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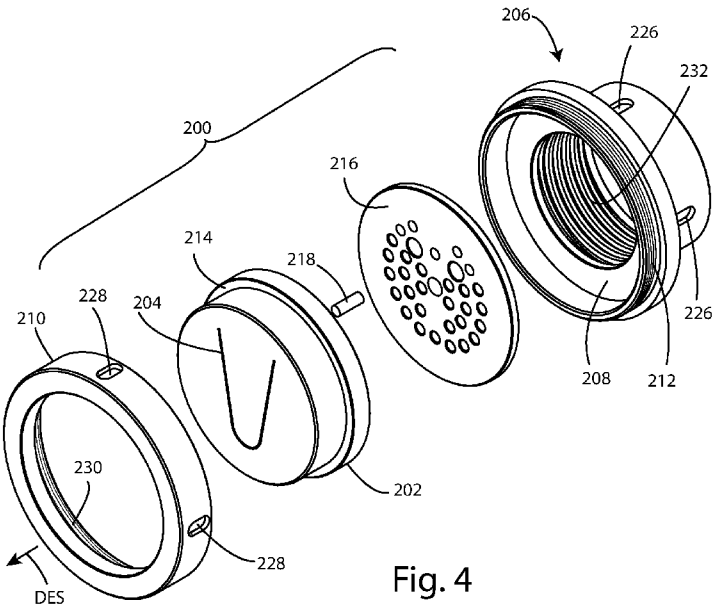


Fig. 4

(57) Abstract: Described is a pasta making machine comprising a kneading machine (1) in turn equipped with a container (11), and an extruding assembly (200) which comprises a forming or extruding body (202), in which is made at least one through extrusion slot (204), an extruding support (206), by means of which the extruding assembly (200) is fixed to the rest of the kneading machine (1) and which forms a seat (208) for the forming or extruding body (202), and a locking system arranged for reversibly securing the forming or extruding body (202) in the relative seat (208) of the extruding support (206), so that, when the locking system is loose, the forming or extruding body (202) is able to rotate with respect to the relative seat (208) in the extruding support (206) so as to rotate the extrusion slot (204) about an axis which is substantially parallel or longitudinal with respect to the extrusion direction (DES).

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# PASTA MAKING MACHINE AND METHOD FOR MAKING PASTA

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## Technical field

**[1]** This invention relates, generically, to a machine for making pasta, such as, for example, ravioli or tortellini or another pasta and a method for using it.

## Background art

**[2]** There are prior art machines for making pasta and, in particular, ravioli making machines, which use a pasta sheet prepared previously by means of, respectively, a first processing of the dough carried out in a pasta making machine and a second processing of the pasta obtained by means of a pasta machine which produces strips of pasta, which are usually wound into rolls.

**[3]** European patent EP**3003051**B**1** describes a machine for making filled pasta and, in particular, ravioli, in a continuous fashion, starting from the dough.

**[4]** This prior art machine consists of individual modular units and it is able to make the sheet of pasta directly on the kneading unit, fill it and give it the final shape of ravioli or tortellini.

**[5]** These and other combined prior art machines which produce the dough, transform it into pasta sheets, fill the pasta sheets with the filling and give them the final shape of the ravioli or tortellini are often equipped with a mould **100** which forms the ribbon of pasta sheet extruding the dough through a V-shape or U-shape slot **101** (Figures **1**, **2**); thanks to the relative weight, the ribbon of pasta sheet, which initially also has a U-shaped and V-shaped transversal section, opens downstream of the mould **100** resting, for example, on a conveyor belt, and adopts a substantially flat shape which allows the filling of the ravioli or tortellini to be placed.

**[6]** In order to allow the ribbon of pasta sheet to open and become flat, the U-shaped or V-shaped slot **101** must be as much as possible arranged

symmetrical to a vertical plane parallel to the extrusion direction DES, that is to say, to the average or main direction with which the dough passes through the U-shaped or V-shaped slot.

**[7]** The prior art moulds **100** with V-shaped or U-shaped slots comprise a threaded tubular body **102** an end of which is closed with a plate **103** in which is made the U-shaped or V-shaped extrusion slot **101**.

The plate **103** is fixed to the body **102** by means of a thread **104** which prevents it from rotating with respect to the body **102**.

The tubular body **102** can be screwed to the conduit coming from the pasta making machine by means of the thread **105**.

**[8]** The author of the invention has noted that mounting these prior art moulds **100** in such a way that their U-shaped or V-shaped slots are substantially symmetrical to the above-mentioned vertical plane parallel to the extrusion direction is very laborious and time-consuming: in fact, if the U-shaped or V-shaped slot **101** is not sufficiently symmetrical to said vertical plane, it is necessary to complexly unscrew, by hand, and re-screw the tubular body **102**, even several times, until finding a satisfactory position of the extrusion slot **101**, whether the thread **104** is coarse or fine.

**[9]** An aim of the invention is therefore to allow a mounting of a mould **100** more easily and with greater precision, in such a way that the U-shaped or V-shaped extrusion slot **101** is substantially symmetrical to a vertical plane parallel to the extrusion direction DES.

## Summary of the invention

**[10]** According to a first aspect of the invention, the aims are achieved with a method for making pasta having the characteristics described in claim 1.

**[11]** According to a second aspect of the invention, this aims are achieved with a process for making pasta having the characteristics described in claim 12.

**[12]** Particular embodiments are the subject of the dependent claims.

**[13]** The aims and advantages of the invention will become clearer from

the following description, relative to a particular embodiment of the machine for making pasta, according to the invention, given by way of example and without limiting its scope, with reference to the accompanying schematic drawings.

