



- (51) International Patent Classification:
C22C 18/04 (2006.01)
- (21) International Application Number:
PCT/IB2012/052344
- (22) International Filing Date:
11 May 2012 (11.05.2012)
- (25) Filing Language:
Italian
- (26) Publication Language:
English
- (30) Priority Data:
MI2011A000826 12 May 2011 (12.05.2011) IT
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- (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, 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, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, 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, 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, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— of inventorship (Rule 4.17(iv))

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

(54) Title: A COMPONENT FOR TAPS AND FITTINGS, BATHROOMS, BATHROOM FITTINGS AND THE LIKE

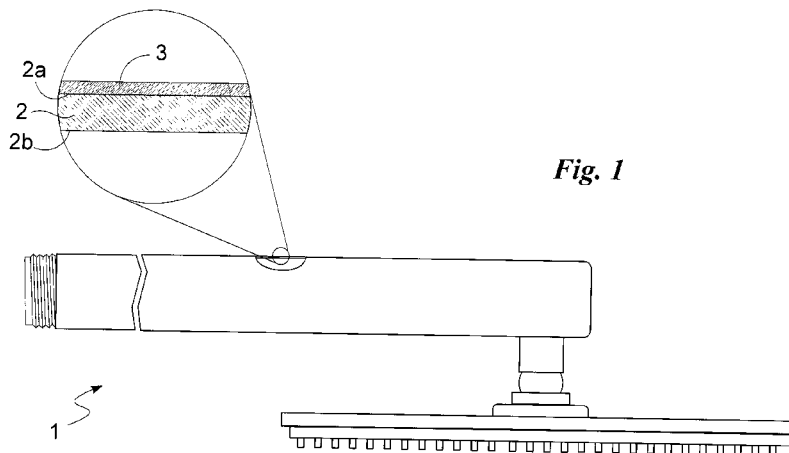


Fig. 1

(57) Abstract: It is provided a component for taps and fittings (1), bathrooms, bathroom fittings and the like comprising a base structure (2) substantially defining the outline of said component (1) made up of a zinc alloy that comprises aluminium in a percentage included between 13% and 25%, and magnesium in a percentage lower than 0.1 %, copper in a percentage lower than 5%, and does not comprise bismuth and lead or keeps them both within percentages lower than 0.004%.



A COMPONENT FOR TAPS AND FITTINGS, BATHROOMS, BATHROOM FITTINGS AND THE LIKE

The present invention relates to a component for taps and fittings, bathrooms and the like of the type pointed out in the preamble of the first claim.

5 In particular, the components for bathrooms and bathroom fittings and for taps consist of valves, pipelines, pipe fittings, cocks, shower heads, or objects adapted to be installed at the end of a supply system and to enable the flow of a fluid coming out of said supply system to be adjusted and directed.

It is known that presently components for taps and fittings, bathrooms and the like
10 are usually made of brass, Zamak[®] or a polymeric material. In addition, more specifically, these elements are chromium plated by an electroplating process.

Usually, lead is added to the brass used for making components for taps and fittings, said lead being insoluble in the component matrix and providing greater workability. In detail, the content of lead usually added to brass is included
15 between 0.5 and 3% by weight.

Recently, due to the higher and higher costs for brass, use of alternative alloys is becoming increasingly more frequent and, in particular, use of an alloy commercially known as Zamak[®] representing a zinc alloy comprising 4% aluminium and possibly copper.

20 The known art mentioned above has some important drawbacks.

A first important problem of known components for taps and fittings, in particular those made of Zamak[®], resides in that these components are subjected to quick deterioration due to corrosion caused by the substances with which they are almost continuously in contact.

25 This decay is much more marked on the inner surface of the component for taps

and fittings, i.e. on the surface that, when the component is passed through by a fluid, is directly in contact with the fluid itself.

In fact, this inner surface, being normally without coating, has the material directly in contact with the fluid and therefore, due to the reduced resistance of these
5 materials, is more subjected to deterioration.

