with a replaceable front contact insert 22. The replaceable contact inserts 21, 22 are made of heat-resistant material and they protect the hot glass product 2 from being damaged by the jaw 20.

In its lower part between the base 12 and arm 13 each jaw 20 is equipped with a nozzle 23 that is oriented upwards, parallel to the arm 13 and product axis 2.

Each nozzle 23 is connected through a distribution channel 34 in the jaw 20 to the distribution space 33 of an elongated shape into which the corresponding outlet from the common distribution channel 32 created in the holder 11 leads. The elongated shape of the distribution space 33 makes it possible for the distribution channel 34 in the jaw 20 to be connected to the distribution channel 32 in the holder 11 even if the jaw 20 is moved in the adjustment direction 43 (see fig. 3). The distribution space 33 is sealed with a gasket 26 along the perimeter. Pressurized air is brought to the distribution channel 32 in the holder 11 through the central supply line 31. Technological borings that are necessary for the production of channels are blinded with plugs.

The transferring element 10 according to figs 1 to 3 is equipped with L-shaped jaws 20 that are fixed to the holder 11 in an adjustable way and have a base 12 and an arm 13 that is oriented in the perpendicular direction to the base 12. However, fig. 5 shows that the jaws 20 can also be U-shaped as besides the arm 13 there is an auxiliary arm 14 connected to the base 12. In another embodiment according to fig. 5 the arm 13 is connected directly to the holder 11 so the holder body 11 directly forms the base 12 of this jaw 20.

Experts will understand that the nozzle 23 according to the invention can be also used in transferring elements 10 where the jaws 20 are connected to the holder 11 in a fixed way or where the jaws 20 and the holder 11 are made of one piece of material.

When the jaw 20 contacts a product 2, the corner between the base 12 and the arm 13 forms a vacuum channel 28 (see fig. 6) in the lower part of which the nozzle 23 is installed. Cross section of the vacuum channel 28 can be modified by forming of the base 12 and arm 13 of the jaw 20 or by forming of the replaceable contact inserts 21, 22.

When the jaws 20 come into contact with products 2 on the dead plate 1, pressurized air is routed from a source (not shown) via a central supply line 31 to the distribution channel 32 in the holder 11. Pressurized air is routed through the distribution channel 32 in the holder 11 to the distribution channels 34 in the jaws 20. Then, in each jaw 20 pressurized air leaves the nozzle 23 and flows upwards through the vacuum channel 28 formed by the walls of the jaw 20 in the corner between the base 12 and arm 13 and the side wall of the product 2. This vertical stream 30 of air (see figs. 1 and 7) is parallel to the vertical axis of the product 2. In the nozzle 23 the speed of the air stream 30 increases considerably, which results in a drop of the total air pressure in the area after the nozzle 23, i.e. in the vacuum channel 28. The result of this phenomenon is force 40 that draws the product 2 into the jaw 20.

The force 40 exerted by the vertical stream 30 of air is higher than the one in the case of known structures with horizontal blowing as the air stream 30 flows vertically around the product 2 and acts on a larger area 44 of the product 2 (see fig. 7).

The inlet of pressurized air to the transferring element 10 is closed when the transferring element 10 with the jaws 20 has transferred the products 2 in the direction 42 (see fig. 2) from the fixed dead plate 1 onto the moving conveyor belt 3. Due to the interruption of the supply of pressurized air, the force 40 that drew the products 2 into the jaws 20 ceases to act, so the products 2 can be carried by the conveyor belt 3 to the next production operation.

Experts find it evident that the transferring element 10 according to the invention can also transfer products 2 with a non-circular cross-section. Examples of such products are presented schematically in fig. 6. The angle β (see fig. 6) between the arm 13 of the jaw 20 and the base 12 of the jaw 20 is generally 90°. Of course, with atypical shapes of products 2 jaws 20 with another angle β can be used.

