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## (54) Method for forming hollow parts

(57) A method for forming hollow parts (30) involves the steps of preparing a rod material; treating the rod material with a tube drawing process to form a hollow portion which has an open end, filling liquid into the hollow portion via the open end; sealing the open end with a plug; forging the rod material which has gone through the steps of filling liquid and sealing the open end into a desired shape, the open end being closed during forging process, and the plug being removed from the open end during the forging process; drilling a discharge hole (12) which is in communication with the hollow portion (11) in the rod material obtained from the step of forging, so as to discharge the liquid out of the hollow portion; and obtaining a hollow part (30) after the liquid is discharged from hollow portion via the discharge hole.

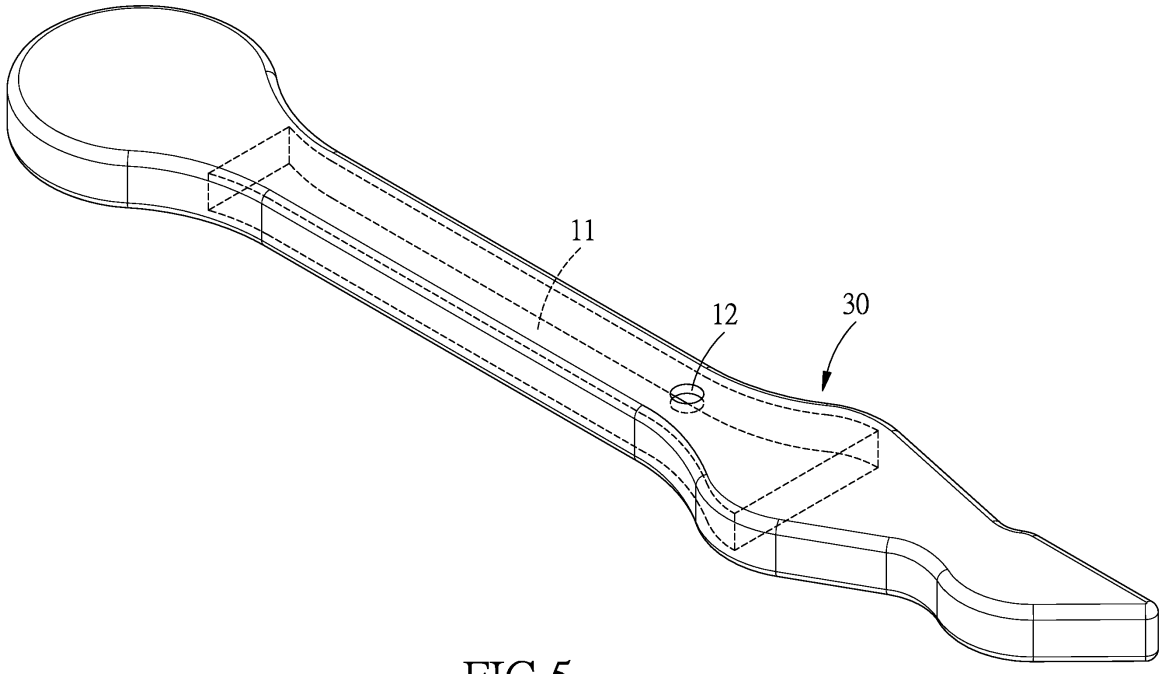


FIG.5

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## Description

### BACKGROUND OF THE INVENTION

#### Field of the Invention

**[0001]** The present invention relates to a method for forming metal parts, and more particularly to a method for forming hollow parts.

#### Description of the Prior Art

**[0002]** A conventional method for forming hollow parts includes: providing a rod-like member; drilling a hole at one end of the rod material to make the rod material hollow; injecting liquid into the hole and sealing the hole with a plug; forging the rod material into a part, and pulling the plug out of the hole during forging process; drilling a hole in the formed part again to let out the liquid.

**[0003]** Since the hollow part is formed by drilling hole in the rod material, and drilling hole reduces the integrity of the rod material, which definitely will impair the structural strength of the finished products.