**List of drawings**

Figure 1 is a perspective view of an extruder of known type;

Figure 2 is a view, partly in cross-section, of the extruder of Figure 1 according to a plane passing through the axis of the extruder and parallel to the direction of extrusion;

Figure 3 is a first perspective view of an extruder for making pasta according to a first particular embodiment of the invention;

Figure 4 is an exploded perspective view of the extruder of Figure 3;

Figure 5 is a cross-section view of the extruder of Figure 3, according to a plane passing through the axis of the extruder and parallel to the direction of extrusion;

Figure 6 is a perspective view from above of a machine for making filled pasta, equipped with the extruder of Figure 3;

Figure 7 is a front view, partly in cross-section, of the machine of Figure 6;

Figure 8 is a side view of the machine of Figure 6;

Figure 9 is a side view, partly in cross-section, of the machine of Figure 6.

**Detailed description**

**[14]** The expressions “pasta” and “filled pasta” used in this description means a pasta obtained from a dough of flour and water which is subsequently shaped and eaten after at least cooking in boiling water or steam.

**[15]** The expression “pasta sheet” used in this description means relatively thin sheets of pasta from which are made, for example, lasagne, ravioli, tortellini, etc.

**[16]** With reference to the above-mentioned drawings, the machine for making pasta according to the invention, such as, for example, ravioli,

tortellini or other filled pasta, comprises a pasta making machine **1** in turn equipped with a container **11** and an extruding assembly **200**.

**[17]** The container **11** is designed for forming inside it dough based on flour and water from which to make the pasta sheet.

**[18]** The extruding assembly **200** in turn comprises:

- a forming or extruding body 202, also called extruder 202, in which is made a through extrusion slot 204, through which, according to a predetermined extrusion direction (DES), the dough coming from the container 11 substantially takes the shape of a ribbon or sheet;
- an extruding support **206** fixed to the rest of the pasta making machine **1** and which forms a seat **208** for the extruding body **202**; and
- a locking system arranged for reversibly securing the forming or extruding body 202 in the relative seat 208 of the extruding support so that, when the locking system is loose, the forming or extruding body 202 is able to rotate with respect to the relative seat 208 in the extruding support 206, for example whilst remaining inserted in the seat, so as to rotate the extrusion slot 204 about an axis which is substantially parallel or longitudinal with respect to the extrusion direction DES (Figures **3**, **4**).

**[19]** The expression “extrusion direction DES” used in this description means the main or average direction of the dough coming out from the through extrusion slot **204**.

**[20]** According to the embodiment of Figures **3**-**5**, wherein the forming or extruding body **202** substantially has the shape of a disc, the extrusion direction DES is substantially perpendicular to the relative front surface **207** which, as in the embodiment illustrated, can be, for example, substantially flat.

**[21]** According to the embodiment of Figures **3**-**5**, the extrusion through slot 204 can have transversal outlet sections with, for example, a substantially C-shape, V-shape or U-shape, but according to other embodiments not illustrated it can clearly have different shapes, for

example transversal outlet sections with a straight line shape, a W-shape, an L-shape, a zig-zag shape, or a wavy or lobed shape.

**[22]** A groove or other guide cavity **234** can be advantageously made on the upstream face of the forming or extruding body **202**, having through sections initially larger than the slot **204** and progressively decreasing in size with the aim of starting and guiding in an orderly fashion the flow of the dough towards the slot **204**.

**[23]** According to the embodiment of Figures **3**-**5**, the locking system can comprise a fixing frame or ring nut 210, reversibly fixed to the extruding support 206 and extending around the forming or extruding body 202 fixing it to the extruding support 206.

**[24]** For example, the ring nut **210** can be fixed to the extruding support **206** screwing onto the thread **212** made on the support **206**, for example on its outer sides; for this purpose, the ring nut **210** can be provided with a suitable inner thread **230**.

**[25]** When the extruding assembly **200** is fitted, advantageously the front surface **207** of the forming or extruding body **202** protrudes outside the ring nut **210** (Figures **4**, **5**).

**[26]** As mentioned above, for example according to the embodiment of Figures **3**-**5**, the forming or extruding body **202** can substantially have the shape of a disc.

**[27]** Advantageously, its perimeter sides form a retention step **214** designed to engage with a corresponding female seat or abutment surface made in the ring nut **210** preventing the forming or extruding body **202** from sliding out from the latter at least in the extrusion direction DES.

**[28]** According, for example, to the embodiment of Figures **3**-**5**, the seat **208** can have, for example, an overall cylindrical shape or in any case, advantageously, that of a recess delimited by a female surface of revolution.

**[29]** The seat **208** prevents movements of the forming or extruding body

**202** in directions parallel, longitudinal and perpendicular to the extrusion direction (DES).

**[30]** In the seat **208**, between the extruding support **206** and the forming or extruding body **202** there can be interposed a distribution plate **216** having the purpose of distributing the dough coming from the container **11**, or in any case from upstream, on a wider surface.

**[31]** According to the direction of flow of the dough during the kneading, the distribution plate **216** is position upstream of the extruding body **202**.

**[32]** For this purpose, the distribution plate **216** can be equipped with a plurality of through holes which form a sort of grid.

**[33]** According to other embodiments not illustrated, the distribution plate can form a single piece with the forming or extruding body, in other words, the grid of the holes of the plate **216** can be made directly on a wall of the forming or extruding body which closes downstream the conduit **232** upstream of the seat **208**.

**[34]** If necessary, the extruding assembly **200** can be equipped with one or more pins **218** inserted in suitable holes both in the distribution plate **216** and in the forming or extruding body **202** preventing the plate **216** and the body **202** from rotating relative to each other.

**[35]** The forming or extruding body **202** and/or any distribution plate **216** are made preferably of bronze or brass, in order to render the surface of the pasta slightly rough and therefore more suitable for retaining sauces and dressings.

**[36]** The extruding support **206** is preferably made of stainless steel.

**[37]** In order to extrude ribbons of pasta sheet which are relatively wide, the extruding support **206** advantageously forms a wider head **222** and a relatively narrower leg **224** (Figure **5**).

**[38]** In order to more easily unscrew and screw the extruding assembly **200** from/on the rest of the pasta making machine **1**, advantageously on the leg **224** there are one or more blind slots or other recesses **226** in

which to engage a suitable tool or unscrewing and screwing (Figure **5**).

