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(71) Applicant: **Bisio Progetti S.p.A**
15100 Alessandria (IT)

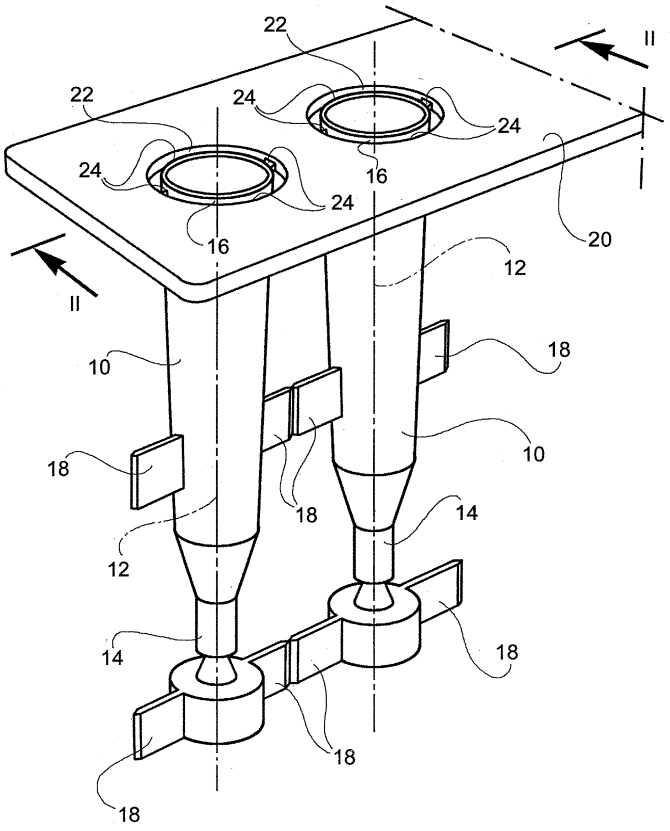
(72) Inventor: **Bisio, Luigi**
15100 Alessandria (IT)

(74) Representative: **Gerbino, Angelo et al**
Jacobacci & Partners S.p.A.
Corso Emilia, 8
10152 Torino (IT)

(54) A strip of containers having a reinforced structure, and associated filling process

(57) The strip comprises a plurality of containers intended to be filled with a liquid, paste or powder substance and subsequently sealed. Each container comprises a hollow body (10) having a longitudinal axis (12) and presenting a delivery end (14) and an open bottom end (16), and is joined to the contiguous containers by tabs (18) which project transversely from the median portion and/or from the delivery end (14) of the hollow body (10). The strip further includes temporary connection means at the open bottom ends (16) of the containers.

Fig. 1



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Description

[0001] The present invention relates to a strip of containers intended to be filled with a liquid, paste or powder substance and subsequently sealed. Typically, such substances are pharmaceutical products, cosmetics and the like and the containers are phials of plastics material having a small volume (from less than 0.5 to about 15 ml) for administration in individual doses or repeated one after the other at short intervals of time.

[0002] In more detail, each container of the strip comprises a hollow body having a longitudinal axis, a delivery end and an open bottom end, and is joined to the contiguous containers by tabs which project transversely from the median portion and/or from the delivery end of the hollow body.

[0003] In the prior art the strips of containers once produced, must be handled with suitable robots and packaged in an ordered manner whereby to avoid interpenetration with one another causing mechanical stresses which could lead to damage, breakage and the like. Typically, the strips are fitted onto specific forked holders which must be subsequently either packaged or supplied manually to a filling machine where the containers are filled by operators working in shifts in sterile chambers. Consequently, the need to make use of sophisticated handling apparatus and staff operating in particular conditions has a definitely negative impact on the time and costs of the container production process and the subsequent filling procedure.

[0004] For the purpose of overcoming these disadvantages, an object of the present invention is to provide a strip of containers of the type initially indicated in the present description and characterised by the fact that it includes temporary connection means at the open bottom ends of the said containers.

[0005] Such temporary connection means temporarily reinforce the structure of the strips which can thus be packaged loose, once produced, without the need for dedicated handling means. Similarly, the strips can be supplied loose to conventional selector-ordering devices disposed upstream of the container filling machines.

[0006] A further object of the present invention is constituted by a container filling process for the containers of a strip of the above-indicated type, characterised in that it comprises the following steps:

- disposing the said strip in such a way that the open bottom ends of the containers are facing upwardly,
- removing the temporary connection means from the open bottom ends of the said containers,
- introducing into the containers a liquid, paste or powder substance, and
- sealing the bottom ends of the said containers.