Another problem connected with deterioration of the shower heads and cocks made of brass is represented by the fact that some of the elements present in the alloy, in particular lead, are released in the water, due to known chemical processes. They are therefore taken by the users. This ingestion, due to the
10 presence of lead, is injurious and therefore can give rise to serious pathologies.

Another drawback of components made of brass and submitted to stresses or tensions during assembling or use is the occurrence of corrosion under stress. This phenomenon causes premature breaking of the components under the combined effect of a weak corrosive environment and application of efforts even
15 of small intensity.

These breaks, in addition to making the components useless, may cause serious economic dangers to the final user due to possible flooding caused by the fluid coming out of the hydraulic system.

Further drawbacks are also caused when objects of brass are manufactured
20 using the gravity die-casting technology. In fact, the high temperature of the liquid metal leads to formation of noxious gases generated by the moulds and the sand cores in contact with the molten metal.

To obviate the mentioned drawbacks, suitable zinc alloys have been made having better mechanical features as compared with Zamak[®].

25 In some of these alloys, high workability and physico-chemical features are given

by particular elements, such as lead, bismuth and still others.

In particular, patent US-B3880679 discloses a particular zinc alloy using bismuth for improving the chemical features of the compound.

However, lead is considered dangerous for the environment, in particular during
5 disposal of same. In addition, it is not yet clear how bismuth has to be disposed of, and also not yet clear are the potential dangerous effects that it could have on the environment.

Another type of alloy is described in patent JP-A-06049572. These alloys have good physico-mechanical features, in particular given by the high amount of
10 copper or a particularly high amount of aluminium.

However these alloys cannot be machined using chip-removal tools, but they are workable only by casting.

Under this situation the technical task underlying the present invention is to conceive a component for taps and fittings, bathrooms and the like capable of
15 substantially obviating the mentioned drawbacks.

Within the scope of this technical task, it is an important aim of the invention to make a component of great durability.

Another important aim of the invention is to obtain a component for taps and fittings of high quality in terms of aesthetics and reduced cost.

20 Another important aim of the invention is to obtain a component that is not subject to corrosion under stress.

The technical task and the aims specified are achieved by a component for taps and fittings, bathrooms, bathroom fittings and the like as claimed in the appended claim 1. Preferred embodiments are highlighted in the sub-claims. The features
25 and advantages of the invention are hereinafter clarified by the detailed

description of a preferred embodiment of the invention with reference to:

Fig. 1 in which a component for taps and fittings, bathrooms, bathroom fittings and the like according to the invention and consisting of a shower head is shown;

Fig. 2 in which a set of components for taps and fittings, bathrooms, bathroom fittings and the like, respectively consisting of valve, cock or tap, soap-holder, pipe fitting, is shown.

With reference to the drawings, the component for taps and fittings according to the invention is generally identified by reference numeral **1**.

In particular, component 1 for taps and fittings, bathrooms, bathroom fittings and the like is preferably an element directly in contact with fluids, more particularly with drinking water, in domestic, working or public places, for example consisting of cocks, pipelines, valves, pipe fittings, supply systems adapted to enable a fluid flow to be adjusted and directed, industrial systems for transfer of various fluids, etc.

In addition, component 1 can be a component used in a high-moisture environment such as a bathroom or the like. These components are therefore accessories and components for bathrooms, bathroom fittings and the like.

It comprises a base structure **2** substantially defining the outline of component 1.

The base structure 2 is made of a zinc alloy comprising aluminium in a percentage included between 13% and 25%, and magnesium in a percentage lower than 0.1% and preferably copper in a percentage lower than 5%. In particular, the zinc alloy has a copper percentage included between 0.2% and 3.5%, an aluminium percentage included between 13% and 25% and a zinc percentage substantially included between 70% and 87%. Preferably, the zinc percentage in this alloy is included between 80% and 75%.

