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(54) Wax pattern, process for setting precious and non-precious stones and jewel obtained

(57) The invention is a new wax pattern for the production of jewels set with stones, provided with protrusions to create the stone seats, wherein said protrusions have inclined side walls and the top side shorter than the base. According to the process adopted to set stones on wax patterns with protrusions, each stone is pressed into its seat and deforms the inclined walls of said protrusions, creating recesses that have exactly the same size as the edge of the stone itself.

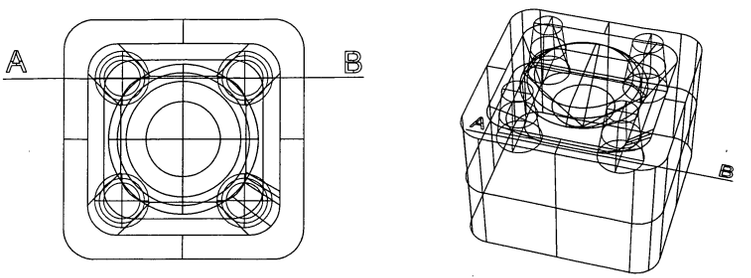
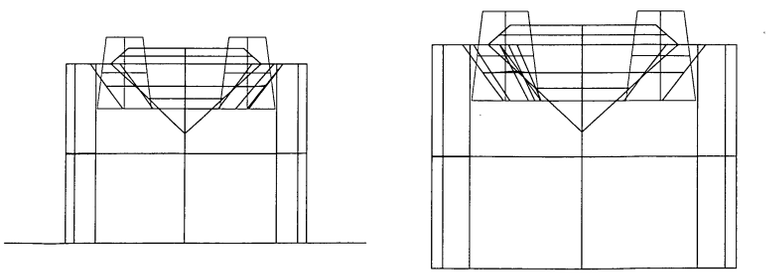


FIG. 1



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Description

[0001] This patent concerns the production of jewels and bijoux in general, hereinafter defined as jewels, set with stones, and in particular it concerns a new wax pattern, the process for setting stones on the metal part of the item and the jewel obtained.

[0002] For the large-scale production of metal jewels with stones the investment casting method is usually adopted, which comprises the following main steps:

- a metal pattern or master is made with a non-precious metal and without stones;
- the processing necessary to obtain small hooks to fix the stones is carried out;
- a rubber mould is carried out using two coupled and vulcanized rubber sheets between which the pattern or master has been previously positioned;
- wax is cast into the rubber mould to obtain a further wax pattern on which the stones are positioned;
- one or more wax patterns are joined in a tree structure that is covered with plaster;
- by means of a successive heating process the wax is melt to clear the pouring channels and the spaces in the mould patterns, for the successive casting of metal;
- the definitive metal to be used for the jewel is cast into the plaster mould, in such a way as to obtain the jewel already set with stones.

[0003] The final quality of the jewel considerably depends on the previous processing and on the quality of the initial pattern or master.

[0004] The most delicate step, which requires extreme precision, is the setting of the stones on the pattern or master.

[0005] At present this stone-setting operation is entrusted to craftsmen who receive the pattern or master with the seats for the stones and engrave the metal around said seats in such a way as to raise very small portions of the metal itself, which are commonly called jaws or claws and are necessary to fix the stones in the seats.

[0006] The initial pattern or master is carried out by the patternmaker, while the pre-setting of the stones is carried out by stone-setters or engravers.

[0007] Considering the very small dimensions of the object to be created, the setting of the stones requires considerable skills and in any case it takes a lot of time both to carry out the pattern or master and to pre-set the stones.

[0008] Therefore, skilled stone-setters are required to ensure a satisfying setting of the stones and this increases the jewel production cost.

[0009] In fact, each single jaw or claw must be carried out with the greatest care and, once the final object has been obtained, it must be raised to set the stone in its seat and must be carefully repositioned by hand in order to fix the stone definitively.

[0010] Furthermore, each pattern must be completely carried out by hand by the patternmaker, even if it differs slightly from other patterns that have already been used or has structural-aesthetical elements already used for other patterns.