**[39]** Similar blind slots or other recesses **228** can be made around the sides of the ring nut **210.**

**[40]** According to embodiments not illustrated, the gripping slots **226** and/or **228** can be replaced by or combined with suitable protruding pins or other projections, and both can be arranged on the head **222**.

**[41]** According to the embodiment of Figures **6**-**9**, the pasta making machine **1** can form part of a first modular unit **10** and comprise, for example, a base **33** and the above-mentioned container **11**.

**[42]** The container **11** can have, for example, substantially the shape of a cylinder arranged with the axis vertical during the normal use and operation of the machine.

**[43]** The container **11** is preferably made of stainless steel and has inside it a planetary type stirrer in turn comprising a spiral rotating about a relative axis and with the axis rotatable about the vertical line passing through the centre of the container **11**, in such a way that the combination of the above-mentioned movements determines the rotation of the stirrer whilst it moves inside the container **11**, in order to best mix, amalgamate and knead the various ingredients.

**[44]** The dough produced in this way, according to the invention, is then pressed and extruded through the extruding assembly **200** described above, located downstream of the container **11** and fed by it.

**[45]** More preferably, the extruding assembly **200** is located downstream of an extrusion unit in turn comprising, for example, an extrusion screw **12** and a jacket or other casing, with a, for example, cylindrical shape, containing the screw **12**.

**[46]** The extruding assembly **200** can be fixed to the extruder by, for example, screwing the threaded section **220** of the extruding support **206** on a corresponding threaded section of the outlet opening of the extruder or in any case, on another conduit located downstream of the extrusion

unit.

**[47]** The extrusion unit is in turn located downstream of the container **11** and fed by it with the dough.

**[48]** The extruding assembly is preferably located at or in the proximity of the bottom of the container **11.**

**[49]** Advantageously, the extrusion unit is located below the bottom of the container **11** in such a way that gravity helps the dough to fall spontaneously into the extruder**.**

**[50]** Preferably, the extrusion screw **12**, any piston which can replace it and the extruding assembly **200** have the axis substantially horizontal.

**[51]** The extrusion unit is preferably actuated by a motor, contained in the casing **14** of the machine **1**, for example by means of a series of gears and a conical torque (not illustrated in the accompanying drawings); the motor of the machine, driven by the operator by means of a control panel **15**, can also actuate the stirrer of the kneading unit **10**.

**[52]** In practice, upon completion of the kneading step, a discharging window located on the bottom of the container **11** opens, manually or automatically, letting the dough fall into the extrusion unit.

**[53]** Rotating about itself, the extrusion screw **12** pushes the dough outside the extruding assembly **200**; passing through the extrusion slot **204** the dough adopts the shape of a relatively thin sheet or ribbon and can be immediately placed, assisted by gravity, on the conveyor belt **18.**

**[54]** In other words, the extrusion unit discharges the dough, already ready at the outlet from the kneading unit **10**, into the second modular unit **16**, of which the combined unit **2** is formed.

**[55]** The second unit **16** can comprise, for example, a ravioli making machine, designed to insert the filling in the sheet of pasta and seal and cut the later so as to form the individual finished ravioli, or other filled pasta.

**[56]** More specifically, according to preferred but non-limiting

embodiments of the invention, such as those illustrated in Figures **6-9,** the pasta making machine **1** or, in any case, the modular unit **10** continuously produces the pasta sheet and places it on the conveyor belt **18** or other continuous conveyor, which conveys it below the dispensing cone or funnel **19** of a cylindrical container **20** of the filling of a second modular unit (ravioli making machine) **16**, which is alongside and in cascade with the pasta making machine **1.** The belt **18** for conveying the ravioli making machine **16** can be placed alongside, in a known manner, steel sheets **40** in order to raise the pasta sheet to the sides and convey it towards the mould **24**, which folds it longitudinally into the two flaps, closing the filling in the pasta sheet, after the dosing of the filling performed by means of the piston **21**, actuated, in turn, by the rack **22**.

**[57]** More specifically, the piston **21** compresses the filling so that it falls to the centre of the pasta sheet in the quantity set by the operator (this dosing is obtained, for example, by means of a regulator 35) and the pasta sheet, filled in this way, passes, for example, through the mould assembly **24**, consisting of a smooth roller and a shaped roller (not illustrated).

**[58]** All this, together with the making of a series di contact elements (holes or slits) on the smooth roller, allows the characteristic and desired shape to be given to the ravioli; in fact, the machine can produce various types of ravioli simply be changing the mould **24** and the relative smooth and shaped rollers.

**[59]** The pasta sheet can therefore proceed to the mould **24** which includes the smooth roller and the shaped roller, both rotating with a vertical axis; the mould thereby allows the flaps of the pasta sheet to be closed with the dose of filling inside them, so as to form one or more ravioli at each turn of the smooth and shaped rollers.

**[60]** The second modular unit or ravioli making machine **16** can be advantageously equipped with a brush **27,** arranged against the smooth and shaped rollers, which rotates transversely with respect to the outlet

direction of the ravioli on the discharge chute **32**, so as to cause the detachment of the individual ravioli if they remain stuck to the roller.

**[61]** The brush **27** can be actuated by a motor pin (not shown) actuated by a relative motor mounted on the modular unit 16.

**[62]** As mentioned, the electric motor of the pasta making machine **1** actuates the stirrer present inside the container **11** of the pasta making machine **1** and the motor can be used to actuate the screw feeder **12**. Moreover, according to preferred embodiments, the pasta making machine **1** and the ravioli making machine **16** have two independent motors, which actuate the respective mechanical components of the relative machines.

**[63]** In order to mount the extruding assembly **200** on the extrusion unit, as already mentioned the extruding support **206** is simply screwed on the outlet opening of the extrusion unit.

**[64]** Starting to screw the extruding support **206** with a random position, when the extruding assembly **200** is completely tightened the extrusion slot **204** most probably has an incorrect orientation with respect to the conveyor belt **18**, typically placing on it the ribbon of pasta sheet folded on itself instead of completely open, flat and extended.

