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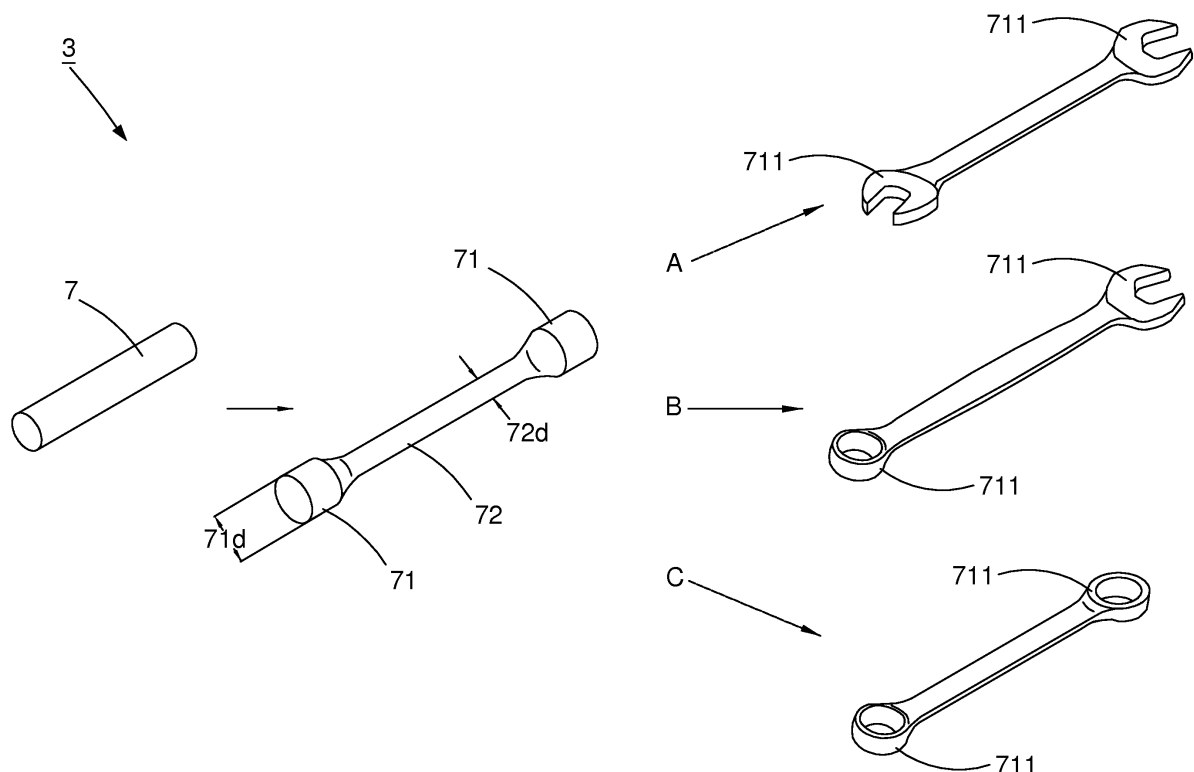
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(54) **METHOD FOR FORMING A SPANNER**

(57) A method (3) for forming a spanner includes following steps (31, 32, 33, 34): preparing a cylindrical metal blank (7), heating the metal blank (7) to become softened, shaping the metal blank (7) by pressing and pushing the metal blank (7) forward on a shaping die (52) with a pushing unit (53) to form two head sections (71) and a holding section (72) connected between the head sections (71), and stamping the metal blank (7) when the metal blank

(7) still has residual heat to flatten the holding section (72) and shape each head section (71) into a spanner-shaped part (711). Therefore, a spanner product is made. The method (3) simplifies the processing procedures, decreases residual materials, achieves a quick shaping operation, reduces processing costs, and increases the forming efficiency.



**FIG. 4**

## Description

### BACKGROUND OF THIS INVENTION

#### 1. Field of this invention

[0001] This invention relates to a tool forming method and relates particularly to a method for forming a spanner.

#### 2. Description of the Related Art

[0002] Referring to Fig. 1 and Fig. 2, a conventional method 1 for forming a spanner is executed by cold forging. The conventional method 1 includes a preparing step 11, a head forming step 12, a stamping step 13, and a removing step 14. The preparing step 11 is performed by preparing a stick-like metal blank 2. The head forming step 12 is executed by cold-forging two ends of the metal blank 2 to form two round heads 21 at two ends of the metal blank 2. The stamping step 13 is performed by pressing the metal blank 2 having the two round heads 21 with a stamping device (not shown) whereby the metal blank 2 is flattened and shaped into an outline of a spanner. Finally, the removing step 14 is executed by removing residual materials from a periphery of the spanner outline of the metal blank 2 with another stamping device (not shown). Therefore, a spanner product is made.

[0003] However, stamping devices with different thrust are required to execute different presses which are the initial cold forging of the round heads 21 and the stamping of the spanner outline of the metal blank 2 in the conventional method 1 in order to finish the spanner. Therefore, the stamping devices should be equipped with the thrust higher than the thrust of general machinery in order to have enough thrust to execute the processing work of cold-forging of the metal blank 2. Moreover, different parts of the spanner are formed by different stamping devices to result in the increased processing costs. Further, the processing work of cold-forging renders the stamping devices to bear the over large impact to further cause the greater damage of the stamping devices and increase repairing costs. Furthermore, the conventional method 1 requires complex steps and needs to use multiple presses with different thrust to complete the processing work of the spanner, with the result that the processing time is prolonged, the processing efficiency is reduced, and production costs are increased. That are unfavorable for increasing the economic effectiveness. Therefore, the conventional method 1 still needs to be improved.