[0011] Due to the minimum size of the pattern or master, the manual execution of the same does not allow, or in any case considerably limits the possibility to have some undercut details, unless they are applied separately, with a considerable increase in production costs, longer production times and obvious difficulties in the implementation of the final object.

[0012] Stereolithography equipment for rapid prototyping is known. These machines comprise a plane that travels vertically in a bath of liquid resin that is solidified by means of a laser ray. Both the laser ray and the movement of the plane are controlled by a computer, so that prototypes can be carried out with a precision of hundredths of millimeter.

[0013] The objects of this patent are the following: a new wax pattern with protrusions in the shape of a truncated cone or truncated pyramid, a new process for the setting of precious and non-precious stones and the jewel obtained from said wax pattern and from said process.

[0014] The aim of the new wax pattern is to allow the stones to be set reducing the manual work required.

[0015] Another aim of the new wax pattern is to obtain a jewel in which the set stones do not come out of their seats or do not move inside the same.

[0016] The aim of the process is to obtain patterns or masters ensuring that the successive mass processing can be carried out with extreme precision.

[0017] Another aim of the new process is to produce patterns of jewels set with stones more rapidly.

[0018] A further aim of the new process is to ensure the production of patterns of similar jewels or of jewels with common characteristics or details, even set with stones, with no need for the patternmaker to remake the whole pattern each time.

[0019] Wax pattern for the production of jewels set with stones, having protrusions in the shape of a truncated cone or truncated pyramid around the seat of each stone, wherein each stone, once set in its seat, deforms the walls of said protrusions, creating recesses having the same size and shape as the edge of the stone itself.

[0020] Process for setting precious and non-precious stones in wax patterns having protrusions in the shape of a truncated cone or truncated pyramid, comprising the step in which the stones are pressed on the seats defined by two or more protrusions, and wherein said stones, when pressed, deform the vertical or inclined walls of the protrusions.

[0021] Process for the production of wax patterns with protrusions in the shape of a truncated cone or truncated pyramid, comprising the 3D computer aided design of the jewel and its 3D solid plotting obtained by means of

stereolithography or CNC equipment, or similar equipment and the consequent implementation of the pattern used to create to rubber mould or master used in turn to obtain the wax pattern.

[0022] Jewel set with stones, produced with said wax pattern obtained with said process/processes.

[0023] The production of the jewel, starting from the wax pattern, includes the following main steps:

- application of the stones to the wax pattern that successively is applied, if necessary together with several wax patterns, to a wax tree structure;
- plaster covering of the patterns with stones and of the tree structure;
- heating of the solidified plaster, in such a way as to eliminate the wax and obtain the plaster mould with the stones;
- casting of the metal into the plaster mould;
- elimination of the plaster and separation of the jewels from the metal tree structure.

[0024] The characteristics of the new wax pattern, of the whole stone-setting process and of the jewel obtained from said wax pattern according to the process described above will be highlighted by the following description of one among many possible applications of the invention and by the following drawings.

[0025] Figure 1 shows a collet provided with 4 pyramid-shaped points that hold the stone.

[0026] Figure 2 shows an enlargement of the collect section.

[0027] Figure 3 shows a jewel set with many stones held by two rows of collets.

[0028] Figures 4 and 5 are a front and a top view of the jewel.

[0029] Figure 6 shows a section of the jewel, while Figure 7 shows a general view of the same.

[0030] The wax pattern of the jewel to be produced has - around the stone seats - at least three protrusions in the shape of a truncated cone or truncated pyramid.

[0031] Said protrusions have one or more preferably inclined walls, with the top side shorter than the base, and are spaced from one another with a distance that is shorter than the side of the stone to be set.

[0032] Therefore, the insertion of the stone in its seat requires the creation of recesses in the vertical or inclined walls of said protrusions, said recesses having exactly the same size and position as the edge of the stones themselves. In this way the stones are fixed by means of the protrusions.

[0033] With a wax pattern made as described above a stone-setter is no more necessary to raise the material around the stones and make the jaws or claws that fix the stones.

[0034] Furthermore each stone, when inserted in its seat in the wax pattern, creates the recess needed to hold it.