CLAIMS

1. A transferring element of a pusher mechanism of a glass forming machine comprising at least one jaw (20) with a base (12) and an arm (13) while a nozzle (23) for feeding of pressurized air from a central source (31) leads to the area of the jaw (20), **characterized in** that the nozzle (23) is arranged in the lower part of the corner between the base (12) and the arm (13) and is directed upwards, parallel to the arm (13).

2. The transferring element according to claim 1, **characterized in** that the jaw (20) is adjustably mounted to a holder (11).

3. The transferring element according to claim 2, **characterized in** that the holder (11) is provided with at least one horizontal clamping form groove (27) in which a nut (29) is installed in an adjustable way to hold the fixing screw (24) for an adjustable attachment of the jaw (20) to the holder (11).

4. The transferring element according to any of the claims 2 and 3, **characterized in** that the nozzle (23) is connected to a distribution channel (34) in the jaw (20) and the distribution channel (34) of the jaw (20) is connected to a distribution channel (32) in the holder (11) via a distribution space (33).

5. The transferring element according to any of the claims 1 to 4, **characterized in** that the base (12) of the jaw (20) is provided with a replaceable lateral contact insert (21) and that the arm (13) of the jaw (20) is provided with a replaceable front contact insert (22).

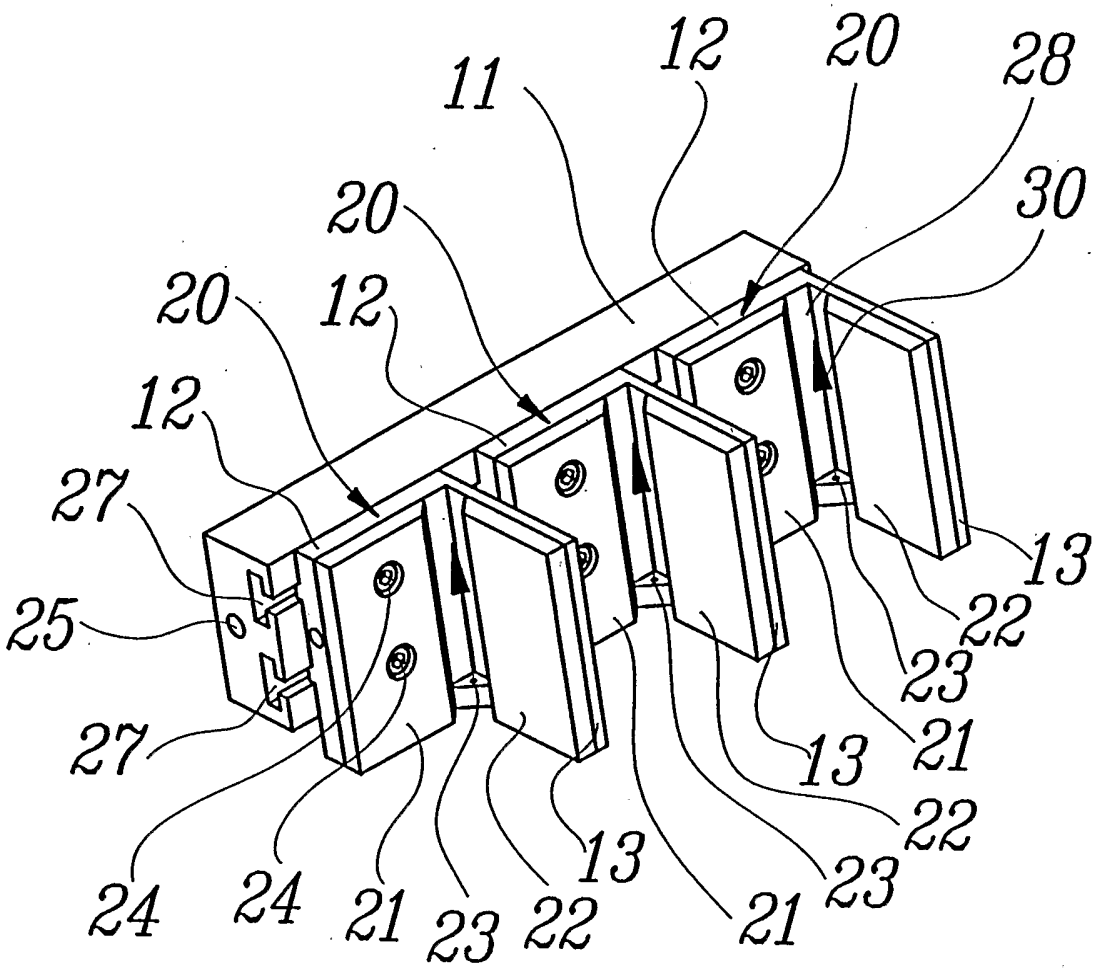
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Fig. 1