In detail, two preferred compositions have the following formulations. First composition: aluminium 15%±1%, magnesium 0.04%±0.02%, copper 1%±0.5%, zinc for the balance. Second composition: aluminium 22%±1%, magnesium 0.04%±0.02%, copper 2%±0.5%, zinc for the balance

5 In said alloy, in addition to zinc, aluminium, copper and magnesium, impurities may be present, i.e. other substances different from those listed above and present in percentages lower than 0.05%. In detail, among the impurities it is possible to have: iron in a maximum concentration of 0.02% because it increases
10 brittleness; cadmium present in percentages not exceeding 0.0015% because it makes the mechanical properties worse and induces inter-crystal corrosion; and tin that is present in the alloy in the maximum concentration of 0.002% because it makes the mechanical properties worse and induces inter-crystal corrosion. Lead, bismuth and nickel have a content lower than 0.004% and preferably of 0.001%.
15 Finally, in the base structure 2 it is possible to identify at least one outer surface **2a**, i.e. the surface constituting part of the portion in sight of component 1 that, therefore, is not designed to come into contact with the fluid when it passes through component 1. This outer surface 2a can be for example identified in the visible surface of a component for taps and fittings 1.

In addition, should the component for taps and fittings 1 be an element directly in
20 contact with fluids, in the base structure 2 an inner surface **2b** can be identified which is adapted to come into contact with the fluid, as shown in Fig. 1.

At least at part of the outer surface 2a, the component for taps and fittings 1 has a coating **3** adapted to cover at least part of the base structure 2. Preferably, coating 3 covers almost the whole of the outer surface 2a, while the inner surface 2b
25 preferably remains uncoated.

This coating 3 comprises at least one layer made by electroplating. This electroplated coating includes copper, nickel, chromium or other substances adapted to improve the resistance and aesthetic aspect of the component for taps and fittings 1; as an alternative to the chromium layer, gold or brass painted coatings can be used for further increasing the aesthetic value of component 1.

The invention comprises a new manufacturing process for the above described component for taps and fittings 1.

This manufacturing process comprises a shaping step in which the base structure 2 is made using said zinc alloy, and a covering step in which at least part of the outer surface 2a is coated with coating 3 obtained by electroplating.

The shaping step is preferably carried out by gravity casting or also by die-casting or hot moulding, which processes are known by themselves.

In particular, gravity casting is preferred because it is suitable for undercuts or other particular shapes frequent in taps and fittings and accessories for bathrooms. It conveniently consists of a die-casting or also sand-casting process.

The manufacturing process, between the shaping step and coating step, suitably contemplates an intermediate working step in which the base structure 2 is submitted to finishing operations by chip removal before the covering step.

This step is followed by another step consisting in mechanical brushing and polishing carried out manually using cleaning robots; the last-mentioned step can be replaced by or integrated with a mass-vibration process with abrasive chips (tumbling).

The invention enables important advantages.

In fact, elements 1 directly in contact with fluids do not suffer for possible release of injurious substances from component 1 to the flowing fluid. Therefore they are

not dangerous if a possible user should take them. This advantage is obtained due to the particular alloy that, unlike brass, does not contain lead or other injurious substances to the user's health.

Another advantage resides in that the components for taps and fittings 1 are particularly strong and adapted to maintain a high aesthetic value over a very long period of time even if placed in moist places such as bathrooms and the like. This advantage is due to the particular zinc alloy.

In addition, another important advantage due to the absence of lead and bismuth is that of obtaining components for taps and fittings that can be easily recycled.

A further advantage is the great workability distinguishing the zinc alloy, so that component 1 can be also machined by a chip-removal process. This advantage in particular is due to the copper content that does not exceed 5% so that ideal chips can be obtained in chip-removal machining processes.

Another aim achieved by the invention is represented by the reduced production cost of elements 1 due to the reduced cost of the alloy used as compared with brass, and by better mechanical properties as compared with Zamak[®] and the polymeric materials.