### SUMMARY OF THIS INVENTION

[0004] The object of this invention is to provide a method for forming a spanner advantageous to shape the spanner quickly, simplify processing procedures, decrease residual materials, reduce processing costs, and increase the forming efficiency.

[0005] The method of this invention includes a step of preparing a cylindrical metal blank derived from cutting a cylindrical metal material into sections, a step of heating the cylindrical metal blank under a high temperature to supply the cylindrical metal blank, a step of shaping the heated cylindrical metal blank by pressing and pushing the cylindrical metal blank forward on a shaping die with a pushing unit to form a holding section and two head sections connected thereto each of which has a width larger than a width of the holding section so that the density of the cylindrical metal blank is changed, and a step of stamping the cylindrical metal blank when the cylindrical metal blank still remains heat to flatten the holding section and shape each head section into a spanner-shaped part whereby a spanner product is obtained. Meanwhile, no residual material is derived from the stamping operation. The needed forming size and shape are kept under control and no crack derived from over stamping is formed whereby the yield is increased and the spanner is formed quickly. Therefore, the successive steps, as aforementioned, simplify the processing procedures, reduce residual materials, increase the processing efficiency, achieve quick forming of the spanner, decrease processing costs, and enhance the forming efficiency.

[0006] Preferably, the cylindrical metal blank is heated by high frequency heating, medium frequency heating, or electric heating.

[0007] Preferably, the holding section and the head sections are processed and formed by multi-stage stamping in the stamping step.

[0008] Preferably, the shaping die is convexly disposed on the base and tapers off from the second end to the first end.

### BRIEF DESCRIPTION OF THE DRAWINGS

#### [0009]

Fig. 1 is a block diagram showing the steps of a conventional method;

Fig. 2 is a perspective view in accordance with the conventional method;

Fig. 3 is a block diagram showing the steps of a first preferred embodiment of this invention in sequential order;

Fig. 4 is a perspective view in accordance with the first preferred embodiment of this invention;

Fig. 5 is a schematic view showing the shaping step of the first preferred embodiment of this invention;

Fig. 6 is a schematic view showing the stamping step of the first preferred embodiment of this invention; and

Fig. 7 is a perspective view showing the holding section and head sections are processed by multi-stage stamping in the stamping step.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0010] Referring to Fig. 3 and Fig. 4, a method 3 for forming a spanner of a first preferred embodiment of this invention includes a preparing step 31, a heating step 32, a shaping step 33, and a stamping step 34. The preparing step 31 is performed by preparing a cylindrical metal blank 7, as shown in Fig. 4, obtained by cutting a cylindrical metal material (not shown) in sections. A length of each cylindrical metal blank 7 can be adjusted according to the size and type of the required spanner product. After the preparing step 31, the heating step 32 is performed by heating the cylindrical metal blank 7 with a heating device 4 under a high temperature to allow the cylindrical metal blank 7 to become soft and moldable. The cylindrical metal blank 7 is heated by high frequency heating, medium frequency heating, or electric heating to reach the high temperature so that the cylindrical metal blank 7 is softened completely.

[0011] After the cylindrical metal blank 7 is heated under the high temperature to get supple, the shaping step 33 is executed. As shown in Figs. 3 to 5, the shaping step 33 is performed by shaping the heated cylindrical metal blank 7 with a shaping device 5. Specifically, the shaping device 5 has a base 51, a shaping die 52 located on the base 51 and having a first end 521 and a second end 522, and a pushing unit 53 movably fitted relative to the shaping die 52. In addition, shaping dies 52 with different shapes and sizes can be applied according to the required shapes and sizes of the finished spanner products to form different types of spanners. Here takes an example that the shaping die 52 is convexly disposed on the base 51 and tapers off from the second end 522 to the first end 521. During the shaping operation, the cylindrical metal blank 7 is situated at the first end 521 of the shaping die 52 and pushed by the pushing unit 53 to move toward the second end 522 of the shaping die 52 gradually. When the cylindrical metal blank 7 is pushed and pressed by the pushing unit 53, a middle part of the cylindrical metal blank 7 gradually becomes thinner and extends toward the both sides during the moving action, thereby forming the holding section 72 and two head sections 71 connected to the holding section 72 according to a shape of the shaping die 52. Further, a width 71d of each head section 71 is larger than a width 72d of the holding section 72, as shown in Fig. 4. The cylindrical metal blank 7 is heated beforehand in the heating step 32 under the high temperature so that the density of the cylindrical metal blank 7 is changed to allow the cylindrical metal blank 7 to become plastic and extendable, thereby increasing the processing malleability of the cylindrical metal blank 7 and facilitating the shaping step 33.