[0035] The protrusions of the wax pattern may have any section, for example round, square, hexagonal, triangular, elliptic or any other section.

[0036] A computer and stereolithography equipment or CNC equipment are used to obtain one or more wax patterns as described above.

[0037] The 3D design of the jewel is carried out by the pattermaker with the aid of the computer, according to his own specifications.

[0038] When the 3D design is considered satisfying, it is converted into data suitable for piloting the stereolithography equipment, the CNC equipment or any other suitable equipment.

[0039] Said equipment carries out - in resin, polymer or through chipping, the full size scale pattern or master complete in all its details, including the seats and the protrusions for fixing the stones, in a single object.

[0040] The pattern or master obtained in this way is used to carry out the vulcanized rubber mould.

[0041] The vulcanized rubber mould is opened, the pattern or master is extracted, then the mould is closed and can be used repeatedly for the production of wax patterns.

[0042] The 3D computer aided design of the jewel makes it possible to evaluate the jewel to be produced in advance, from every point of view and to take in consideration every single detail. In the computerised design phase it is possible to make any modification and to intervene in advance on any morphological or structural aspect of the final jewel to be obtained.

[0043] Furthermore, computer aided design makes it possible to use components, common features or ornamental details that can be repeated in jewels with different size, shape or application, like for example earrings, bracelets, pendants and rings belonging to the same line.

[0044] The implementation of the pattern or master by means of stereolithography equipment, CNC equipment or any comparable equipment makes it possible to work with extreme precision, even with undercut details and elements, reducing the production time of the pattern or master and therefore even of the wax pattern.

[0045] The use of the wax pattern with protrusions according to the process described above ensures the production of jewels reducing costs and time, while guaranteeing high quality and precision.

[0046] The stones are applied to the wax pattern and perfectly held by the protrusions. In fact, when the stones are inserted between said protrusions in the wax pattern, they slightly dig into the sides of the protrusions, creating grooves that hold the stones themselves.

[0047] The various wax patterns with stones are placed on a wax tree structure, which is then covered with liquid plaster.

[0048] Once the plaster has completely solidified, it is heated, in order to melt and eliminate the wax. The stones remain fixed within the plaster block/mould.

[0049] The successive casting of metal inside the plaster block/mould fills the spaces left empty by the wax

patterns and envelops, where required, the stones held by plaster. In fact, the metal cast into the plaster mould, besides making the jewel, also makes said protrusions with the relevant recesses to hold the stones.

[0050] Finally, the plaster mould is opened and the jewels set with stones are separated from the metal tree structure resulting from the casting.

[0051] The jewel obtained in this way does not need any special processing, apart from the final finishing and polishing.

[0052] The stones are already positioned in their seats and held by the protrusions that surround their edges with extreme precision.

[0053] The wax pattern with protrusions, the production process of the same, the stone-setting process described above make it possible to obtain jewels set with precious and non-precious stones with production times and precision that could not be obtained with the processes known up to now.

[0054] The seats obtained in the protrusions of the wax pattern are shaped according to the contour, size and exact dimensions of the stones.

[0055] Therefore, with reference to the above description and the attached drawings, the following claims are put forth.

Claims

1. Wax pattern for the creation of jewels set with stones, **characterized in that** it is provided, around the seat of each single stone, with protrusions with vertical or inclined side walls and the top side shorter than the base, and wherein said protrusions are spaced from one another with a distance that is shorter than the side of the stone to be set.

2. Wax pattern with protrusions around the stone seats for the creation of jewels set with stones, **characterized in that** said protrusions may have any section, for example round, square, hexagonal, triangular, elliptic or any other section.

3. Process for setting stones on wax patterns with protrusions according to claims 1, 2, **characterized in that** each stone is pressed into its seat and deforms the walls of said protrusions, creating recesses that have the same dimensions as the edge of the stone itself.

4. Process for the production of wax patterns according to claims 1, 2, **characterized in that** it comprises:

   - 3D computer aided design of the jewel;
   - conversion of said design into data suitable for piloting stereolithography equipment, CNC equipment or any other suitable equipment;
   - execution of a pattern or master of the jewel made of resin or polymer by means of stereolithography equipment, CNC equipment or similar equipment;
   - execution of a vulcanized rubber mould by means of said resin or polymer pattern or master;
   - execution of wax patterns by means of said vulcanized rubber mould.