**[65]** The assembly technician can however tighten the extruding support **206** with the final tightening torque.

**[66]** Subsequently, in order to correct the orientation, the assembly technician must only slightly unscrew the ring nut **210** - in almost all cases a fraction of a turn is sufficient - loosening the tightening of the forming or extruding body **202**, and then rotate by hand the latter in the seat **208** about itself around an axis parallel to the extrusion direction DES.

**[67]** After quickly finding, by hand, the correct orientation of the forming or extruding body **202**, the assembly technician re-screws and tightens again the ring nut **210** on the extruding support **206** locking the angular position of the forming or extruding body **202** and therefore, of the extrusion slot

**204**, and again in order to do this a fraction of a turn is sufficient in almost all cases (this operation therefore requires just a few seconds instead of the several minutes necessary for completely unscrewing and re-screwing, very often several times, the thread 104 of the moulds **100** of known type).

**[68]** The considerable saving in time which the extruding assembly **200** enables is clear from the above description.

**[69]** The extruding assembly **200** therefore reduces the downtimes during the processing changes and further increases the versatility and output of the combined machine **2**, that is, comprising the first module **10** and the second module **16**.

**[70]** The extrusion screw **12** can be replaced, for example, by a piston or other components or mechanisms for pushing the dough out of the extruding assembly **200**.

**[71]** The embodiments described above can be modified and adapted in several ways without thereby departing from the scope of the inventive concept.

**[72]** For example, the forming or extruding body **202** can have an overall shape which is also different from a disc, and can have, for example, the overall shape of a plate which is substantially planar or also non-planar, or the shape of a squat insert with a cylindrical or non-cylindrical shape, or having outer sides which form a surface of revolution.

**[73]** Each reference in this description to an “embodiment", “an example embodiment" means that a particular characteristic or structure described with regard to that embodiment is included in at least one embodiment of the invention and specifically in a particular variant of the invention, as defined in a main claim.

**[74]** The fact that these expressions appear in various parts of the description does not imply that they are necessarily referred only to the same embodiment.

**[75]** Moreover, when a characteristic, element or structure is described in

relation to a particular embodiment, it should be noted that it falls within the skills the average technician to apply the characteristic, element or structure to other embodiments.

**[76]** Numerical references which differ only in terms of different superscripts, e.g. 21', 21", 21'", indicate, unless specified otherwise, different variants of an element named in the same way.

**[77]** Moreover, all details of the invention may be substituted by technically equivalent elements.

**[78]** For example, any materials and dimensions may be used, depending on the technical requirements.

**[79]** It should be understood that an expression of the type "A *comprises* B, C, D" or "A *is formed by* B, C, D" also comprises and describes the particular case in which "A *consists of* B, C, D".

**[80]** The expression *"A comprises an element B"* is to be understood as *"A comprises one or more elements B"* unless otherwise specified.

**[81]** The examples and lists of possible variants of the invention are to understood as non-exhaustive lists.

# CLAIMS

1) A pasta making machine, comprising a kneading machine (1) provided with a container (11) arranged to form a dough from which to obtain the pasta, and an extruding assembly (200) which comprises:

- a forming or extruding body (202) in which at least one through extrusion slot (204) is obtained, through which, according to a predetermined extrusion direction (DES), the dough coming from the container (11) takes a sheet or ribbon shape;
- an extruding support (206) through which the extruding assembly (200) is fixed to the kneading machine (1) and which forms a seat (208) for said forming or extruding body (202); and
- a locking system arranged for reversibly securing the forming or extruding body (202) in said seat (208) of the extruding support (206) so that, when the locking system is loose, the forming or extruding body (202) is able to rotate with respect to said seat (208) of the extruding support (206), so as to rotate said at least one through extrusion slot (204) about an axis which is substantially parallel or longitudinal with respect to the extrusion direction (DES).

2) The machine according to claim 1, wherein said extrusion through slot (204) has one or more shapes selected from the following: a substantially U-shape, V-shape, C-shape, W-shape, L-shape, a straight line shape, a zig-zag shape, a wavy or a lobed shape.

3) The machine according to claim 1 or 2, wherein the forming or extruding body (202) has a shape selected from the following: a disk shape, a substantially planar plate shape, a body whose sides substantially form a rotation surface.

4) The machine according to one or more of the previous claims, wherein the locking system comprises a ring nut (210) extending around the forming or extruding body (202) so as to fix said body (202) to the extruding support (206), said ring nut (210) being reversibly fixed to the extruding support (206).

5) The machine according to claim 4, wherein the ring nut (210) is reversibly fixed to the extruding support (206) by means of one or more

threaded connections (212, 230).

6) The machine according to one or more of the previous claims, wherein the forming or extruding body (202) forms sides or one or more boundary edges which in turn form a retention step (214) which engages with a corresponding female seat obtained in the ring nut (210), thus preventing the forming or extruding body (202) from sliding out from the female seat according to the extrusion direction (DES).

7) The machine according to one or more of the previous claims, wherein the extruding assembly (200) comprises a distribution plate (216) on which a grid and/or a plurality of holes is/are obtained, said distribution plate (216) being interposed between the extruding support (206) and the forming or extruding body (202) and being able to distribute the dough coming from the container (11) on a wide pass-through section.

8) The machine according to one or more of the previous claims, comprising a continuous conveyor (18) which forms a movable working plane, wherein the extruding assembly (200) is arranged to place on the continuous conveyor (18) the pasta sheet or ribbon drawing from said extruding assembly (200), said continuous conveyor (18) comprising a conveyor belt onto which the extruded pasta sheet or ribbon is laid.

9) The machine as claimed in one or more of the previous claims, comprising an extruder unit configured to push the dough through the extruding assembly (200) and to draw the dough coming from the container (11).

10) Method for making pasta, including the following operations:

- providing a machine for making pasta having the features according to at least one of the previous claims;
- extruding a sheet or ribbon of pasta through the extruding assembly (200) so that, as soon as said sheet is extruded, the cross-sections of said sheet form at least one concavity;
- laying said sheet or ribbon of pasta on the continuous conveyor (18) so that said cross-sections open and lie down and that the sheet or ribbon of pasta, which is laid on the continuous conveyor (18), forms a single layer of dough which is substantially plan.