This reduced cost is further due to the low working temperatures and high workability of the zinc alloy that therefore enables a production process 10 to be adopted that can be obtained by machinery involving reduced power and electric consumption. This advantage is particularly apparent making a comparison between said alloy and brass.

Furthermore, the low working temperature greatly reduces emission of polluting fumes, in particular in case of sand casting, therefore improving

safety and work quality of the workers producing these elements.

Finally, the possibility of making components 1 using many processes due to versatility of the described alloy, enables any type of the above accessories 1 to be obtained having the desired quality and cost.

- 5 A further advantage of the new alloy as compared with brass is that it is not subject to corrosion under stress, so that accidental breaking of the components during assembly can be prevented.

Finally, the particular alloy used has high resistance to oxidation so that high amounts of uncoated components for taps and fittings 1 can be stored, coating
10 3 being made later on, so that the logistics connected with storage is optimised. This possibility was absolutely impossible in products made of Zamak[®] because this material is highly subject to oxidation and therefore the coating must be immediately made.

This greater resistance to oxidation and therefore to corrosion also belongs to
15 the pieces that have been submitted to the previously described coating and protection steps (electroplating, painting, PVD).

CLAIMS

1. A component for taps and fittings (1), bathrooms, bathroom fittings and the like comprising a base structure (2) substantially defining the outline of said component (1); **characterised in that** said base structure (2) is made up of a zinc alloy that comprises aluminium in a percentage included between 13% and 25%,
5 magnesium in a percentage lower than 0.1%, copper in a percentage lower than 5%, and does not comprise bismuth and lead or keeps them both within percentages lower than 0.004%.
2. A component (1) as claimed in claim 1, wherein the copper percentage in
10 said alloy is substantially included between 3.5% and 0.2%.
3. A component (1) as claimed in one or more of the preceding claims, wherein the zinc percentage in said alloy is included between 70% and 87%.
4. A component (1) as claimed in one or more of the preceding claims, wherein said alloy does not comprise bismuth and lead or keeps them both within
15 percentages lower than 0.001%.
5. A component (1) as claimed in one or more of the preceding claims, wherein said alloy does not comprise nickel or keeps it within percentages lower than 0.001%.
6. A component (1) as claimed in one or more of the preceding claims,
20 consisting of an element which is in direct contact with fluids.
7. A component (1) as claimed in one or more of the preceding claims, consisting of an element used in a high-moisture environment.
8. A component (1) as claimed in one or more of the preceding claims, wherein said base structure (2) has an outer surface (2a) adapted not to get into
25 contact with said fluid; and said component for taps and fittings (1) comprises a

coating (3) suitable to cover said outer surface (2a).

9. A component (1) as claimed in one or more of the preceding claims, wherein said base structure (2) has an uncoated inner surface (2b).

10. A component (1) as claimed in one or more of claims 5-6, wherein said
5 coating (3) comprises a layer obtained by electroplating.

11. A process for manufacturing a component for taps and fittings (1),
bathrooms, bathroom fittings and the like for controlling or directing a fluid flow;
said manufacturing process comprising a melting step in which a base structure
(2) is made which substantially defines the outline of said component for taps and
10 fittings (1), **characterised in that** said melting step takes place through gravity
casting of a zinc alloy that includes aluminium in a percentage in the range of
13% to 25%, and magnesium in a percentage lower than 0.1%, copper in a
percentage lower than 5%, copper in a percentage lower than 5% and does not
comprise bismuth and lead or keeps them both within percentages lower than
15 0.004%.