5. Jewel set with stones, **characterized in that** it is obtained from wax patterns with protrusions according to claims 1, 2, 4, on which the stones are set according to claim 3.

6. Process for the production of jewels according to claims 1, 2, 3, 4, **characterized in that** it comprises the following steps:

   - said wax pattern set with stones is applied to a wax tree structure, if necessary together with other wax patterns set with stones;
   - the tree structure with wax patterns and stones is covered with plaster, which then solidifies;
   - the plaster block is heated, in order to eliminate the wax and allow the metal to be cast into the spaces left empty by the wax and to envelop, where required, the stones blocked by plaster;
   - the plaster block is opened and the jewels are separated from the metal structure that results from the casting.

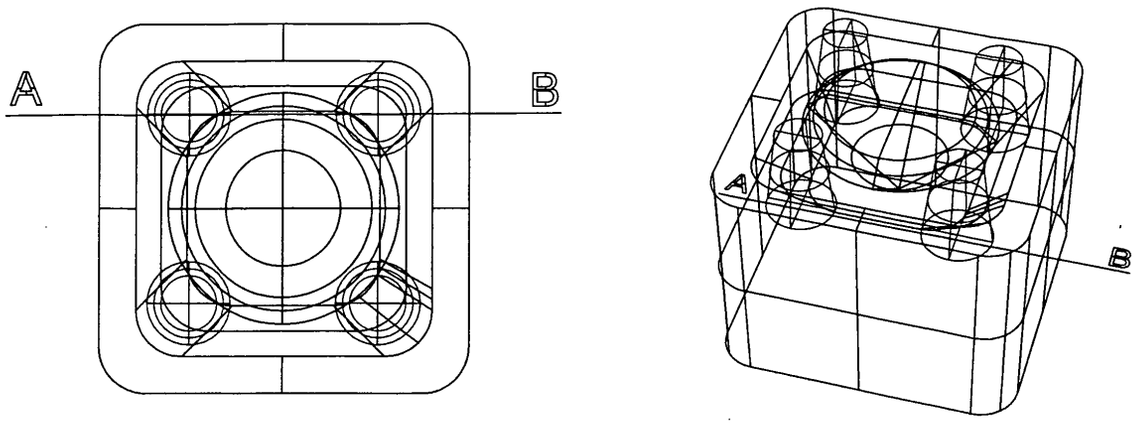
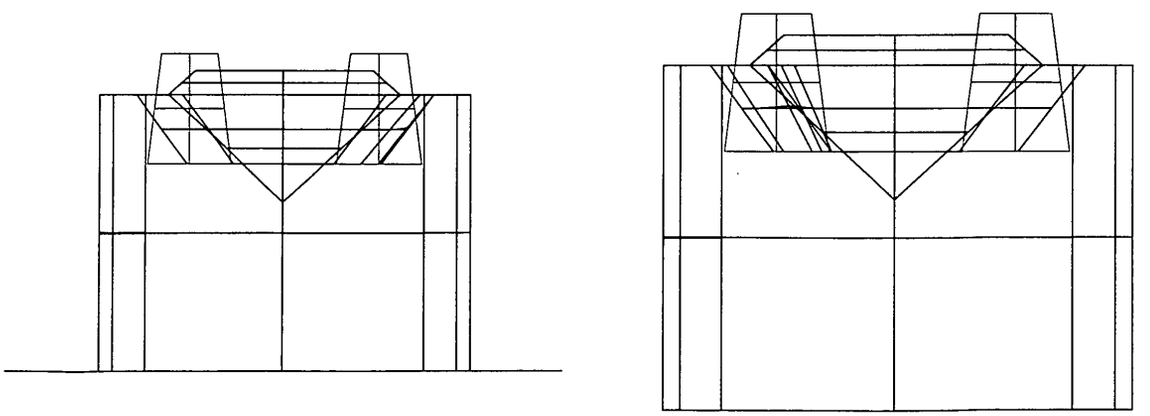