Fig. 1

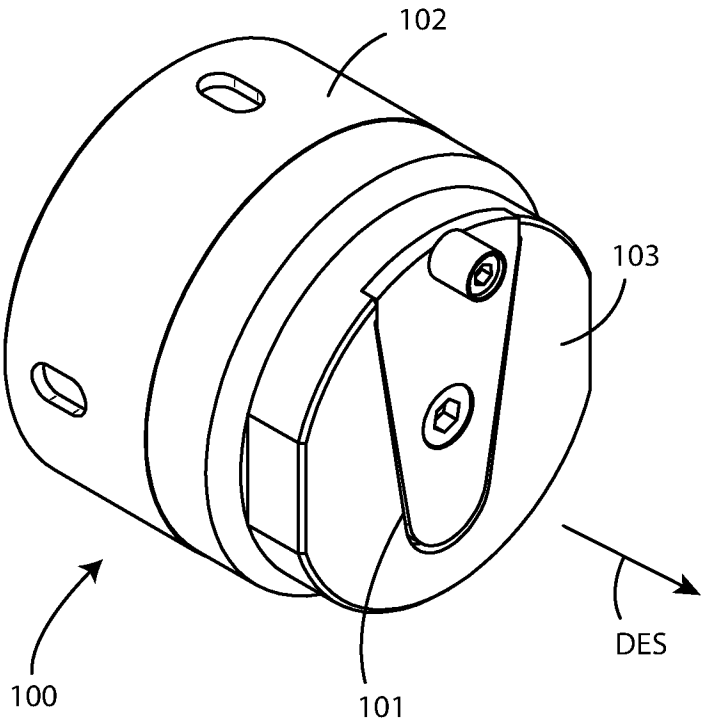
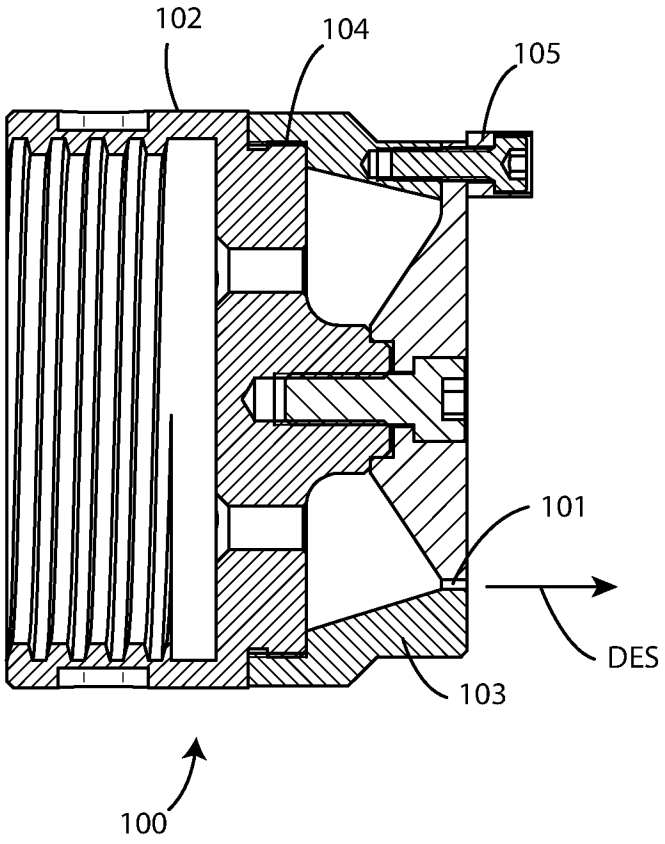