[0007] With respect to the prior art, the filling process of the present invention has the advantage of avoiding the use of forked holders specific to the strips of containers, as well as staff dedicated to the operation of feeding such holders to the filling machine.

[0008] Further advantages and characteristics of the present invention will become apparent from the following detailed description, provided purely by way of non-limitative example, with reference to the attached drawings, in which:

Figure 1 is a perspective view of a strip of phials according to the invention;
Figure 2 is a sectional view taken on the line II - II of Figure 1; and
Figure 3 is a perspective view of a variant embodiment of a strip of phials according to the invention.

[0009] Figure 1 illustrates a strip of containers intended to be filled with a liquid, paste or powder substance and subsequently sealed. Each container comprises a hollow body 10 having a longitudinal body 12, a delivery end 14 and an open bottom end 16, and is joined to the contiguous containers by tabs 18 which project transversely from the median portion and from the delivery end 14 of the hollow body 10.

[0010] The strip further includes temporary connection means for connecting the open bottom ends 16 of the containers, which means are formed as a plate 20 having a plurality of holes 22 within each of which a bottom end 16 of a respective container is located. From the edge of each hole 22 of the plate 20 project a plurality of circumferentially spaced frangible connection elements 24 which are joined to the outer surface of the bottom end 16. The connection elements 24 advantageously have a shape which tapers - narrowing from the edge of the holes 22 of the plate 20 towards the containers. The plate 20 is disposed orthogonally with respect to the longitudinal axes 12 of the containers.

[0011] Typically, the bodies 10 of the containers, the tabs 16 and the plate 20 of each strip are made of plastics material and are moulded in a single injection cycle. After moulding, the strips are subjected to the usual quality controls intended to ascertain the correctness of the dimension parameters of each container and the absence of micro-holes, after which they can be packaged loose, since the presence of the plate 20 reinforces their structure avoiding mutual interpenetration which can cause breakage, damage and/or deformations.

[0012] Subsequently, the strips of containers of the invention can be fed loose, for example by means of a loading hopper, to a selector-ordering device disposed upstream of a filling machine in which the open bottom ends 16 of the containers are oriented to face upwardly. In this configuration the plate 20, which has by now served its purpose of allowing a simplified management of the logistics of packaging and manipulation, is removed by exploiting the break points formed by the connections of the elements 24 to the bodies 10 of the containers. It is to be noted that the tapered form of the elements 24 promotes them to break off together with the

plate 20 thereby avoiding fragments thereof remaining adherent to the bodies 10 of the containers.

[0013] Then the liquid, paste or powder substance with which they are to be filled is introduced into the containers - operating, if necessary, in a sterile white room - and subsequently their bottom ends 16 are sealed by heat welding. During this operation all remaining traces of the connection elements 24 substantially disappear such that the strips of filled containers are substantially indistinguishable from those produced with conventional techniques which do not involve the use of a reinforcing plate 20 or similar temporary connection means at the bottom ends of the containers.

[0014] Figure 3 illustrates a variant embodiment of a strip of phials according to the invention, in which the same reference numerals as in the preceding Figures are used for corresponding or equivalent parts. In this case the plate 20 further has a projection 26 which projects from the outer transverse perimetrical edge with respect to the general plane of the plate 20 so as further to reinforce the structure thereof. The structure of the projection 26 can be continuous, as illustrated, or possibly even discontinuous.

[0015] Naturally, the principle of the invention remaining the same, the details of construction and the embodiments can be widely varied with respect to what has been described purely by way of non-limitative example, without by this departing from its ambit. In particular, the plate could be connected to the bottom end of each container by means of a respective single frangible connection element having a circumferential extension. Again, the height at which the reinforcing plate 20 is located with respect to the body 10 of the containers can vary and be chosen on the basis of the dimensions of these latter and the characteristics of the device for the removal the plate 20. Further, the number of containers in each strip can be substantially any number for example from 2 to 15 in dependence on their individual volume.

Claims

1. A strip of containers intended to be filled with a liquid, paste or powder substance and subsequently sealed, each container comprising a hollow body (10) having a longitudinal axis (12), a delivery end (14) and an open bottom end (16) and being joined to the contiguous containers by tabs (18) which project transversely from the median portion and/or delivery end (14) of the hollow body (10), said strip being **characterised in that** it includes temporary connection means for the open bottom ends (16) of the said containers.