FIG. 1



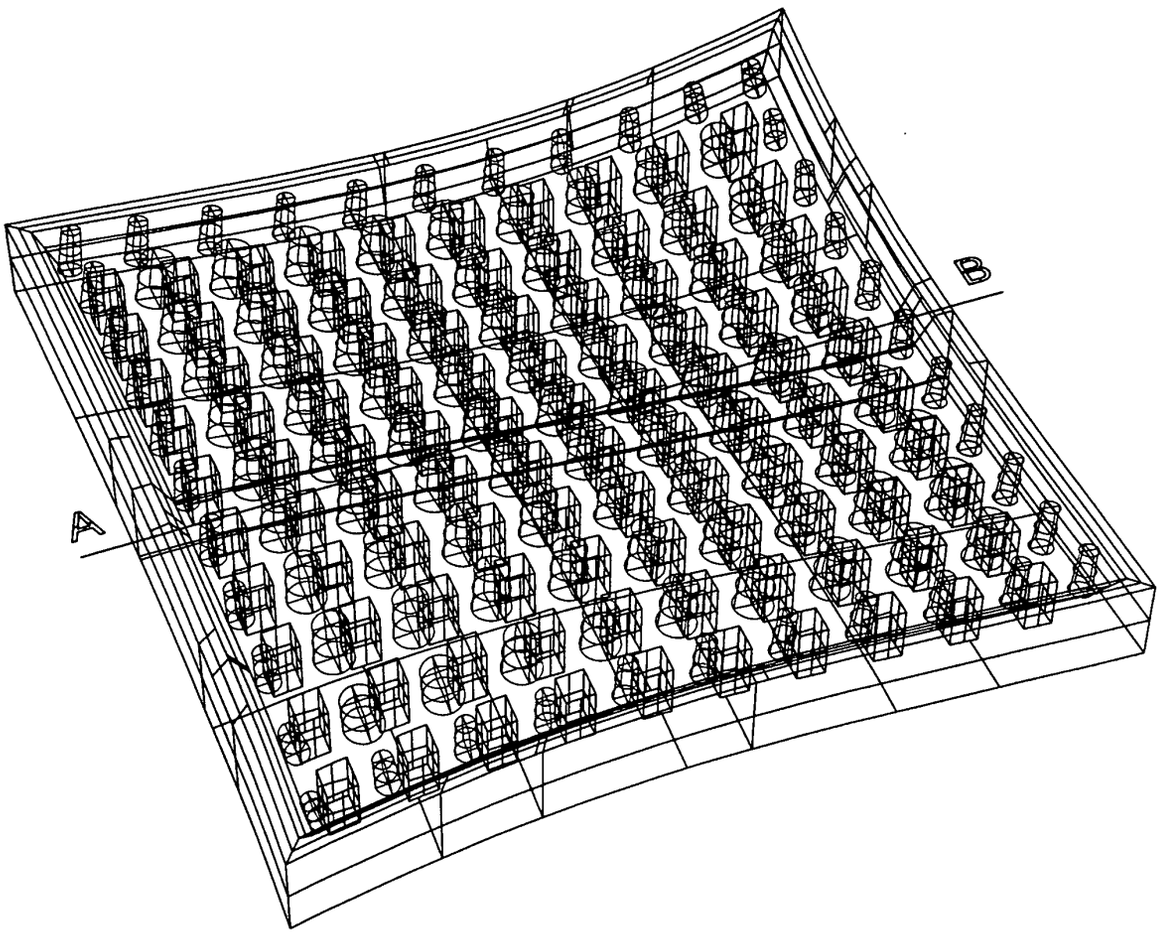


FIG. 3