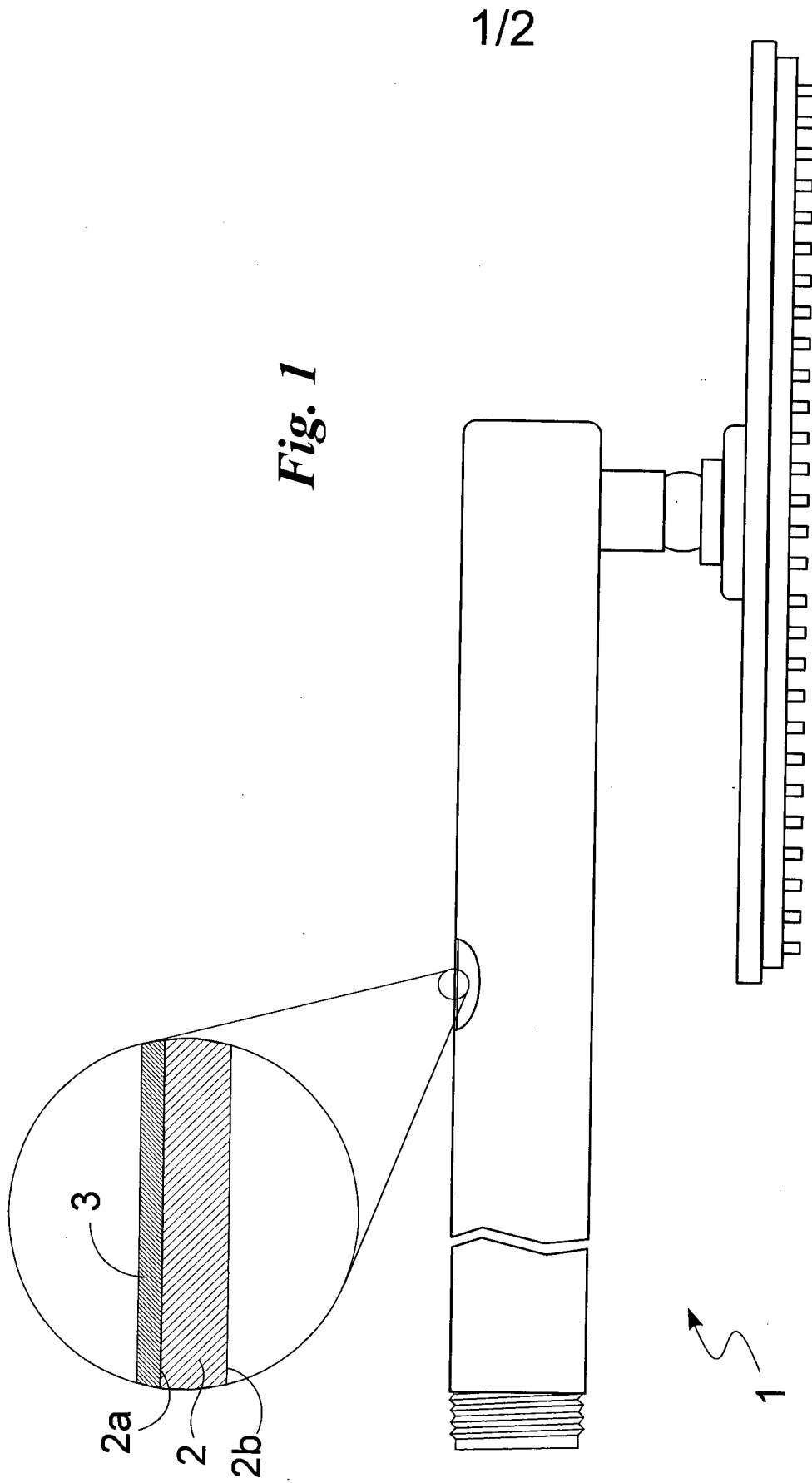
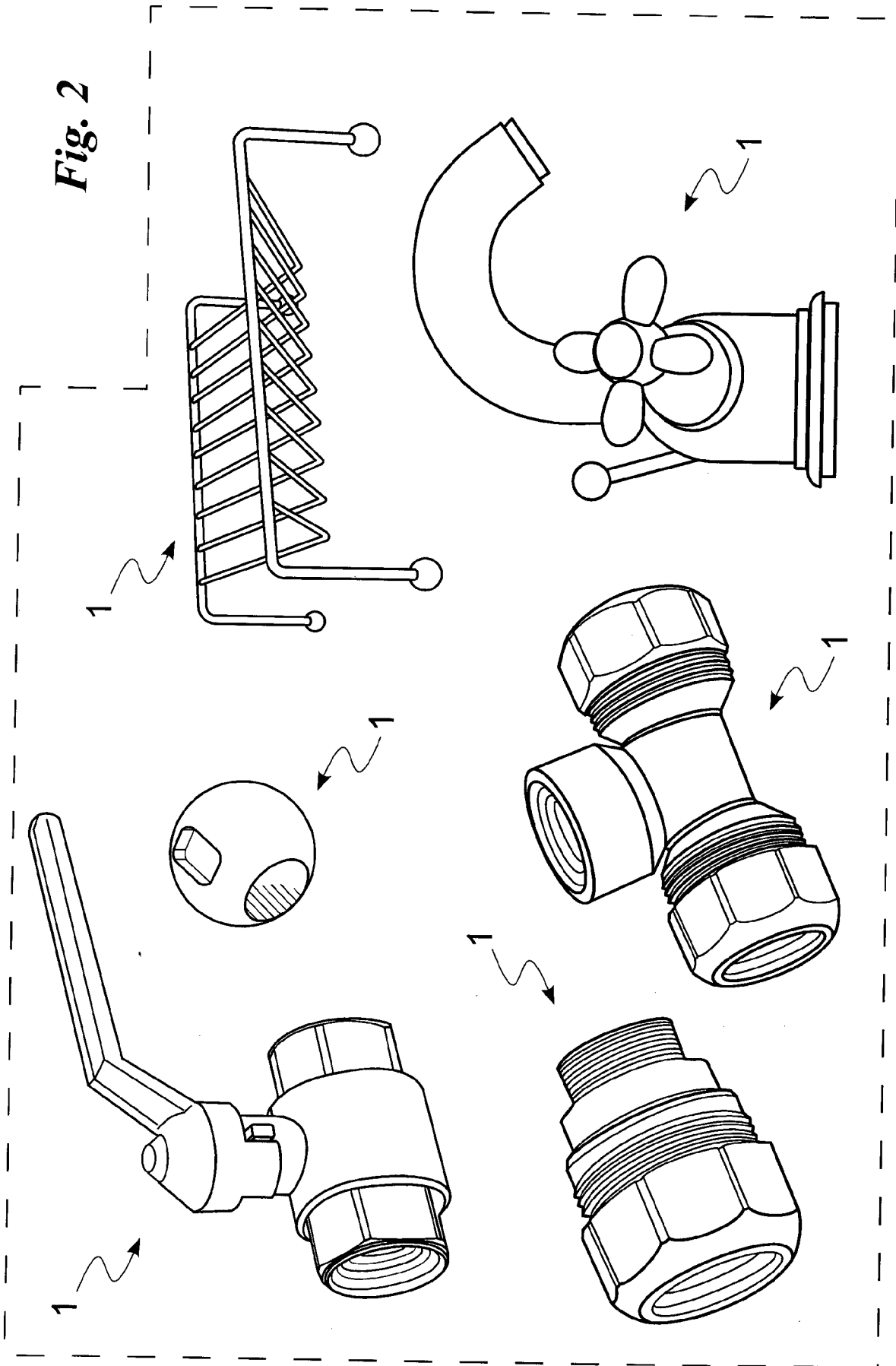


Fig. 1

Fig. 2



INTERNATIONAL SEARCH REPORT

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| International application No PCT/IB2012/052344 |
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| A. CLASSIFICATION OF SUBJECT MATTER INV. C22C18/04 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) C22C E03C | | |
| 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 | | |
| C. DOCUMENTS CONSIDERED TO BE RELEVANT | | |
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| * Special categories of cited documents : | | |
| "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed | "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 "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family | |
| Date of the actual completion of the international search | Date of mailing of the international search report | |
| 12 September 2012 | 19/09/2012 | |
| 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 Radeck, Stephanie | |

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Information on patent family members

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