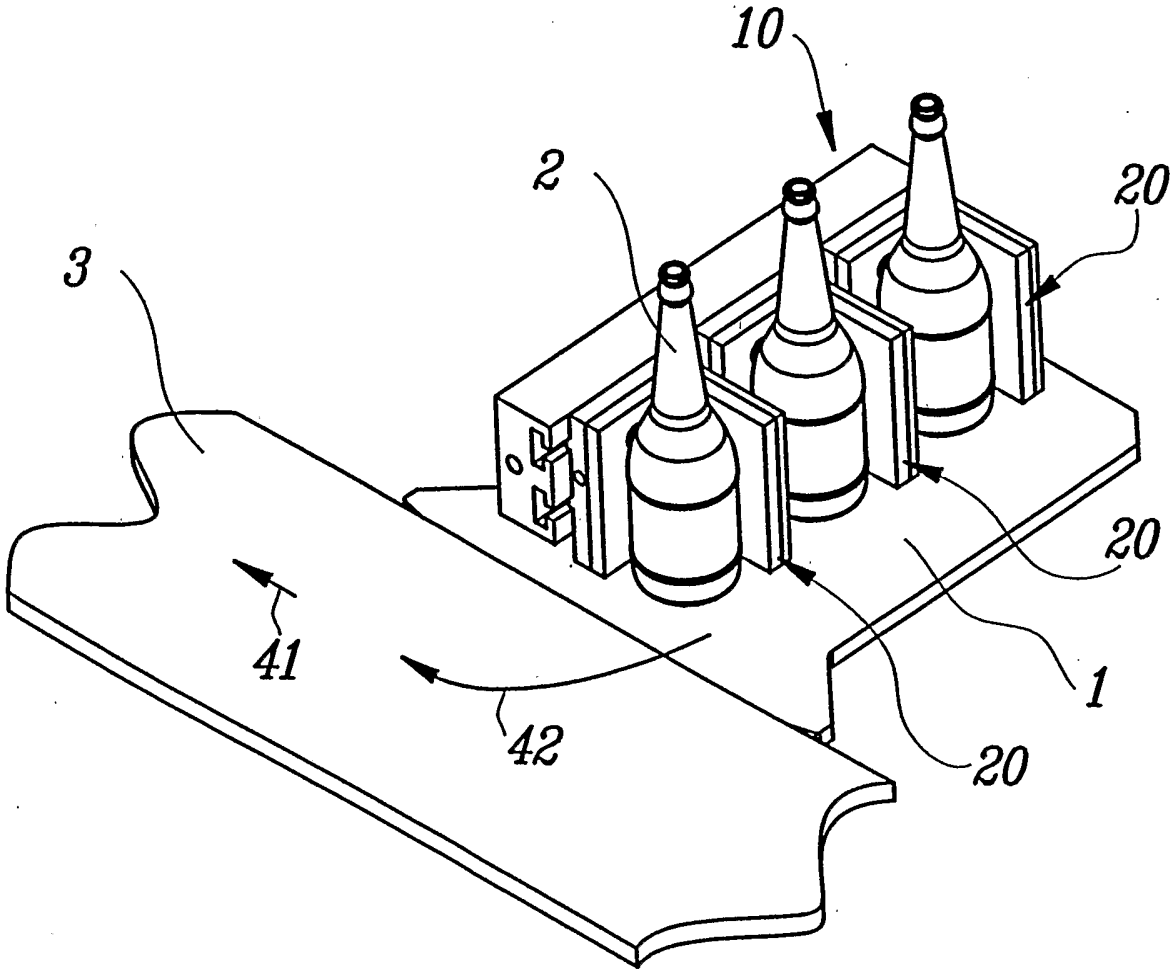

Fig. 2

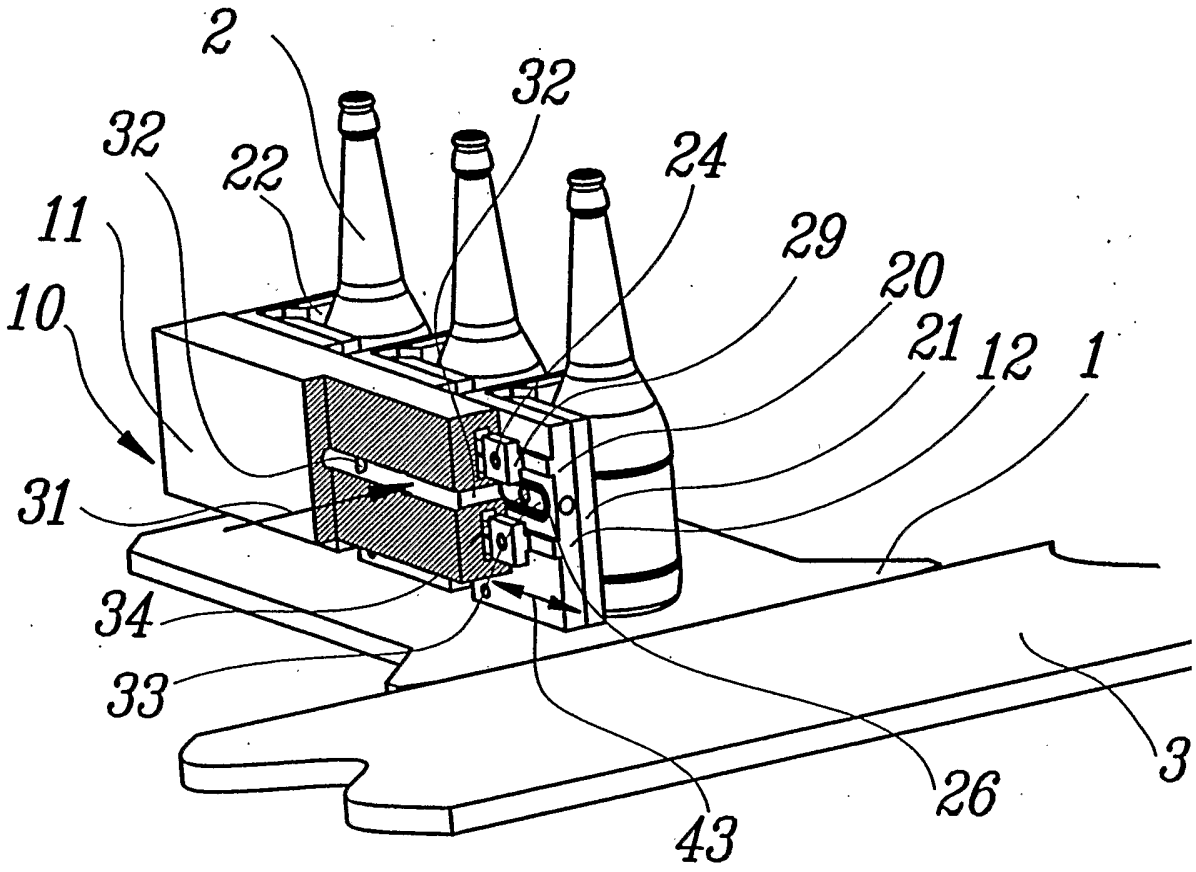

Fig. 3

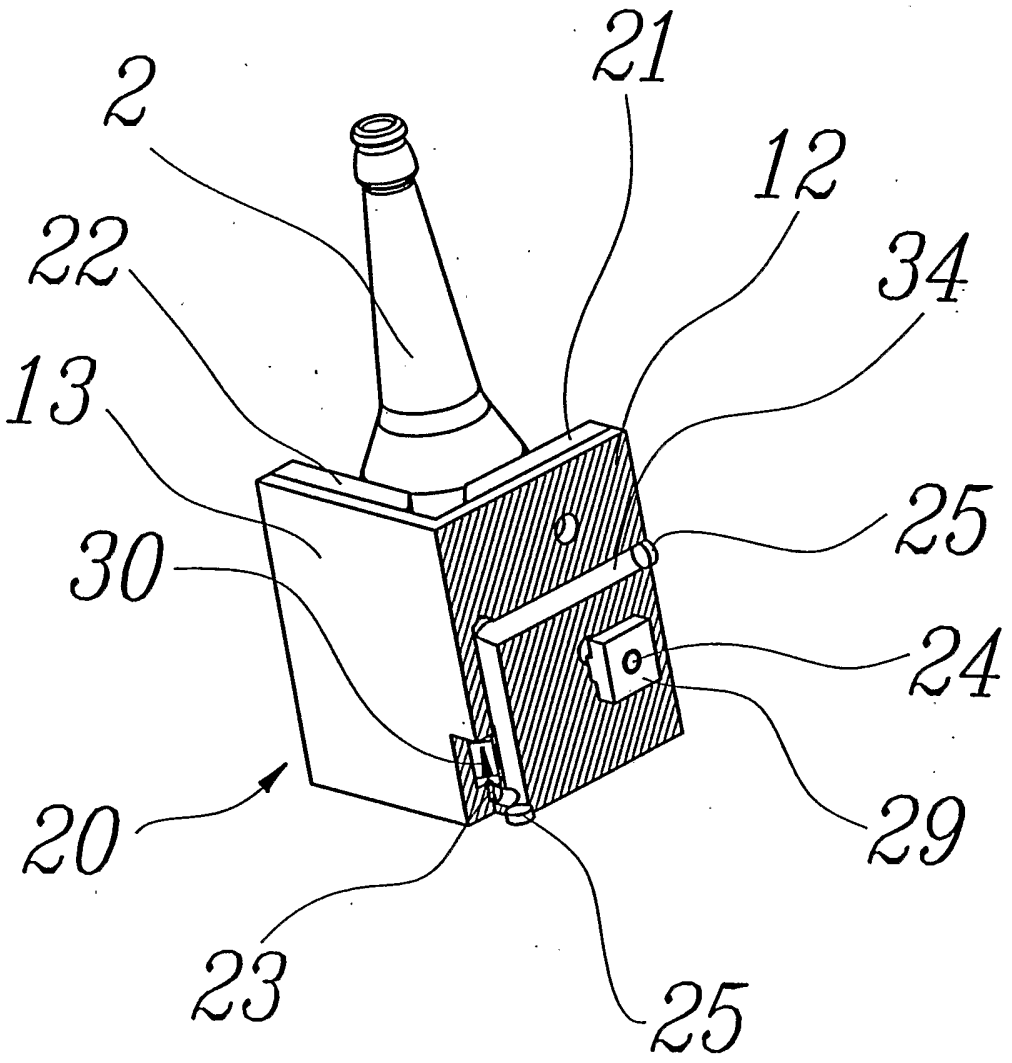

Fig. 4

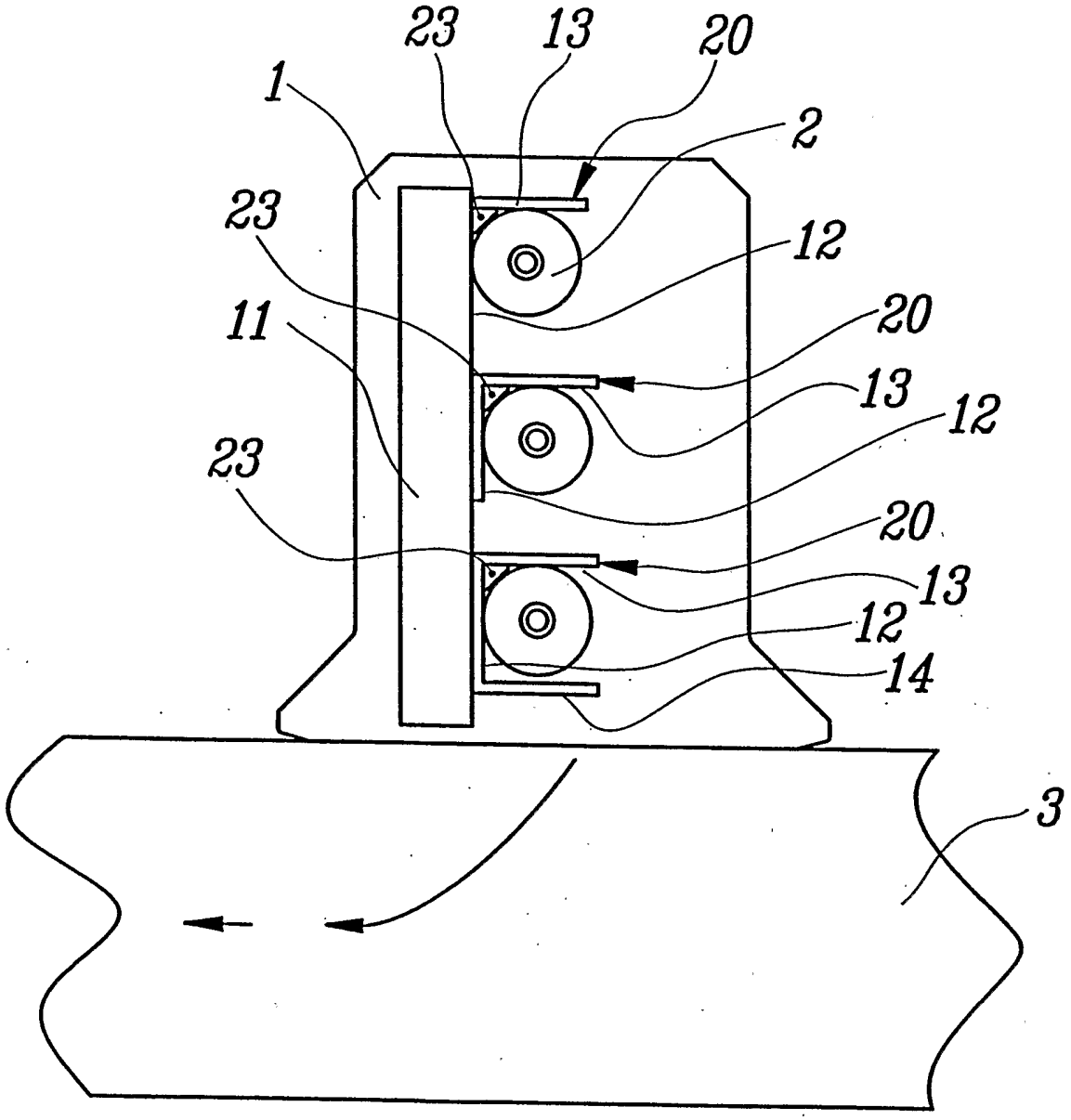

Fig. 5