[0012] Referring to Figs. 3 and 6, after forming the head sections 71 and the holding section 72, the stamping step 34 is executed. The stamping step 34 is performed by punching the shaped cylindrical metal blank 7 with a stamping device 6 when the cylindrical metal blank 7 still

remains heat to simultaneously flatten the holding section 72 and press the head sections 71 to shape each head section 71 into a spanner-shaped part 711 whereby the spanner product is made. In particular, the type of the spanner-shaped part 711 can be formed according to needs. As shown in Fig. 4, the A-type spanner has two spanner-shaped parts 711 each having jaws with a central open hole. The B-type spanner has one spanner-shaped part 711 formed in a ring-shaped head with a central closed hole and another spanner-shaped part 711 formed in jaws with a central open hole. The C-type spanner has two spanner-shaped parts 711 each formed in a ring-shaped head with a central closed hole. Hence, the finished spanner can be formed with different types of the spanner-shaped parts 711 through adjusting a contour of a cave of the stamping device 6. Furthermore, the holding section 72 and the head sections 71 can be processed and formed by multi-stage stamping in the stamping step 34, as shown in Fig. 7.

[0013] The operation of this invention is described with the aid of Figs. 3 and 4. First, a cylindrical metal blank 7 is prepared by cutting a cylindrical metal material into sections according to a size of required spanner product. After preheating the heating device 4 to reach the set temperature, the cylindrical metal blank 7 is heated by the heating device 4 under the high temperature to become softened, thereby increasing the processing malleability of the cylindrical metal blank 7, facilitating the processing work, and shortening the processing time in the following steps greatly and effectively. Meanwhile, the heated cylindrical metal blank 7 is favorable for quick shaping operation. In addition, the cylindrical shape of the metal blank 7 allows the direct shaping in the shaping step 33. In the shaping step 33, the heated cylindrical metal blank 7 is placed at the first end 521 and pushed and pressed by the pushing unit 53 toward the second end 522. The pushing and pressing actions of the pushing unit 53 allow the middle part of the heated and softened cylindrical metal blank 7 to gradually become thinner during the moving action to form the holding section 72 and parts of the cylindrical metal blank 7 extend toward the both sides to form the head sections 71 whose width 71d is larger than the width 72d of the holding section 72. After that, the stamping device 6 executes the stamping operation when the cylindrical metal blank 7 still remains heat to flatten the holding section 72. Meanwhile, the head sections 71 are pressed by the stamping device 6 whereby the head sections 71 are punched by the punching force of the stamping device 6 to form the spanner-shaped parts 711 which may be troughs or holes according to a shape of the cave. Hence, the spanner product is completed. The stamping operation results in a change in the density of the interior structure of the cylindrical metal blank 7. Hence, the spanner product is completed. Because the cylindrical metal blank 7 remains heat while executing the stamping operation, no crack derived from over stamping is formed and the required forming size and shape are kept under control whereby the yield is

increased and the stamping operation is executed stably and quickly. Thus, a succession of the steps **31**, **32**, **33**, **34** including the preparing, high temperature heating, shaping and quick stamping simplifies the processing procedures, reduces a use of processing machinery, decreases residual materials, lowers the damage of processing machinery, increases the processing efficiency, attains the fast forming operation, reduces processing costs, and enhances the forming efficiency effectively.

**[0014]** The method **3** is distinguished in comparison with the conventional method **1** and provided with advanced effects. First, the method **3** takes an advantage of softening the cylindrical metal blank **7** through heating to increase the processing malleability of the cylindrical metal blank **7**, shorten the processing time of the following steps effectively, reduce a use of processing machinery, lower the damage of machinery, decrease residual materials, and increase the processing efficiency effectively.

**[0015]** Second, the shaping step **33** and the stamping step **34** execute the shaping and stamping operation after the cylindrical metal blank **7** is heated under the high temperature that is different from the conventional method **1** which makes the spanner by cold forging and executes stamping by many stamping devices with different thrust. Therefore, the high temperature heating action of the cylindrical metal blank **7** assists in forming the holding section **72** and the head sections **71** quickly, reducing residual materials, and executing the following steps smoothly. Further, the holding section **72** and the head sections **71** can be processed and formed by multi-stage stamping in the stamping step **34** whereby the holding section **72** is flattened and the head sections **71** are formed with the spanner-shaped parts **711** separately. Therefore, a use of processing machinery is reduced, residual materials are decreased greatly, the stamping operation is accelerated to attain the quick and stable stamping, and the processing and production costs are lowered effectively.

**[0016]** To sum up, the method of this invention includes steps of preparing a cylindrical metal blank by cutting a cylindrical metal material into sections, heating the cylindrical metal blank whereby the cylindrical metal blank turns into supple and the malleability of the cylindrical metal blank is increased to shorten the processing time of the following steps, shaping the heated cylindrical metal blank into the holding section and the head sections at two sides thereof, and stamping the cylindrical metal blank whereby the holding section is flattened and each head section is formed simultaneously to have the spanner-shaped part. Hence, the succession of the steps reduces a use of processing machinery, simplifies the processing procedures, lowers the damage of processing machinery, decreases residual materials, increases the processing efficiency, achieves the quick and stable stamping operation, and reduces production costs.

**[0017]** While the embodiments of this invention are shown and described, it is understood that further varia-

tions and modifications may be made without departing from the scope of this invention.