Fig. 2



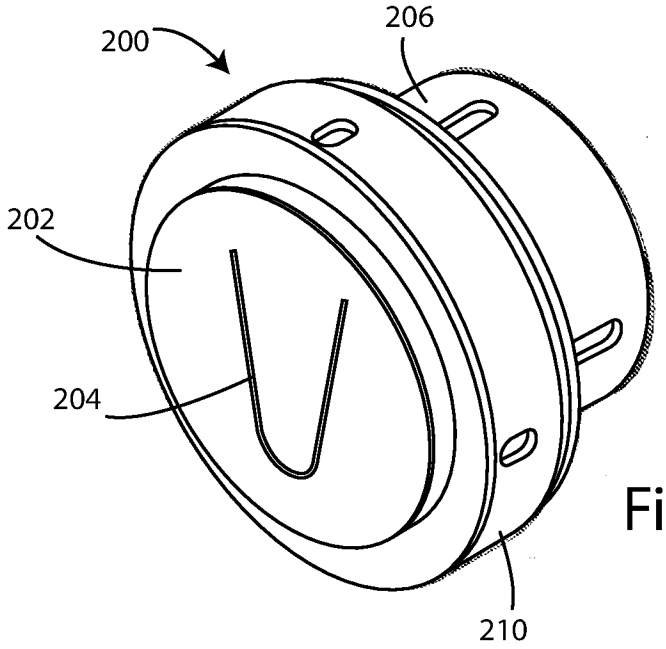
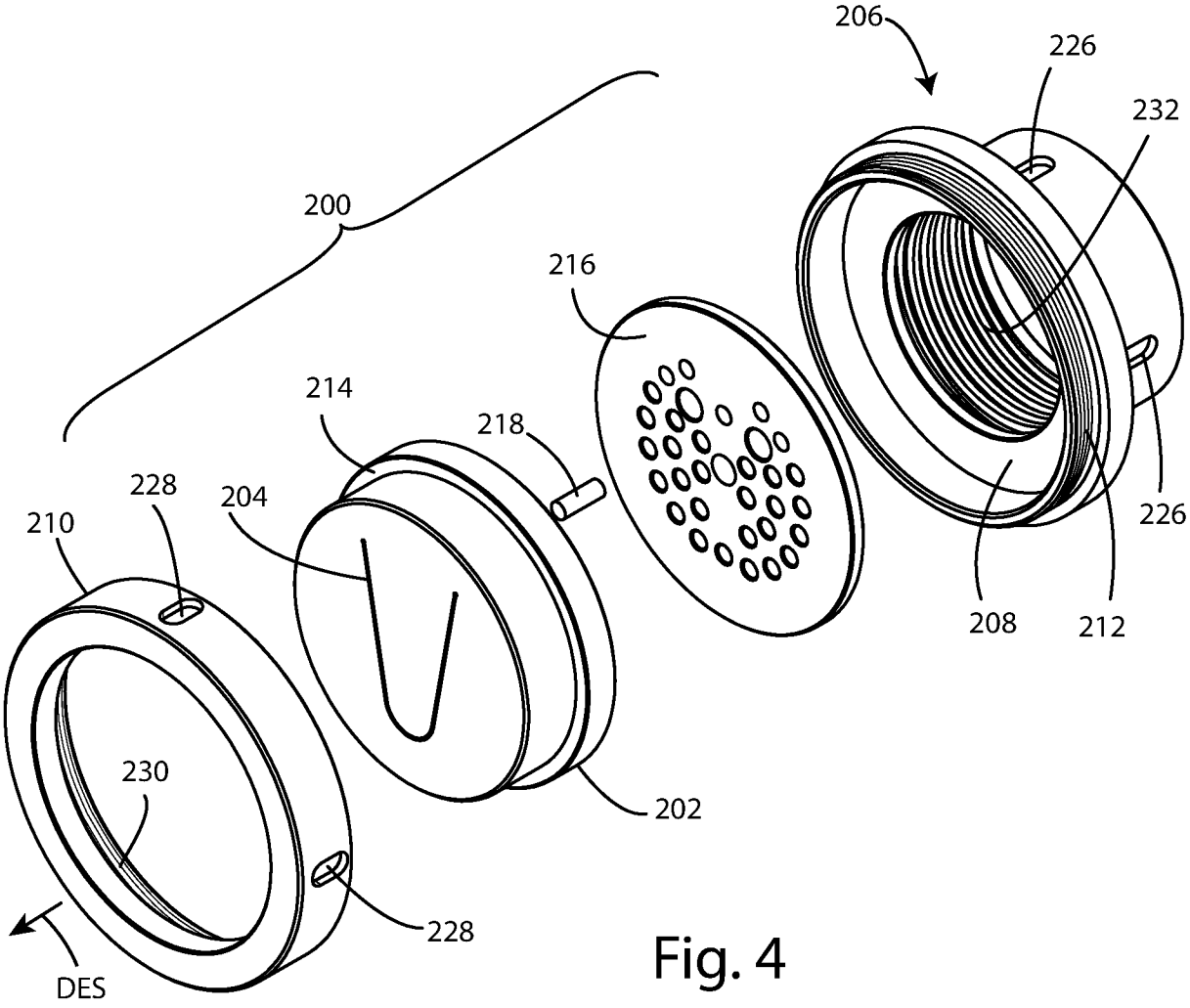

200
206
202
204
210

Fig. 3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DES

Fig. 4

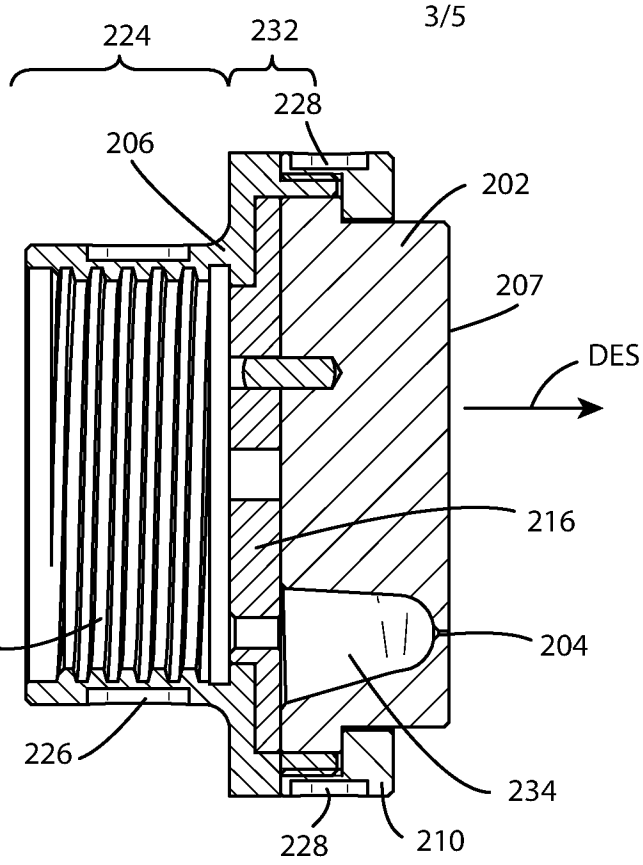
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Fig. 5