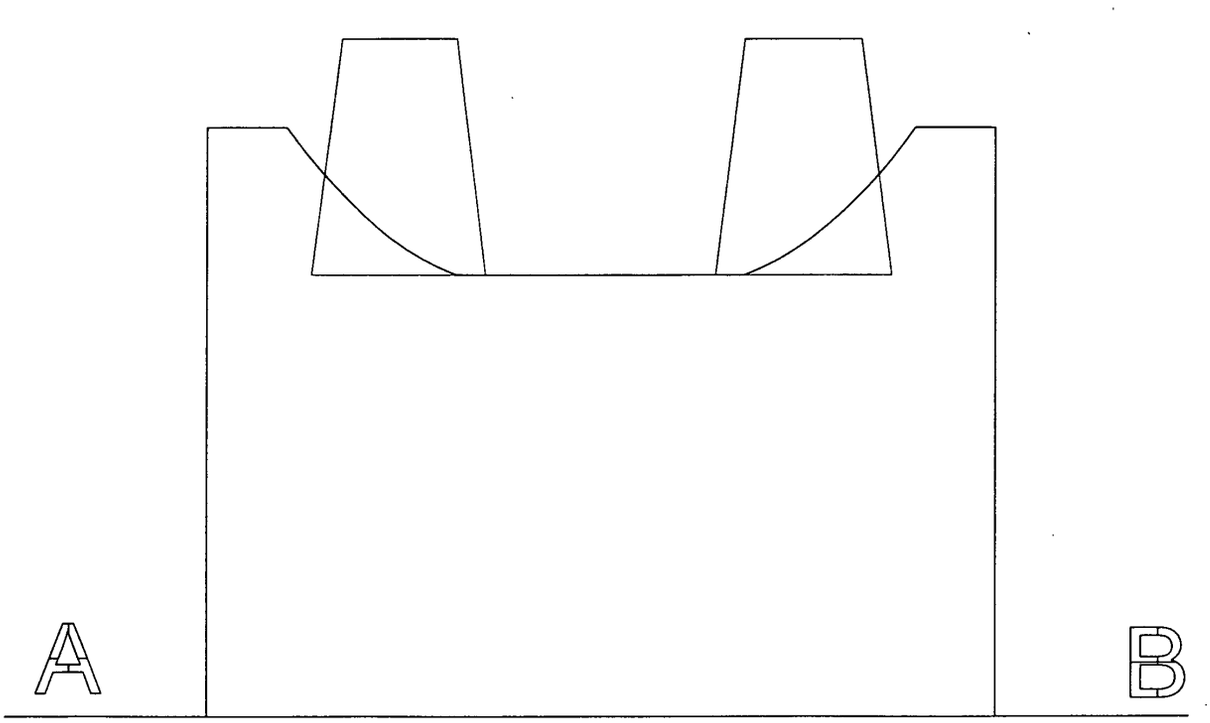


FIG. 2

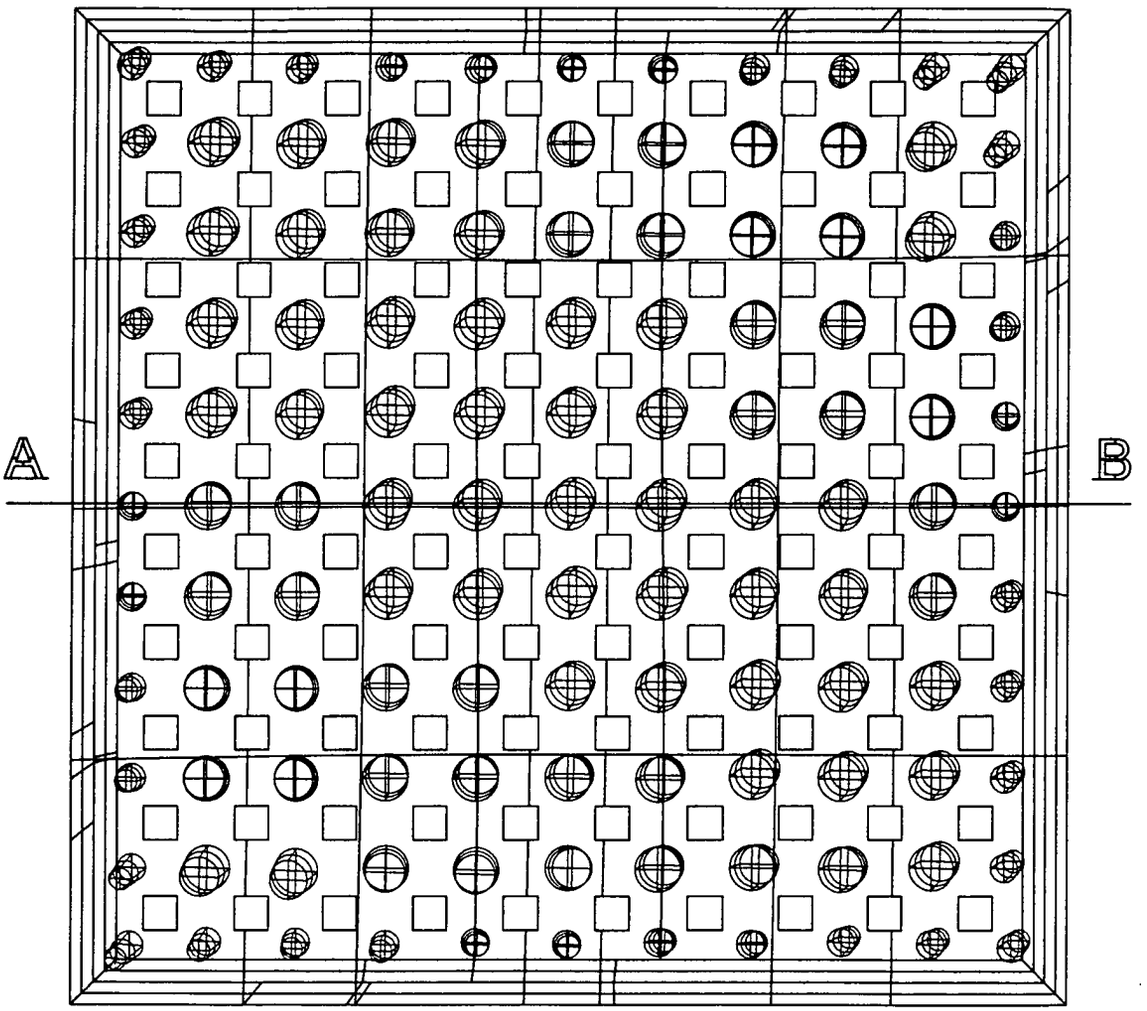