**[0004]** The present invention has arisen to mitigate and/or obviate the afore-described disadvantages.

### SUMMARY OF THE INVENTION

**[0005]** The primary objective of the present invention is to provide a method for forming hollow parts at high efficiency.

**[0006]** To achieve the above objective, a method for forming hollow parts in accordance with the present invention comprises the following steps:

preparing a rod material;
treating the rod material with a tube drawing process to form a hollow portion which has an open end, the hollow portion being formed by inserting a tube into the rod material, and the rod material being deformed and lengthened during the tube drawing process;
filling liquid into the hollow portion via the open end;
sealing the open end with a plug;
forging the rod material which has gone through the steps of filling liquid and sealing the open end into a desired shape, the open end being closed during forging process, and the plug being removed from the open end during the forging process;
drilling a discharge hole which is in communication with the hollow portion in the rod material obtained from the step of forging, so as to discharge the liquid out of the hollow portion; and
obtaining a hollow part after the liquid is discharged from hollow portion via the discharge hole.

**[0007]** Since the hollow portion of the finished hollow part is formed by tube drawing without impairing the integrity of the rod material, the mechanical property and the structural strength of the rod material are still maintained during the process of forming the hollow portion. Then the rod material goes through the steps of filling, sealing, forming and drilling to form the hollow part, and the mechanical property and the structural strength of the rod material are not impaired during the whole process of forming the hollow part. The open end is closed by the forging process, which increases the yield rate and improves the structural strength of the finished product.

### BRIEF DESCRIPTION OF THE DRAWINGS

**[0008]**

Fig. 1 shows a rod material used in the method for forming hollow part in accordance with the present invention;
Fig. 2 shows the rod material obtained by the step of rough molding of the method for forming hollow part in accordance with the present invention;
Fig. 3 shows the rod material obtained by the step of tube drawing of the method for forming hollow part in accordance with the present invention;
Fig. 4 shows the rod material obtained by the steps of filling and sealing of the method for forming hollow part in accordance with the present invention;
Fig. 5 shows the final product obtained after the step of forging of the method for forming hollow part in accordance with the present invention; and
Fig. 6 is a flow chart showing the steps of the method for forming hollow part in accordance with the present invention.

### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

**[0009]** The present invention will be clearer from the following description when viewed together with the accompanying drawings, which show, for purpose of illustrations only, the preferred embodiment in accordance with the present invention.

**[0010]** Referring to Figs. 1-6, a method for forming hollow parts in accordance with the present invention comprises the following steps:

Step A of preparing a rod material: preparing a rod material 10, as shown in Fig. 1;
Step B of rough molding: roughly molding the rod material 10 into a rough shape, as shown in Fig. 2;
Step C of tube drawing C: the rod material 10 is processed with tube drawing process to form a hollow portion 11 which has an open end 111. The hollow portion 11 is formed by inserting a tube X into the rod material 10, meanwhile, the rod material 10 is deformed and lengthened during the tube drawing process (when the tube X is pulled out);
Step D of filling: filling liquid into the hollow portion

11 via the open end 111, as shown in Fig. 4;
Step E of sealing: sealing the open end 111 with a plug 20;
Step F of forging: forging the rod material 10 which has gone through the steps D and E into a desired shape, the open end 111 is closed during forging process, and the plug 20 is removed from the open end 111 since the pressure applied to the plug 20 changes during the forging process;
Step G of drilling: drilling a discharge hole 12 which is in communication with the hollow portion 11 in the rod material 10 obtained from the step F, so as to discharge the liquid out of the hollow portion 11; and
Step H of obtaining a hollow part: a hollow part 30 is obtained after the liquid is discharged from hollow portion 11 via the discharge hole 12, as shown in Fig. 5.