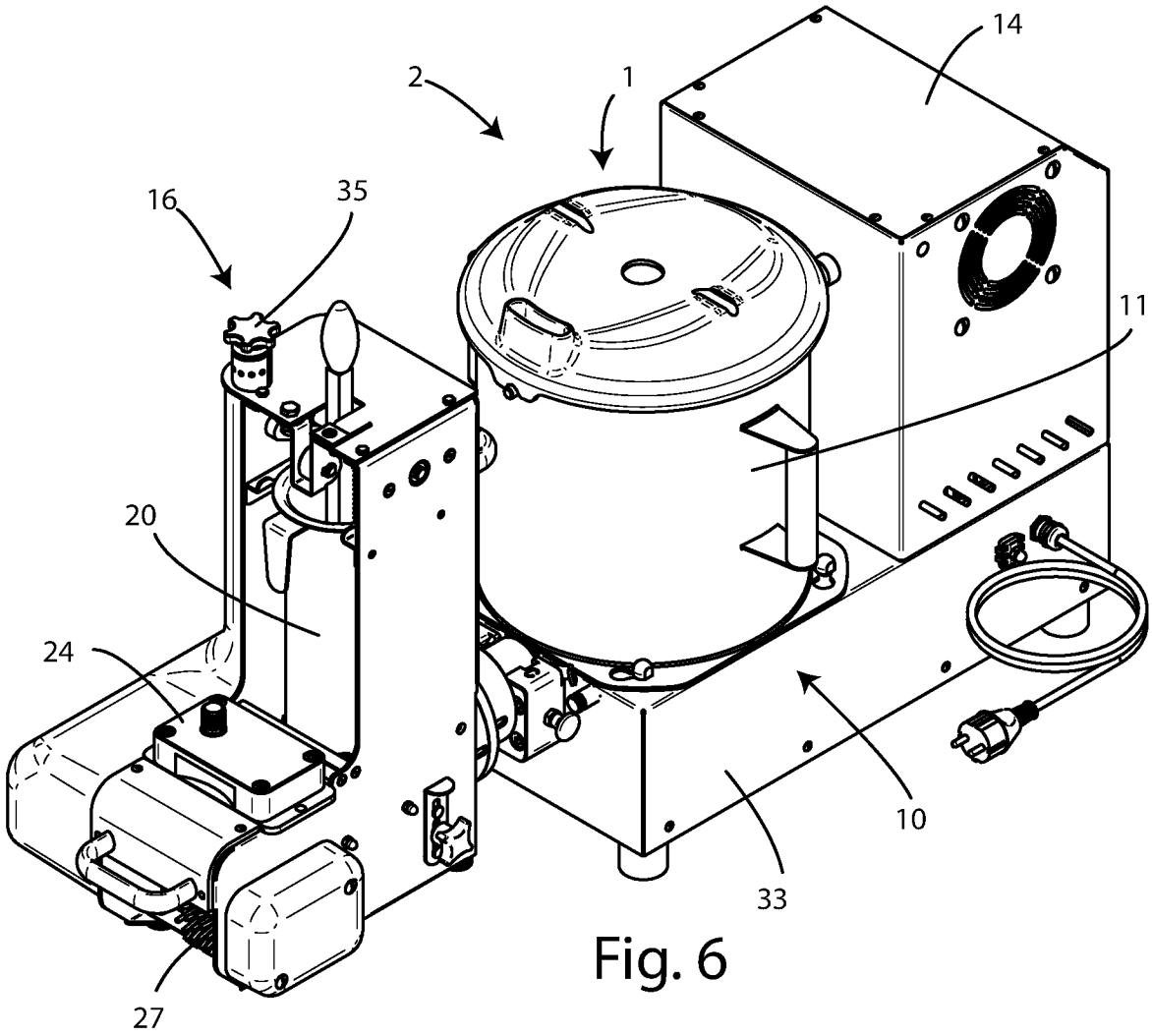
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Fig. 6