2. A strip according to Claim 1, **characterised in that** the said temporary connection means are formed as a plate (20) having a plurality of holes (22) into each of which is disposed one bottom end (16) of a respective container, at least one respective frangible connection element (24) connected to the outer surface of the bottom end (16) of the container projecting from the edge of each hole (22).

3. A strip according to Claim 2, **characterised in that** a plurality of connection elements circumferentially spaced (24) and connected to the outer surface of the bottom end (16) of the respective container project from the edge of each hole (22) of the plate (20).

4. A strip according to Claim 2 or Claim 3, **characterised in that** the said at least one connection element (24) has a shape tapering from the edge of the hole (22) of the plate (20) towards the container.

5. A strip according to any preceding Claim from 2 to 4, **characterised in that** the said plate (20) is disposed orthogonally with respect to the longitudinal axes (12) of the said containers.

6. A strip according to any preceding Claim from 2 to 5, **characterised in that** the said plate (20) has a projection which extends from the outer perimetrical edge transversely with respect to its general plane.

7. A strip according to any preceding Claim, **characterised in that** the bodies (10) of the containers are of plastics material.

8. A filling process for containers of a strip according to any preceding claim, **characterised in that** it comprises the following steps:

   - orienting the said strip in such a way that the open bottom ends (16) of the containers face upwardly,
   - removing the said temporary connection means from the open bottom ends (16) of the said containers,
   - introducing into the containers a liquid, paste or powder substance, and
   - sealing the bottom ends (16) of the said containers.