FIG. 5

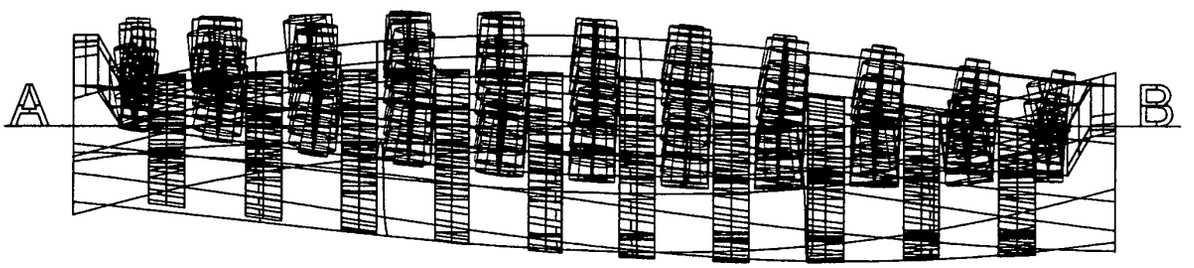


FIG. 4

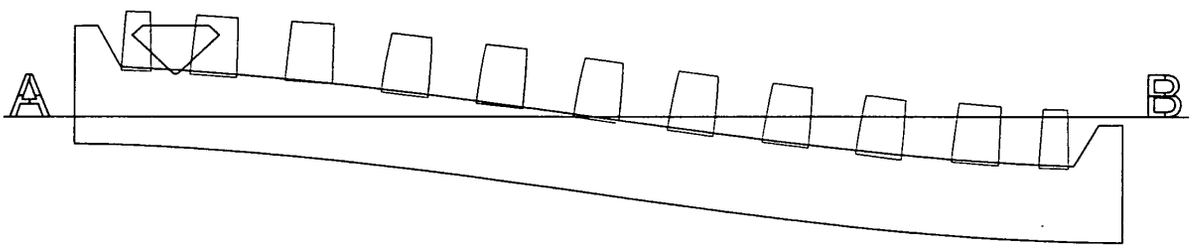