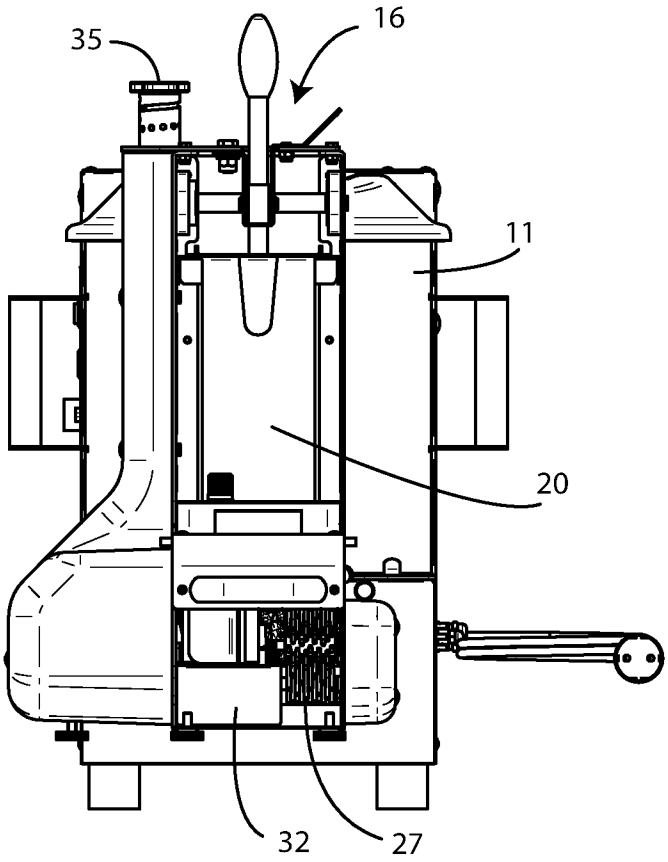


Fig. 7

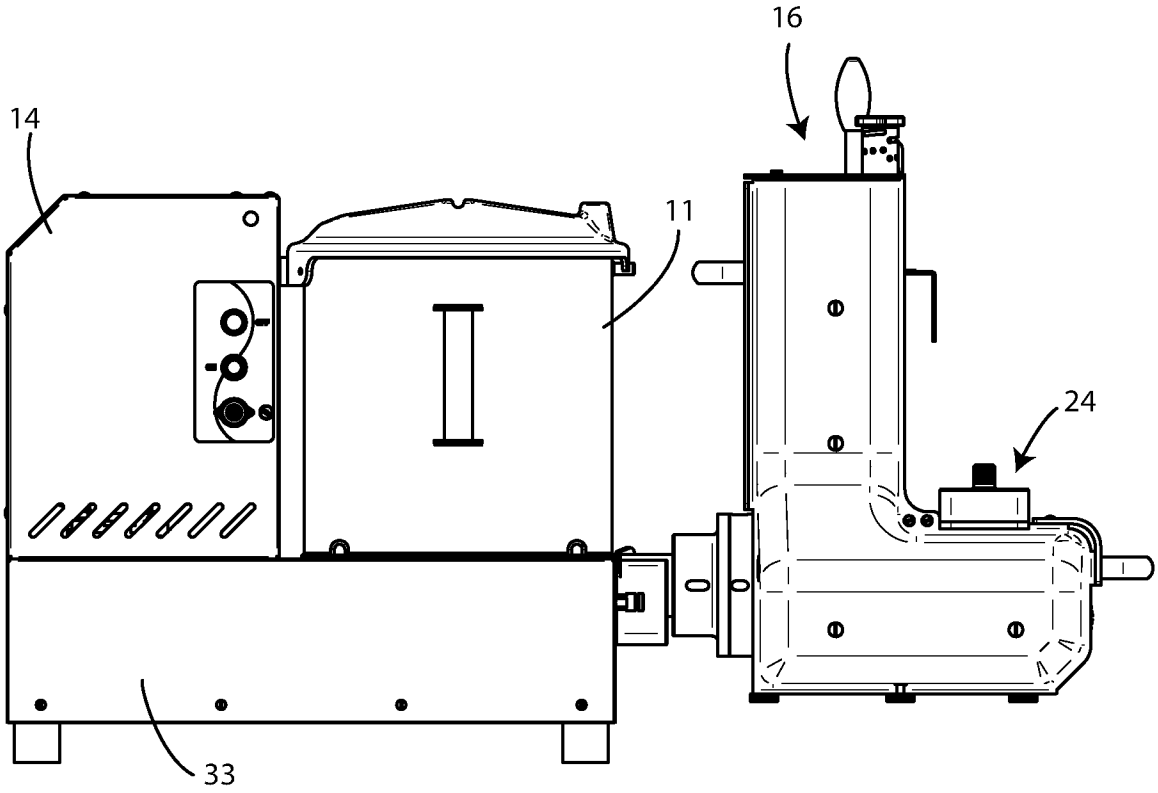


Fig. 8

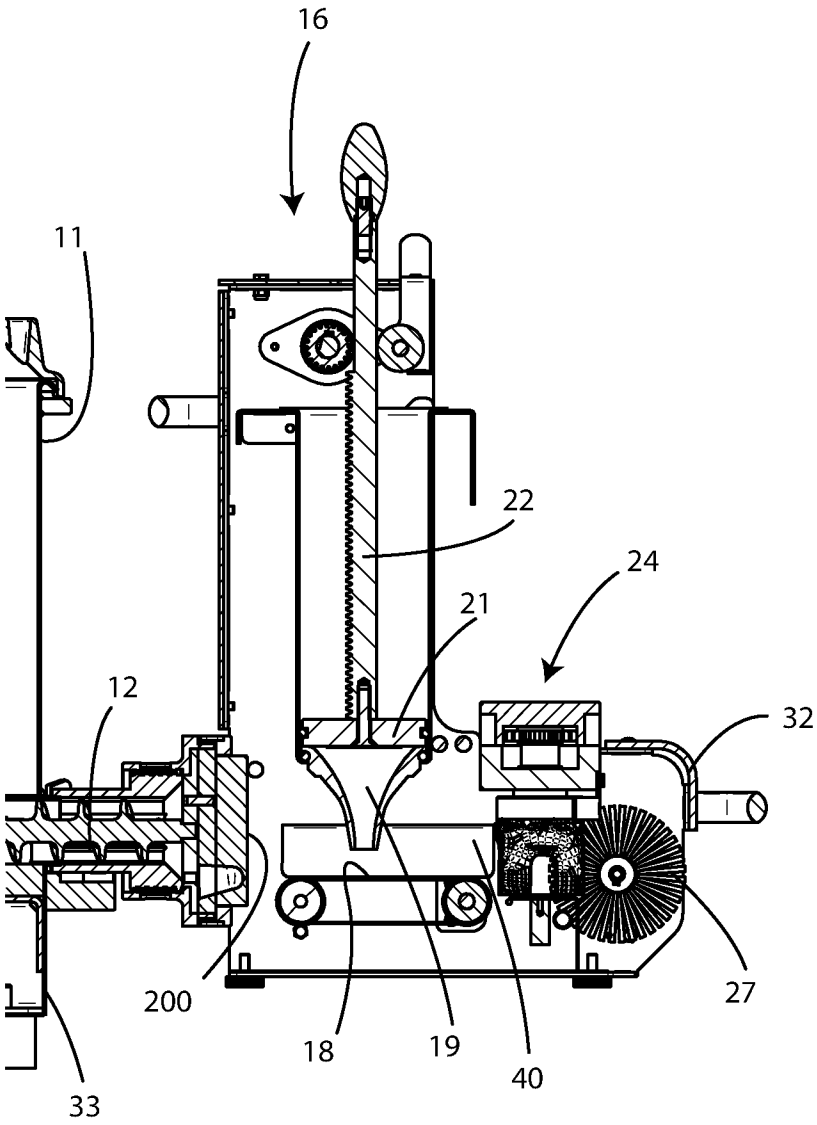


Fig. 9

# INTERNATIONAL SEARCH REPORT

International application No
PCT/IT2019/050145

A. CLASSIFICATION OF SUBJECT MATTER
INV. A21C3/04 A23P30/20 A21C9/06
ADD.

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)
A21C A23P

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. |
|---|---|---|
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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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"&" document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 26 September 2019 | 07/10/2019 |

| Name and mailing address of the ISA/ | Authorized officer |
|---|---|
| European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel. (+31-70) 340-2040,<br>Fax: (+31-70) 340-3016 | Mootz, Frank |

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# INTERNATIONAL SEARCH REPORT

International application No
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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| X | US 4 332 539 A (ZANI GIAN M) 1 June 1982 (1982-06-01) column 5, line 51 - line 66; figure 8 column 7, line 9 - line 18; figure 9 | 1-6,9 |
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| A | US 6 086 352 A (MCFARLAND ARCHIE RAE [US]) 11 July 2000 (2000-07-11) column 4, line 3 - line 19; figures 8-10 | 1 |
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