## 5 Claims

1. A method (3) for forming a spanner comprising steps (31, 32, 33, 34) of:

preparing a cylindrical metal blank (7), said cylindrical metal blank (7) being made by cutting a cylindrical metal material into sections; heating said cylindrical metal blank (7) under a high temperature with a heating device (4) to soften said cylindrical metal blank (7); shaping said heated cylindrical metal blank (7) with a shaping device (5), said shaping device (5) having a base (51), a shaping die (52) situated on said base (51) and providing a first end (521) and a second end (522), and a pushing unit (53) movably disposed relative to said shaping die (52), said cylindrical metal blank (7) being pressed and pushed by said pushing unit (53) and pushed forward from said first end (521) of said shaping die (52) toward said second end (522) thereof to form a holding section (72) and two head sections (71) at two sides of said holding section (72) according to a shape of said shaping die (52), a width (71d) of each of said head sections (71) being larger than a width (72d) of said holding section (72); and stamping said shaped cylindrical metal blank (7) with a stamping device (6) when said cylindrical metal blank (7) has residual heat to flatten said holding section (72) and shape each of said head sections (71) to form a spanner-shaped part (711), thereby completing a spanner product.

2. The method (3) according to claim 1, wherein said cylindrical metal blank (7) is heated by high frequency heating, medium frequency heating, or electric heating.
3. The method (3) according to claim 1, wherein said holding section (72) and said head sections (71) are processed and formed by multi-stage stamping in said stamping step (34).
4. The method (3) according to claim 1, wherein said shaping die (52) is convexly disposed on said base (51) and tapers off from said second end (522) to said first end (521).

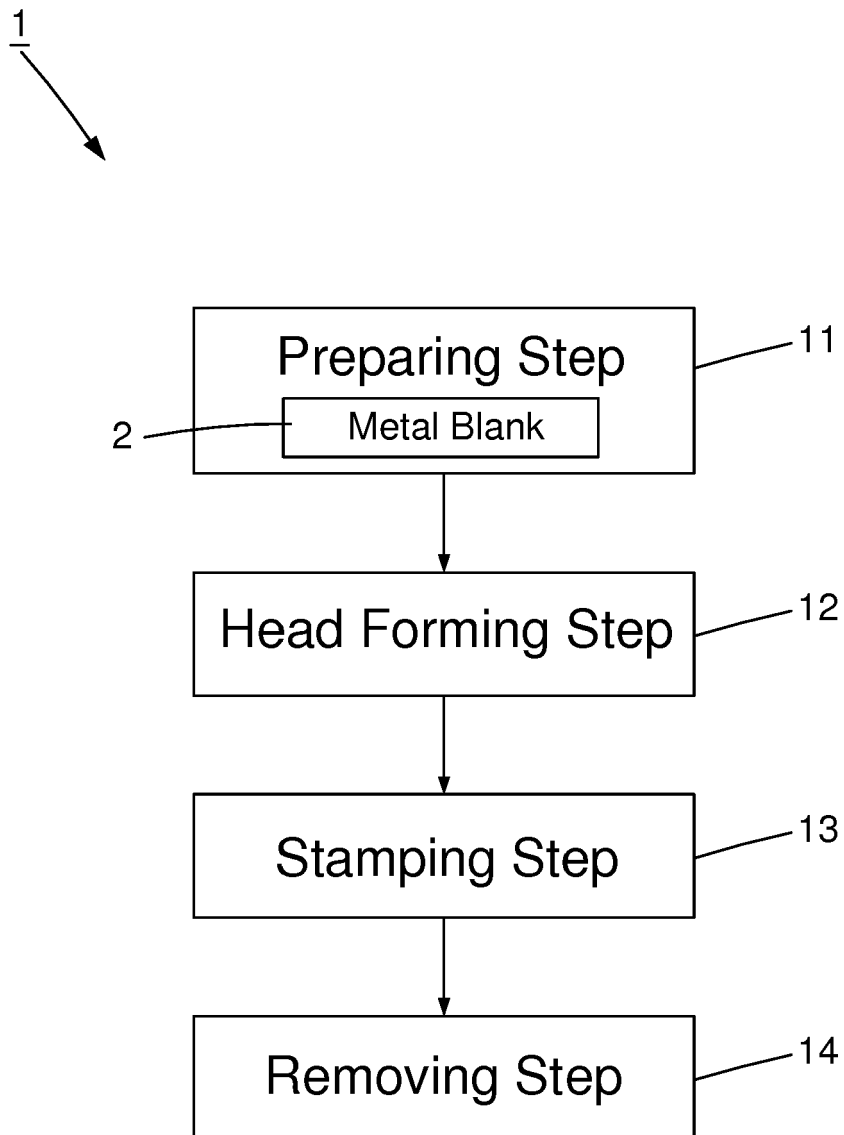


FIG. 1 (Prior Art)