Fig. 1

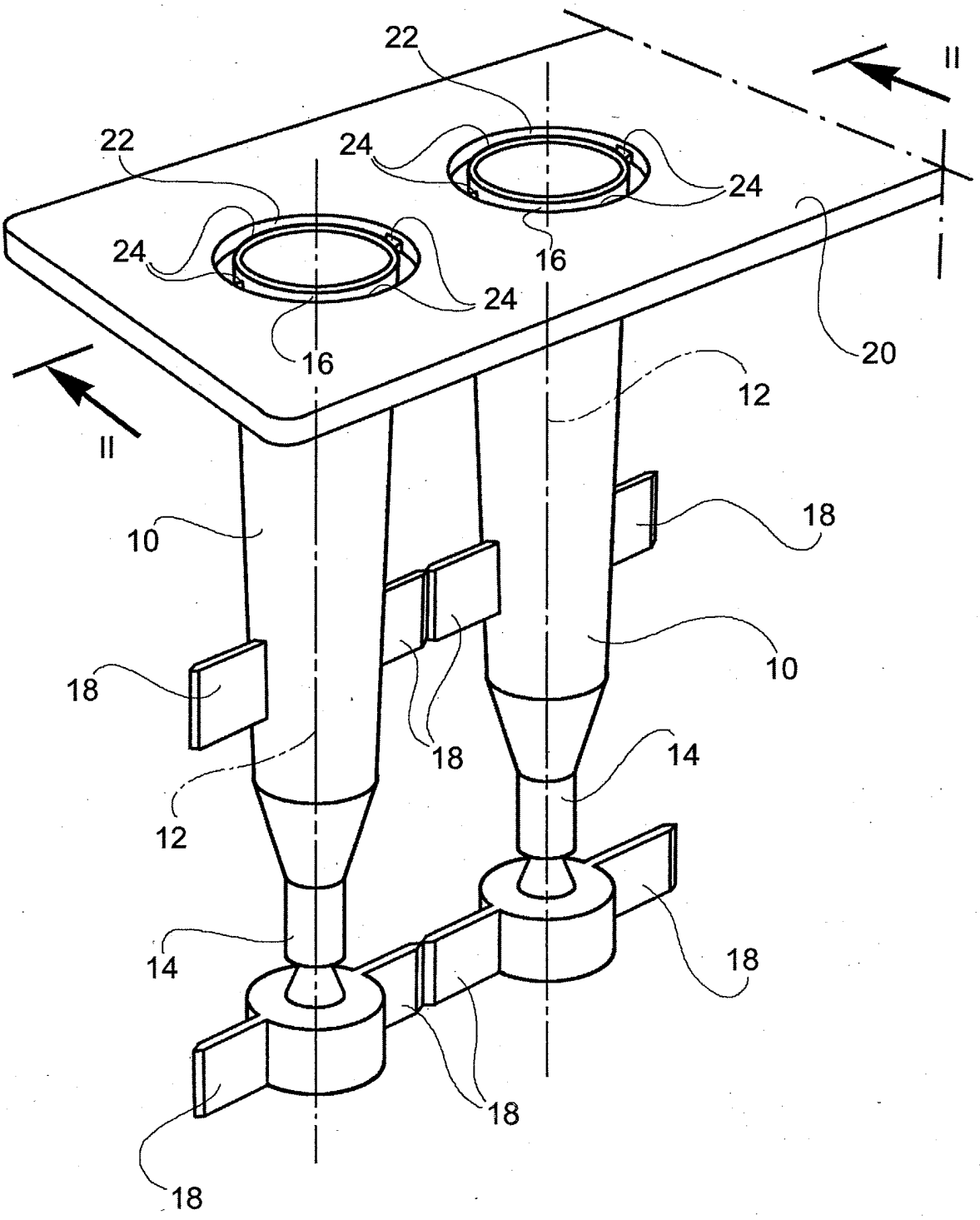


Fig. 2

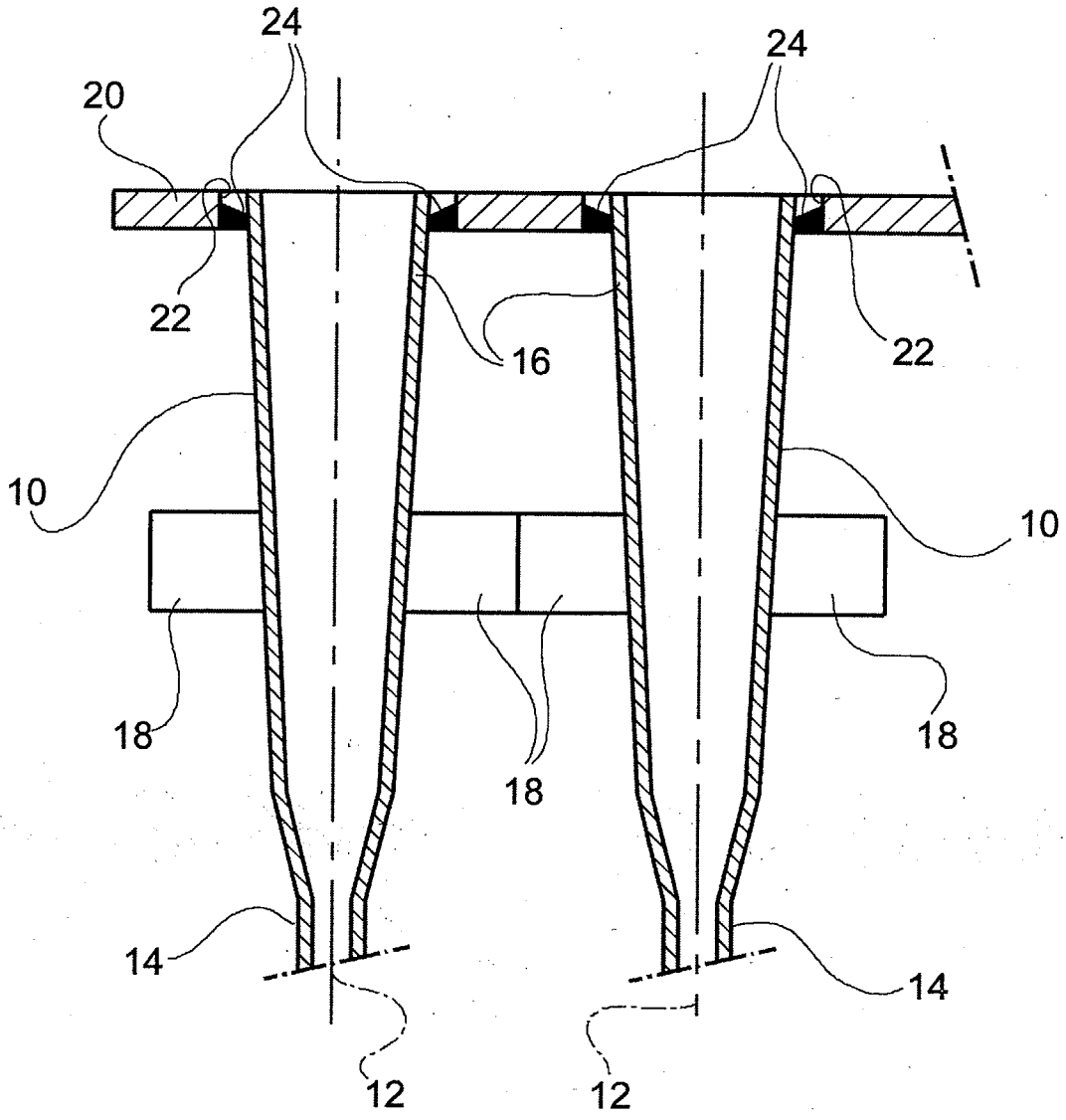
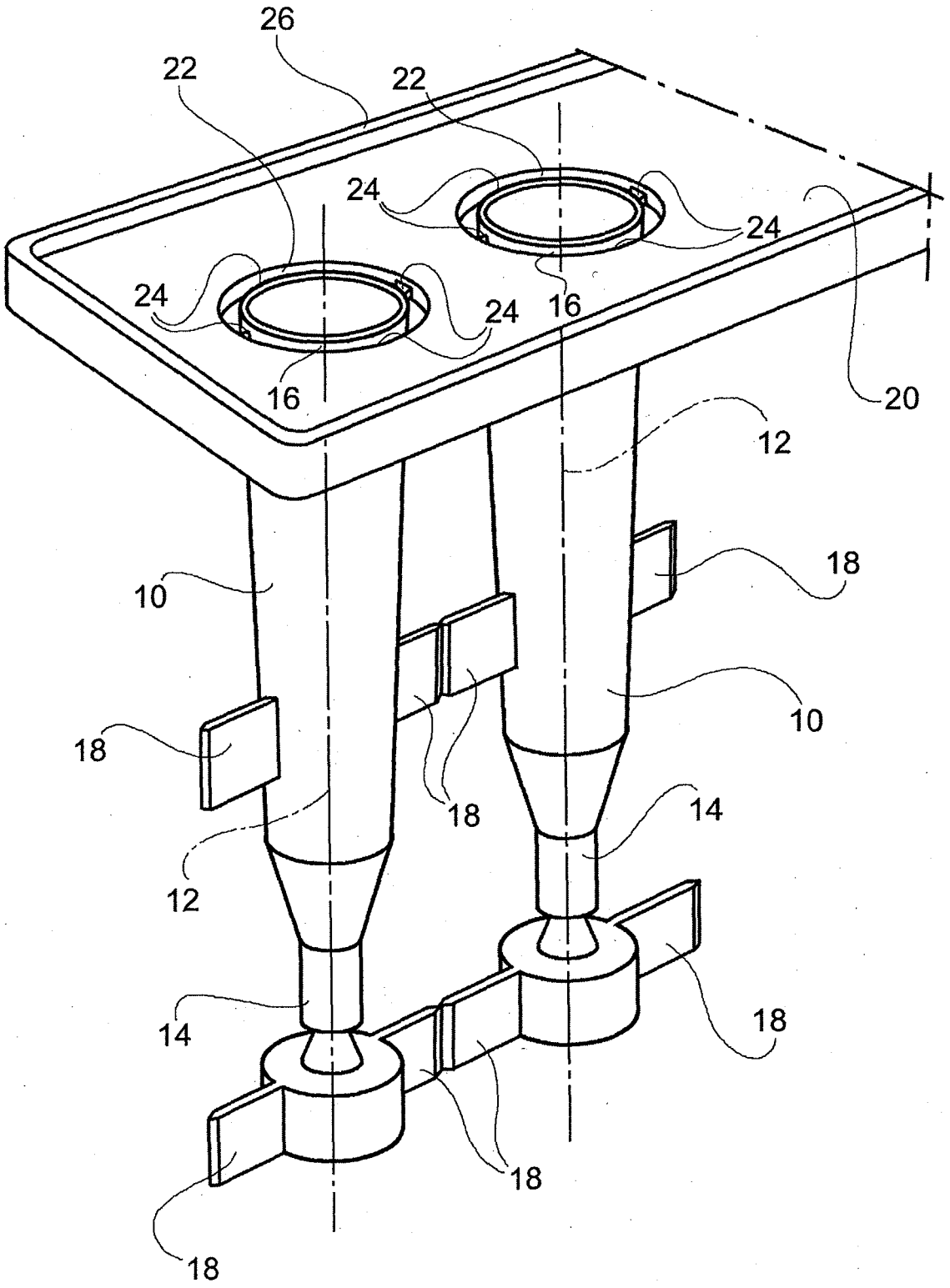


Fig. 3



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EUROPEAN SEARCH REPORT

Application Number
EP 04 42 5675

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	27 January 2005	SERRANO GALARRAGA, J

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 04 42 5675

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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