FIG. 6

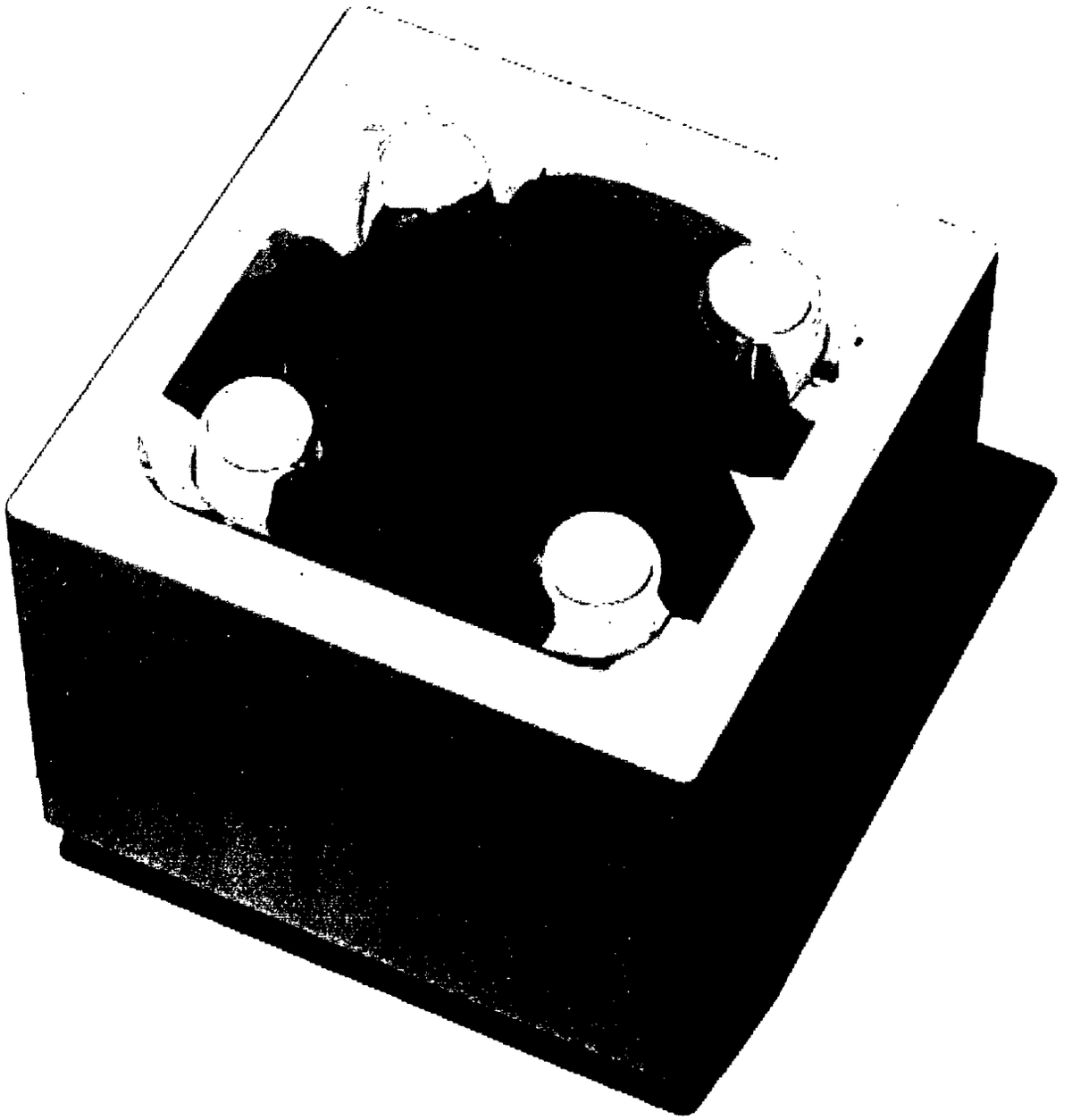


FIG. 7