**[0011]** Since the hollow portion 11 of the finished hollow part is formed by tube drawing without impairing the integrity of the rod material 10, the mechanical property and the structural strength of the rod material 10 are still maintained during the process of forming the hollow portion 11. Then the rod material 10 goes through the steps of filling, sealing, forming and drilling to form the hollow part, and the mechanical property and the structural strength of the rod material are not impaired during the whole process of forming the hollow part. The open end 111 is closed by the forging process, which increases the yield rate and improves the structural strength of the finished product.

**[0012]** While we have shown and described various embodiments in accordance with the present invention, it is clear to those skilled in the art that further embodiments may be made without departing from the scope of the present invention.

## Claims

1. A method for forming hollow parts **characterized by** comprising the following steps:

   step A of preparing a rod material, preparing a rod material (10);
   step C of tube drawing, the rod material (10) is processed with tube drawing process to form a hollow portion (11) which has an open end (111), the hollow portion (11) is formed by inserting a tube (X) into the rod material (10), and the rod material (10) is deformed and lengthened during the tube drawing process;
   step D of filling liquid into the hollow portion (11) via the open end (111);
   step E of sealing, sealing the open end (111) with a plug (20);
   step F of forging the rod material (10) which has gone through the steps D and E into a desired shape, the open end (111) is closed during forging process, and the plug (20) is removed from the open end (111) since the pressure applied to the plug (20) changes during the forging process;
   step G of drilling a discharge hole (12) which is in communication with the hollow portion (11) in the rod material (10) obtained from the step F, so as to discharge the liquid out of the hollow portion (11); and
   step H of obtaining a hollow part, a hollow part (30) is obtained after the liquid is discharged from hollow portion (11) via the discharge hole (12).

2. The method for forming hollow parts as claimed in claim 1 further comprising a step B of rough molding between the steps of A and C, and the step B is used to roughly mold the rod material into a rough shape.