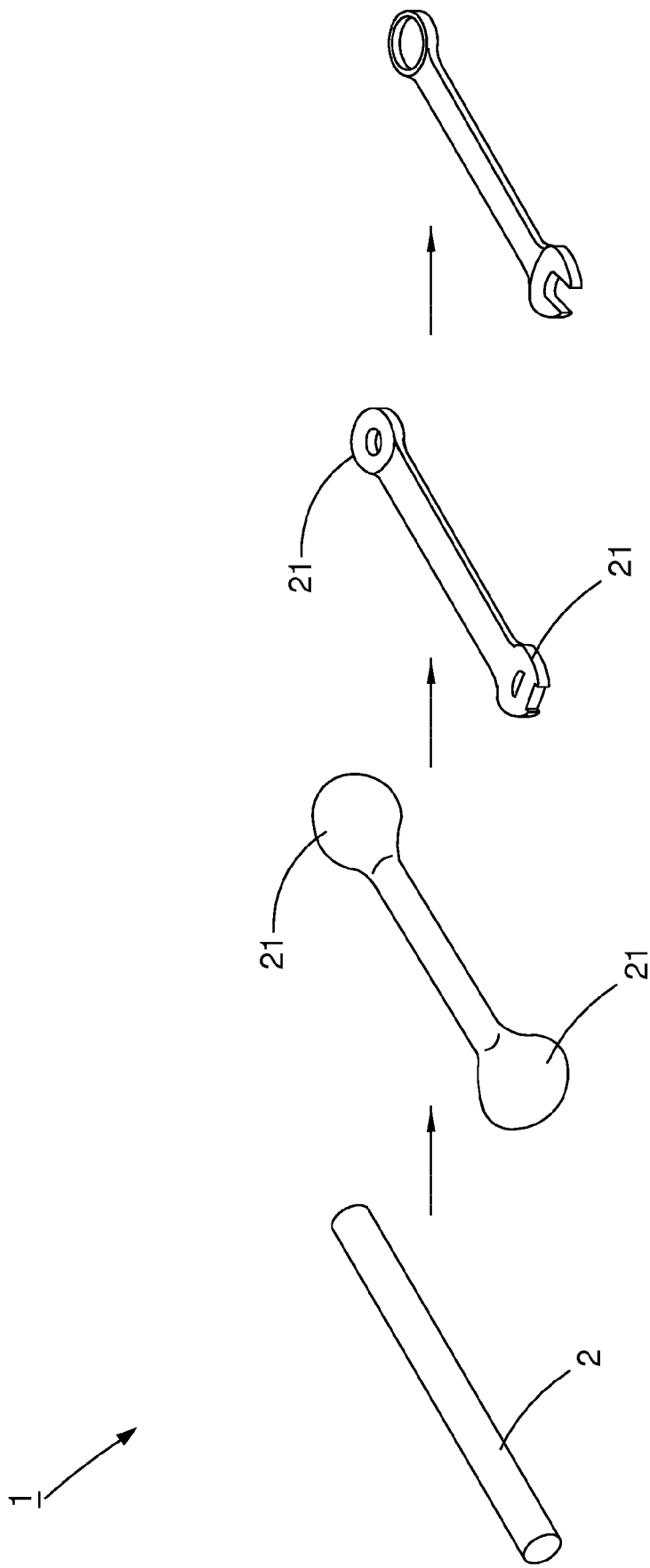


FIG. 2 (Prior Art)