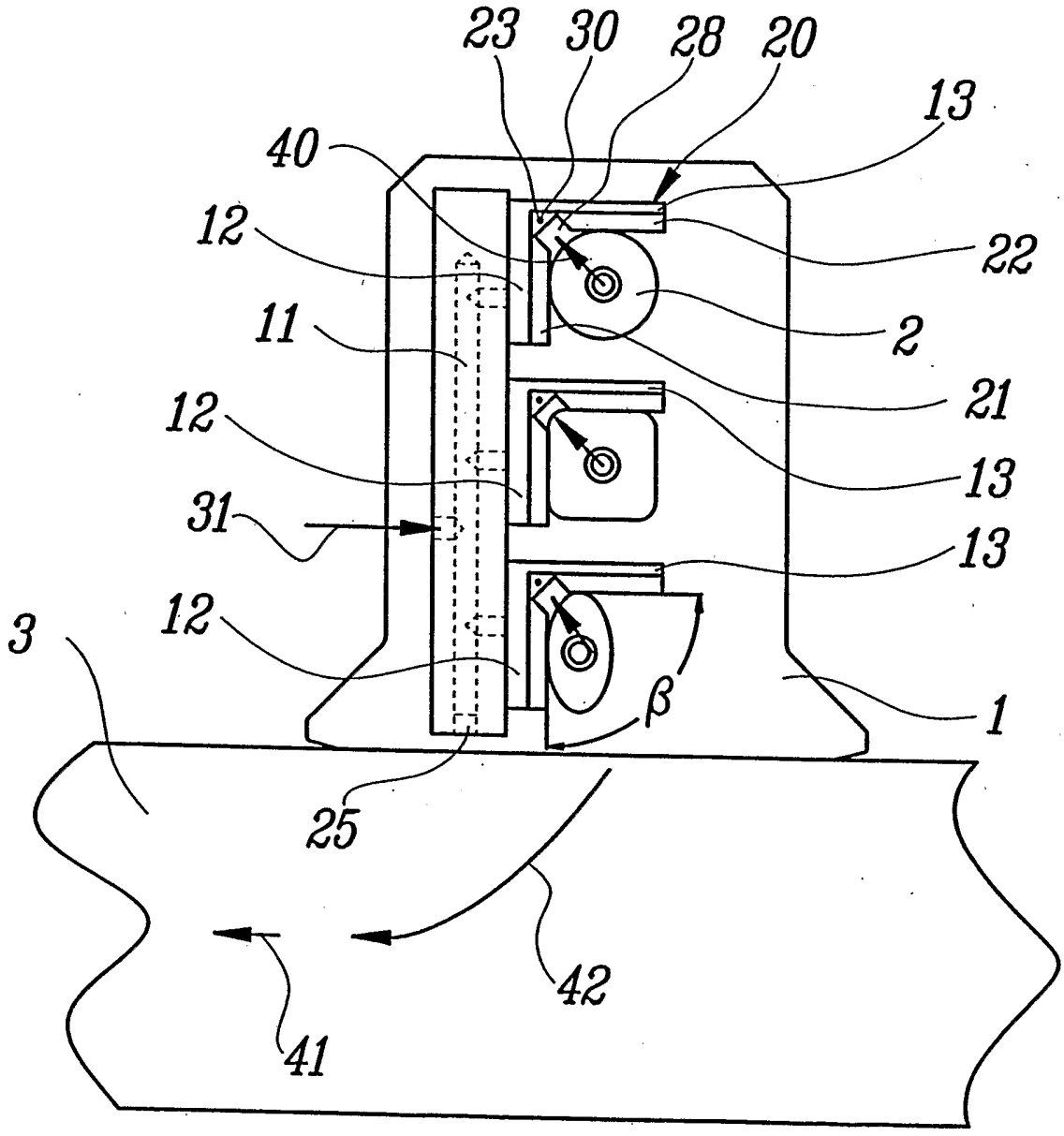

Fig. 6

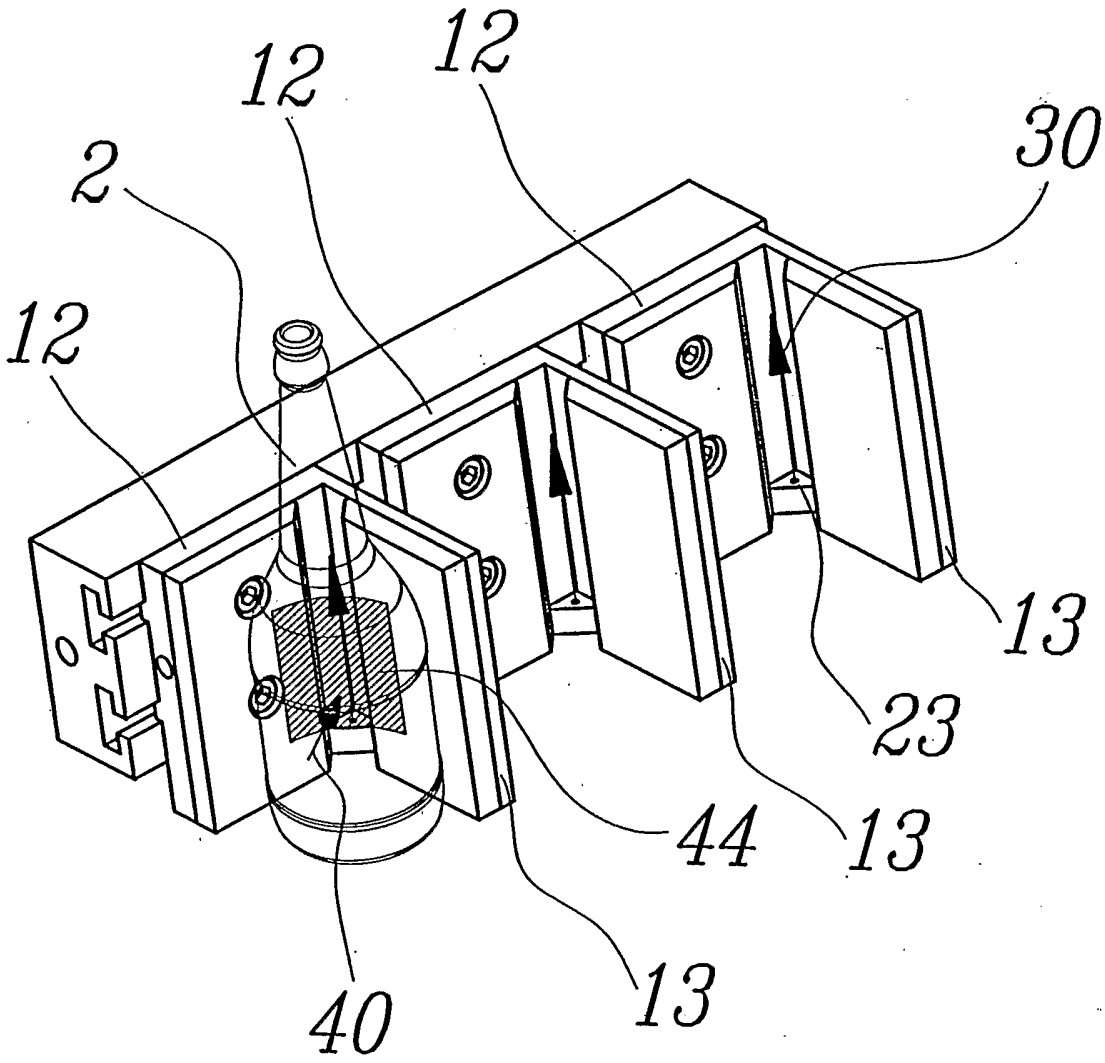

Fig. 7

INTERNATIONAL SEARCH REPORT

International Application No
PCT/CZ2005/000030

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C03B9/453

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)
IPC 7 C03B

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 494 063 B1 (MALEK RAIMUND) 17 December 2002 (2002-12-17) the whole document	1-5
A	US 6 601 410 B1 (BOEGERT HERMANN ET AL) 5 August 2003 (2003-08-05) the whole document	1-5
A	US 5 527 372 A (VOISINE ET AL) 18 June 1996 (1996-06-18) cited in the application the whole document	1
A	US 5 733 354 A (VOISINE ET AL) 31 March 1998 (1998-03-31) cited in the application the whole document	1

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

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
6 July 2005	13/07/2005

Name and mailing address of the ISA	Authorized officer
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/CZ2005/000030

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