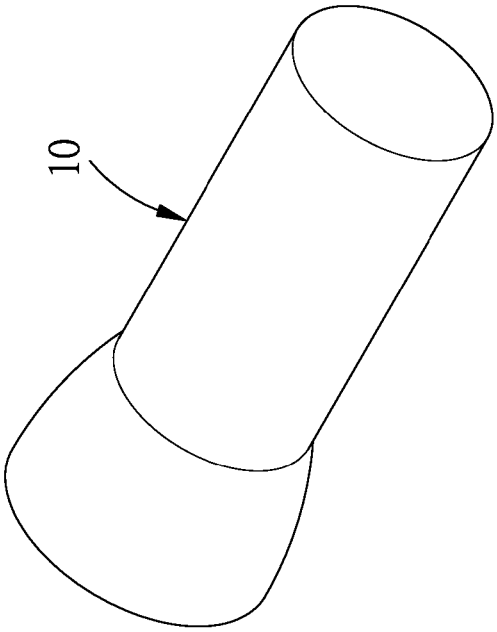


FIG.2

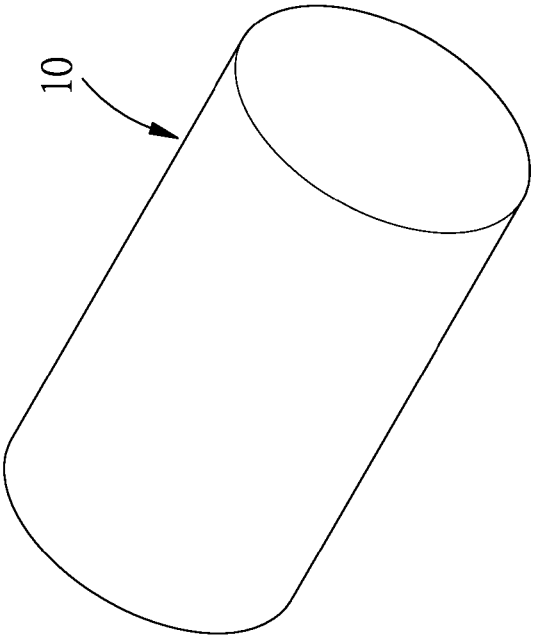


FIG.1

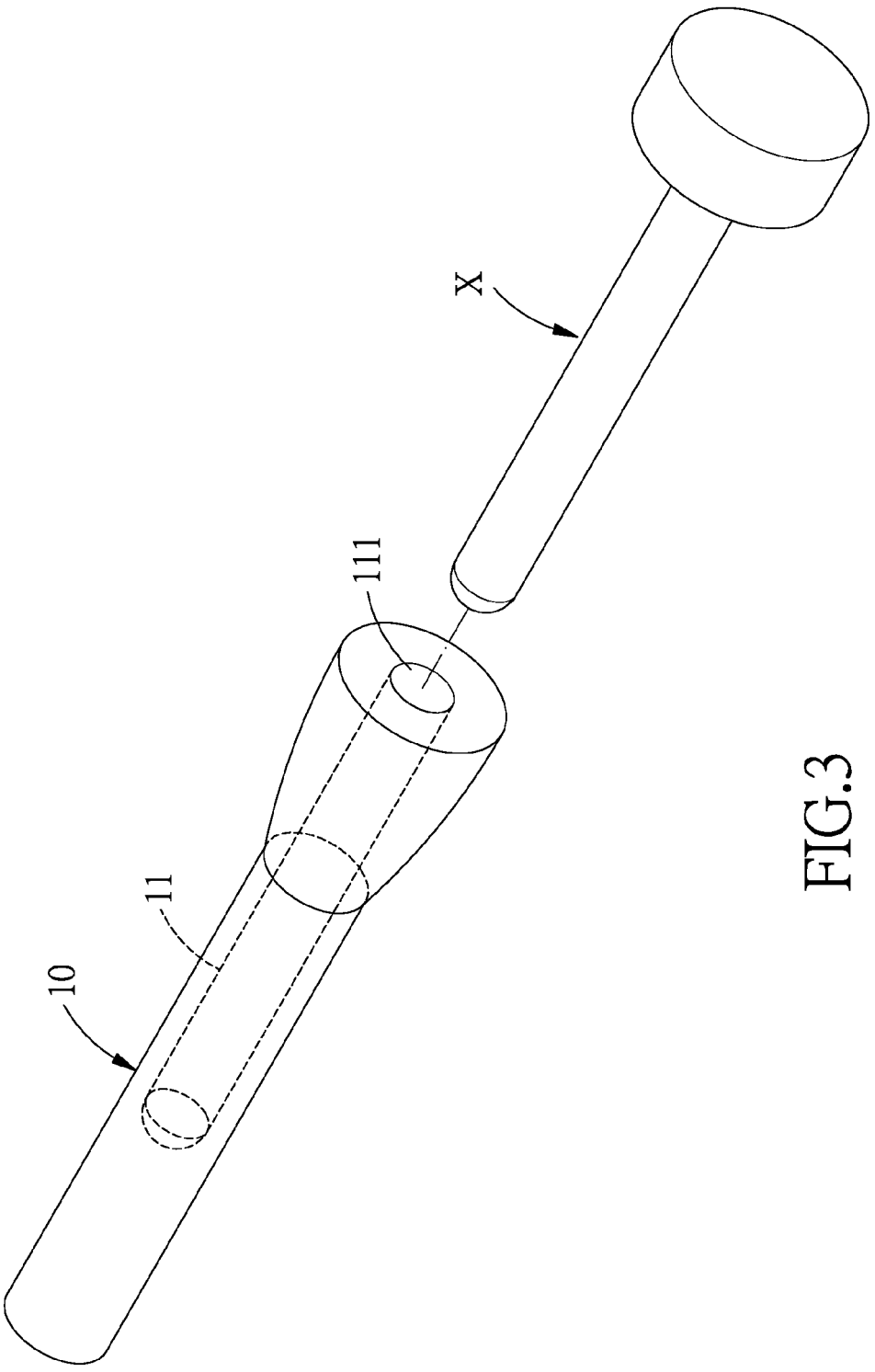


FIG.3

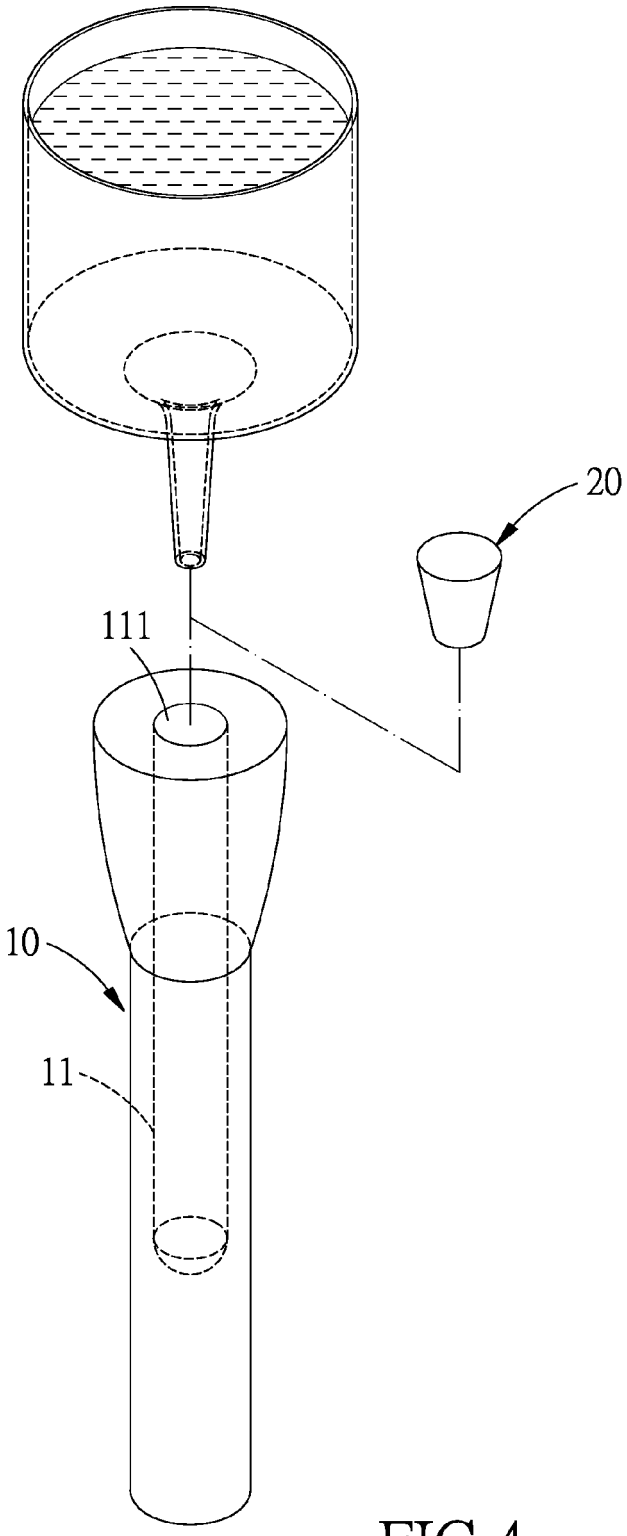


FIG.4

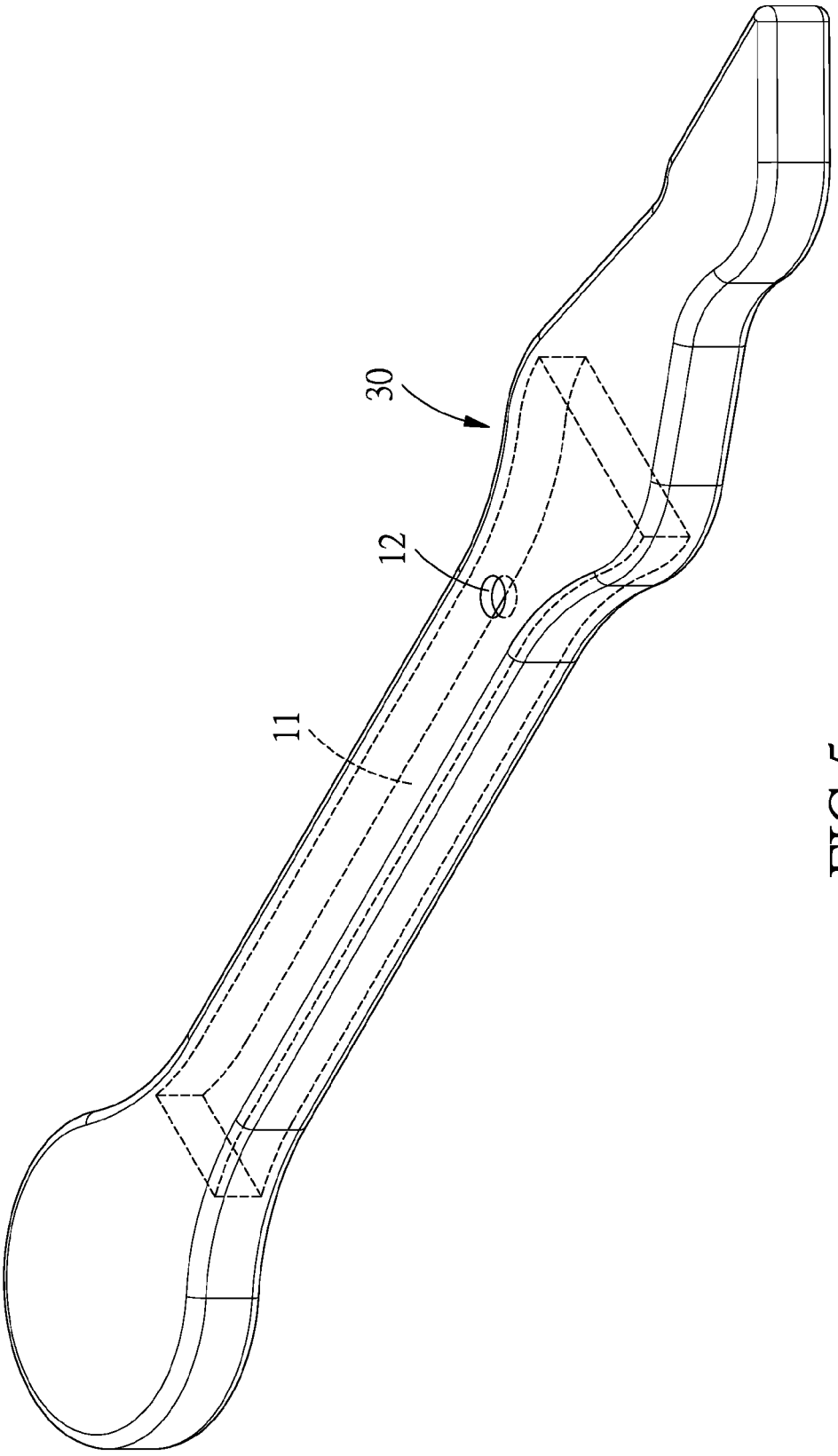


FIG.5

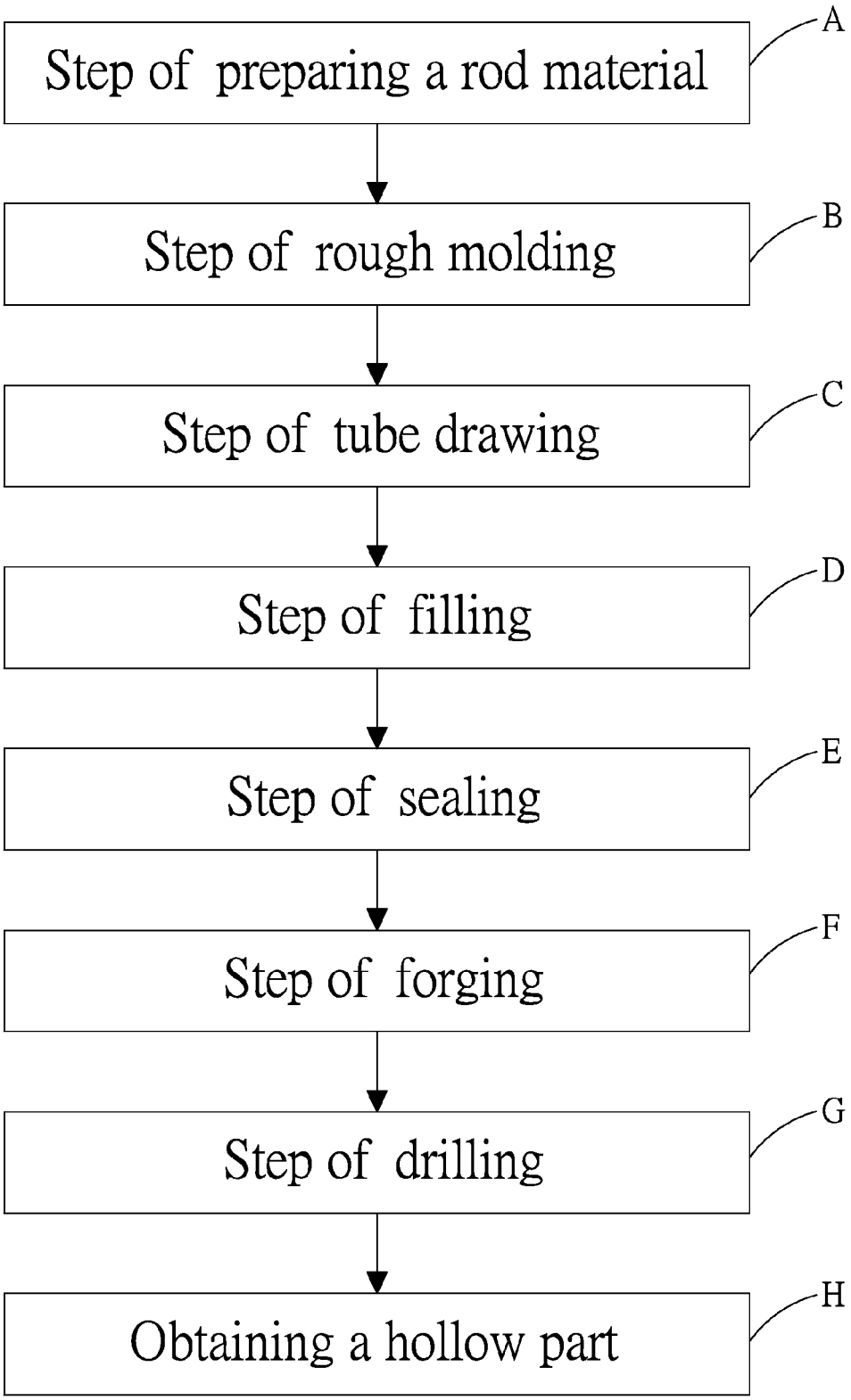
Step of preparing a rod material
A
Step of rough molding
B
Step of tube drawing
C
Step of filling
D
Step of sealing
E
Step of forging
F
Step of drilling
G
Obtaining a hollow part
H

FIG.6

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# EUROPEAN SEARCH REPORT

Application Number
EP 14 15 6235

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
|---|---|---|---|
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| A | TW 201 242 797 A (SUPERALLOY IND CO LTD [TW]) 1 November 2012 (2012-11-01) * abstract; figures 2-5 * | 1,2 | |
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| A | GB 605 555 A (GEORGE OSWALD ECCLES; GEORGE LEWIS TALBOT) 27 July 1948 (1948-07-27) * the whole document * | 1,2 | TECHNICAL FIELDS SEARCHED (IPC) B21J B21K |

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| Munich | 27 August 2014 | Ritter, Florian |

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 14 15 6235

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