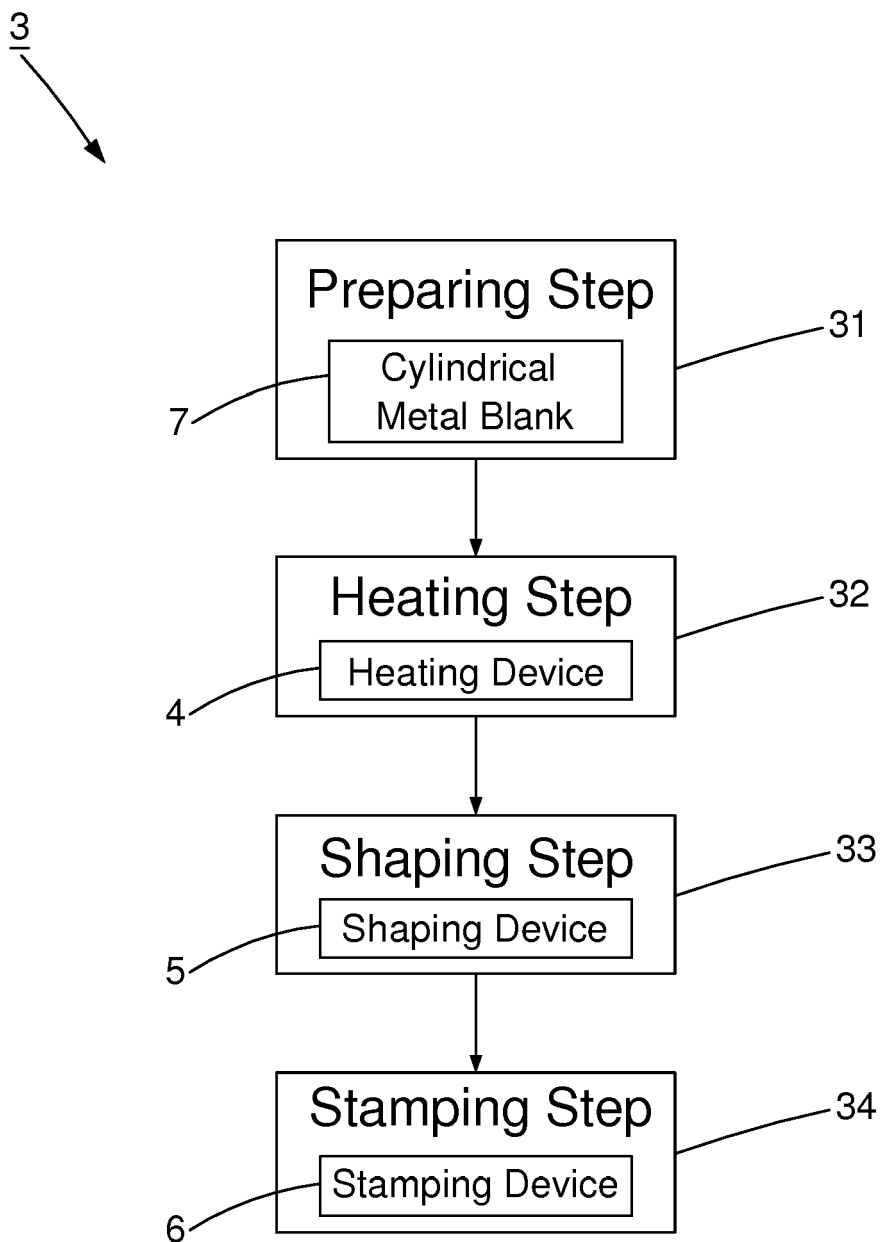


FIG. 3

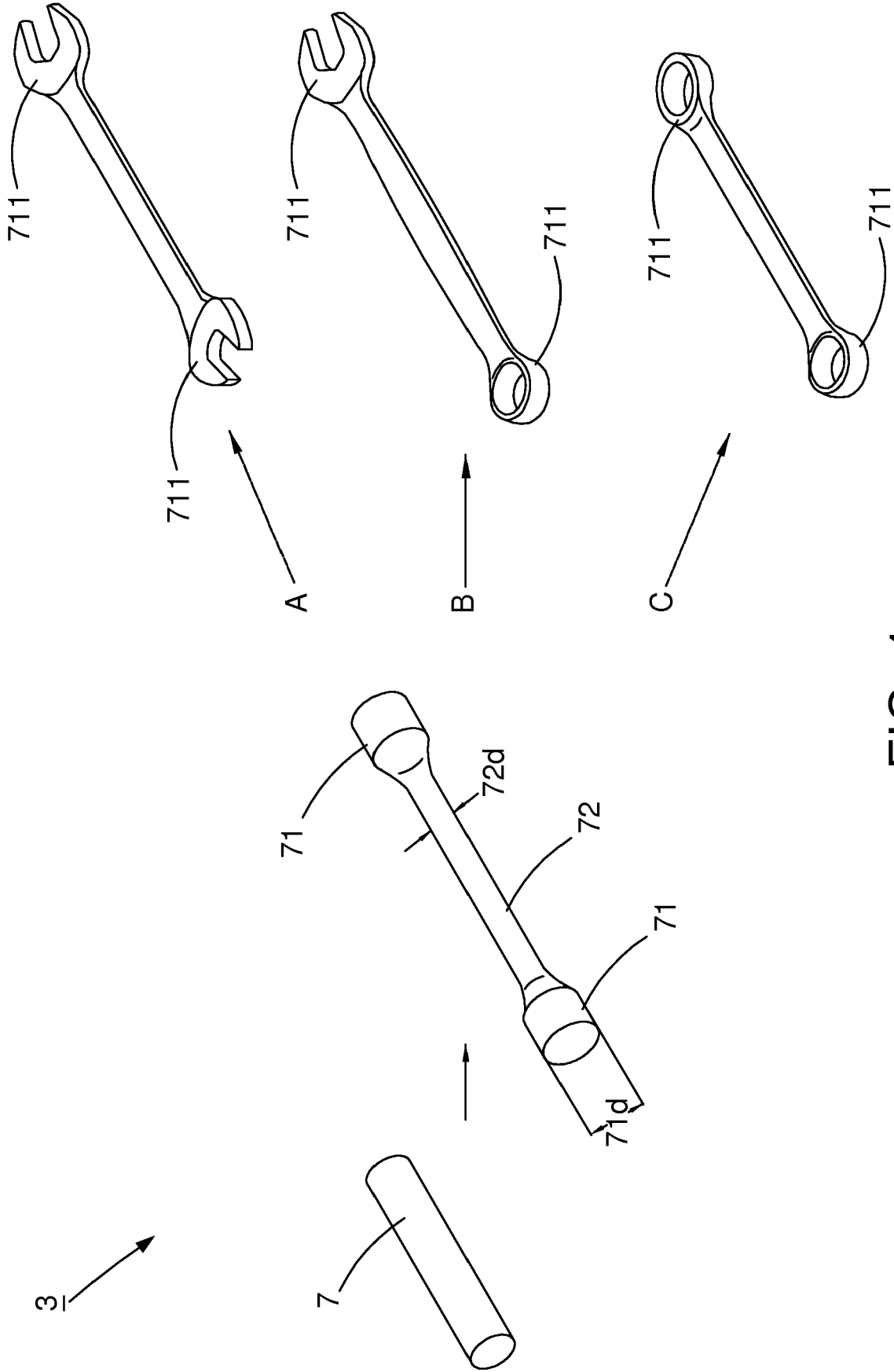


FIG. 4

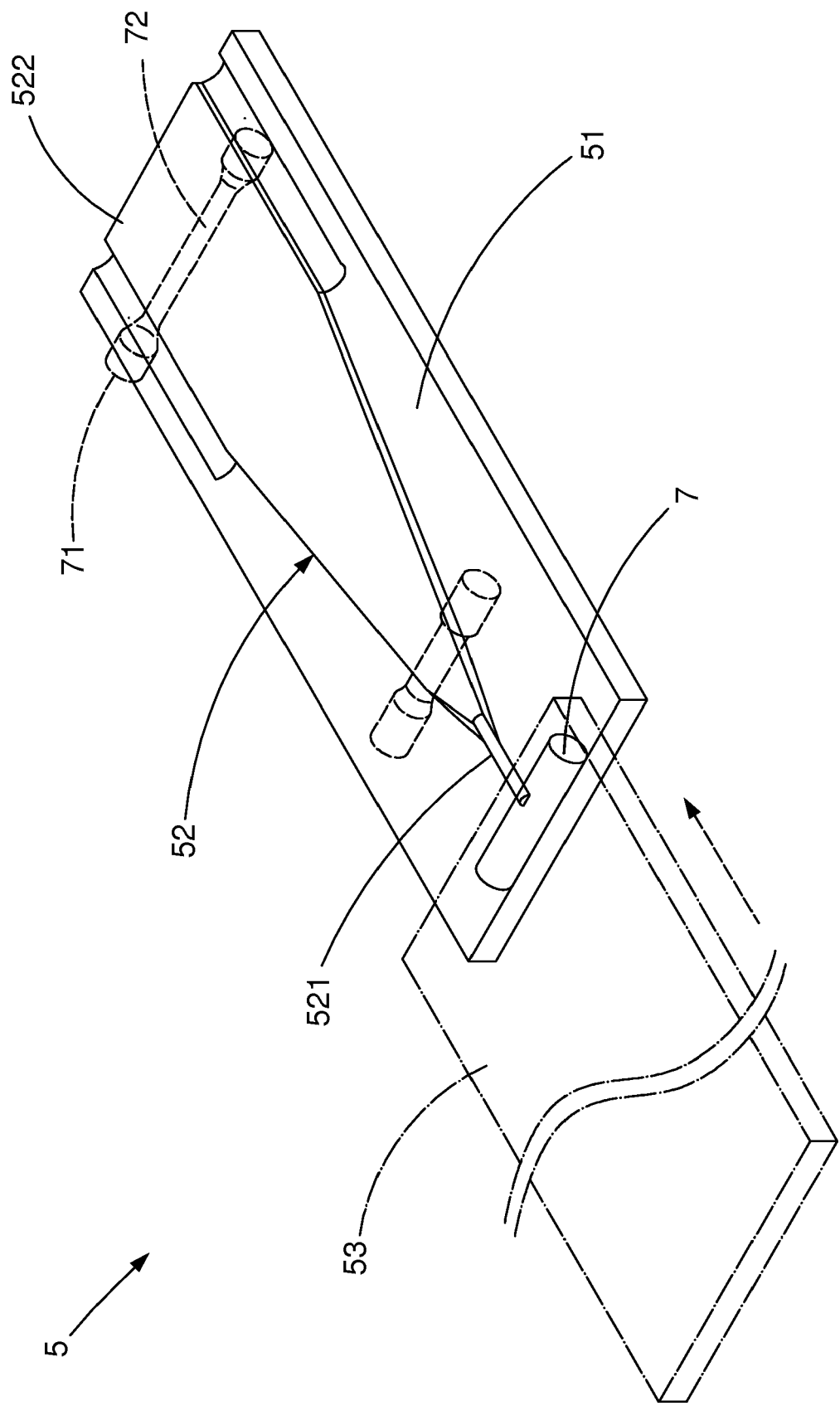


FIG. 5

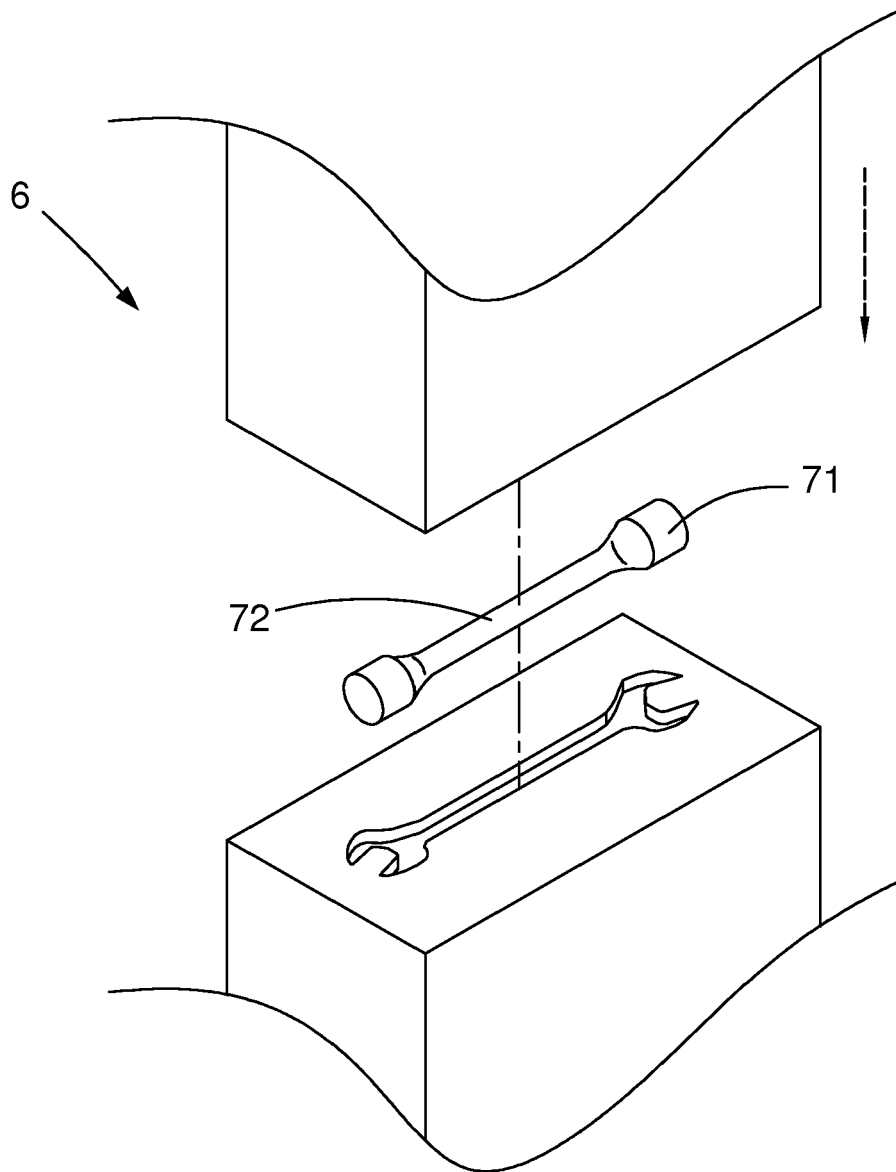
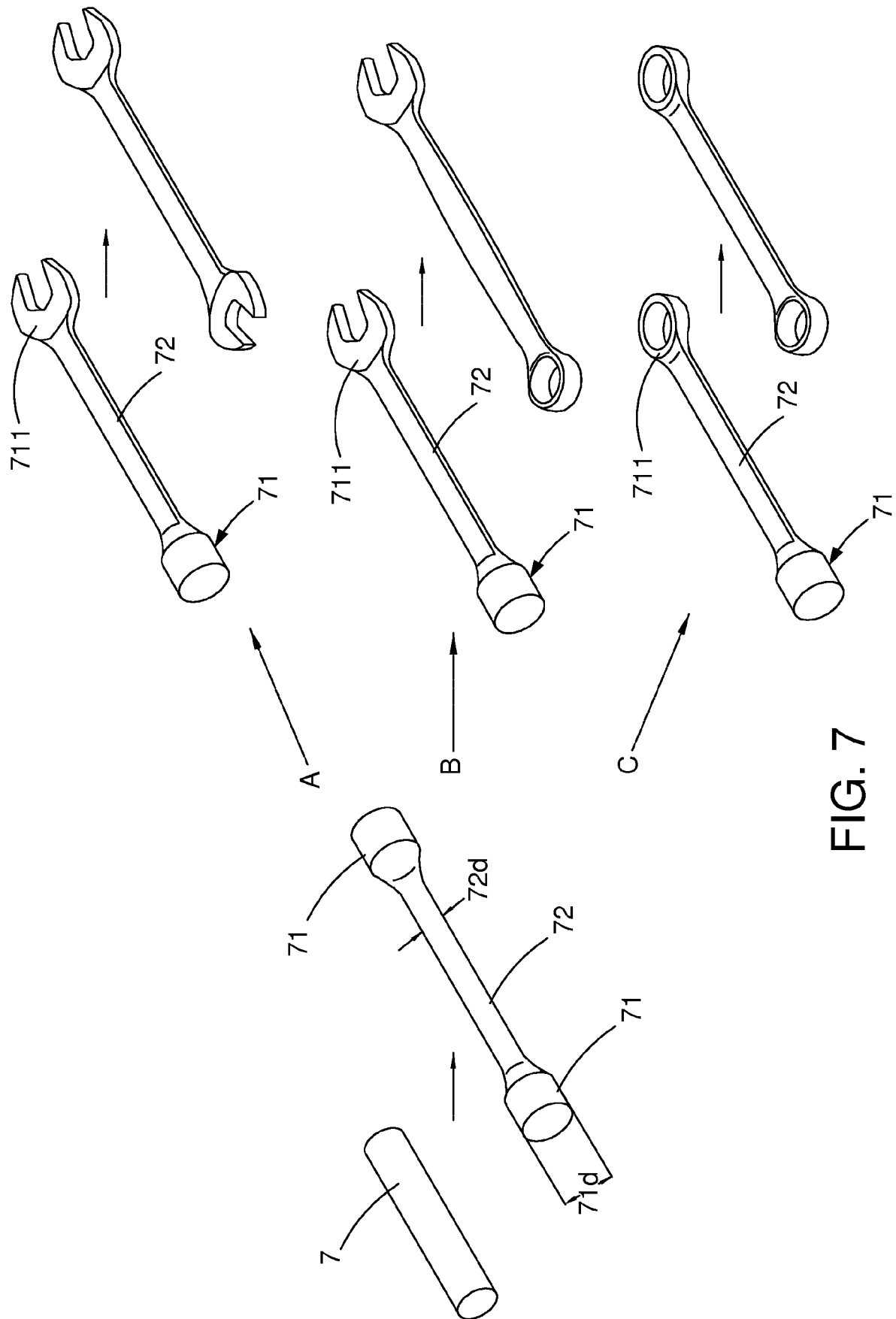


FIG. 6





## EUROPEAN SEARCH REPORT

 Application Number  
 EP 17 20 6066

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The present search report has been drawn up for all claims			
Place of search <b>Munich</b>		Date of completion of the search <b>6 June 2018</b>	Examiner <b>Charvet, Pierre</b>
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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