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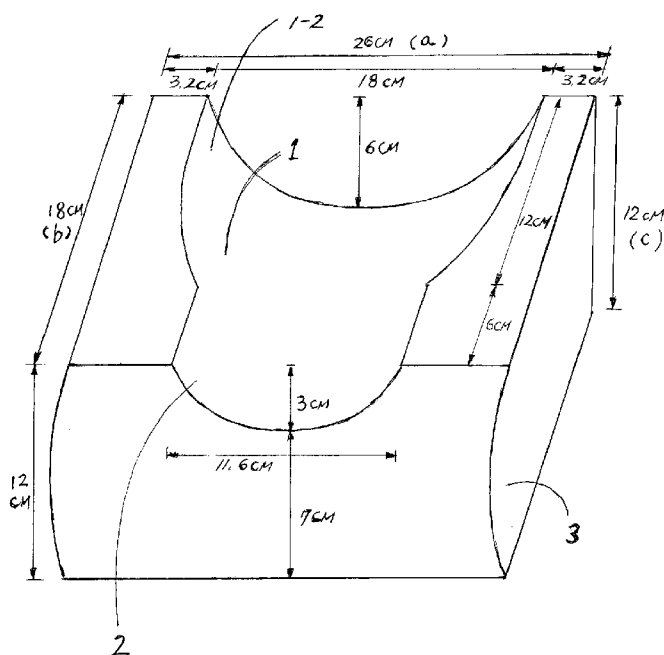
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(54) Title: MULTIPURPOSE & COMPATIBLE PILLOW/HEADREST

[Fig. 1]



(57) Abstract: This invention with improvements in external figure and structure based on new and different concept for pillow and chairs is intended to create practical convenience in daily life and to minimize the neck and shoulder pain created from usage of uncomfortable pillows in bed and inconvenient chair during long-distance travel. In an aspect of external figure, the invention adopts the concept of 'ergonomic shape hole of head-insert' which they never tried so far. As for the structure, this invention provides insert space hole on the body of applicable objects which 'pillow/headrest' (it has an 'ergonomic shape hole of head-insert') combines with, for easy process of assembly and separation between body and pillow/headrest. Additionally it is designed to maximize the portability and to accommodate the multiple usage by unifying the shape and size of 'pillow/headrest.' This invention promotes the convenience and practicality for everyday use of the pillow and chair. Applicable objects are: 1) bed pillows for sleeping on and pillows for leaning 2) portable pillows in outdoor camping area 3) head cushions on existing reclining chairs 4) headrest on passenger seats of long distance transportations including airplane, ship, train, bus 5) headrest on office chairs and reclining chairs 6) headrest on drivers' seats and assistant drivers' seats of automobile during rest and sleeping

after reclining backward 7) headrest function of back seats of the car 8) headrest on sofas In particular, they can reuse the existing chairs by simply remodeling the product; this will be a valuable attempt to benefit both in economic aspects (saving natural resources) and eventually to increase the convenience of customers.

## Description

### MULTIPURPOSE & COMPATIBLE PILLOW/HEADREST

#### Technical Field

- [1] The present invention focuses on improvement of head-support function of pillows and chairs; it is intended to enhance the convenience for everyday use with application of ergonomic figure, proper utilization of materials and advanced structure.
- [2] **aa) Concept of ergonomic figure**
- [3] Among human spinal column, the cervical vertebrae consists of seven bones around neck area and joins skeleton to the spine. It looks a curve having a "C" shape of c in a sectional view. It plays an important role of sustaining head and regarded as one of the most important and delicate part of human body because spinal cord (assembled group of various neurons) penetrates through this cervical vertebrae. The human cervical vertebrae has a 'C' shaped curve when standing straight, while it floats in the air when lying down on the bed or leaning against the chair. When sleeping in the chair, it is also wrenched and tilted to the left/right or forward/backward due to the relaxation of neck-muscle as well as round-shape of back of the head. It creates pain on the neck and shoulder when we use pillows and headrest of chairs manufactured without consideration of such phenomenon. It is the purpose of this invention to use proper pillows and functional headrest of chairs so as to seek comfort and to release pain and ache from neck and shoulder during the sleep on bed and chairs.
- [4] Mostly, pain and ache on neck and shoulder created by wrong posture of head cause interrupted sleep and tiredness during the sleep on passenger seats of long distance transportations including airplanes, ships, trains, buses and automobiles.
- [5] It is difficult to support the head straight while sleeping because of the relaxed neck muscle. Unless the head is placed properly, the neck becomes wrenched and easily bent. Therefore, the best way to protect cervical vertebrae and to release pain is to fix and place head in naturally comfortable way on pillows and chairs. Unfortunately, existing products are still far from solution to this problem.
- [6] The meaning of natural head-fix(place) is to insert head deeply into 'ergonomic shape hole.' The main concept of this invention is to use the method of head-fix and head-support in stable and comfortable manner on pillows and chairs by comprising deep 'ergonomic shape hole of head-insert' that copies the back shape of head and neck.
- [7] **bb) Concept of combination structure and its applicable objects**
- [8] The present invention is to add 'ergonomic shape hole of head-insert' to the pillow/headrest combined with applicable objects (such as pillows, chairs and sofas). For its proper usage, it should be remodeled by the concept of combining the pillow/headrest with applicable objects. For its multipurpose and compatibility, the joint-dimension

between applicable objects and the pillow/headrest is unified and standardized. Also, its portability will be increased by minimizing the size and weight of the pillow/headrest. Accordingly, this invention furnishes more comfortable way of living by facilitating the multi-use of the product.

- [9] The pillow/headrest can be utilized for variety of environments; bedrooms, sofas, reclining chairs and office head-back chairs and also for outdoor places such as camping zones and picnic areas, including passenger seats of airplanes, ships, trains, buses, automobiles.

[10] **cc) Technological condition**

- [11] The purpose of this invention is to maintain the best comfort position of head and neck in any circumstances and environments. The technological conditions are as follows:

- [12] 1) Most people would feel satisfied with comfort on head and neck for the long time use of 'pillow/headrest'(Fig. 1) with external figure of 'ergonomic hole of head-insert' which copies the back shape of the head and neck.

- [13] 2) Materials of pillow/headrest (such as latex-form, memory-form, sponge) should feel soft, light weight and cushioning and particularly be able to embody and materialize the 'ergonomic hole of head-insert' (drawing code 1 and 2).

- [14] 3) The pillow/headrest should be combined with and separated from the body of applicable objects easily and simply for the effective usage. The external size should be standardized (expected to be about 26-28 centimeters width) for properly compatible use with all kinds of applicable objects in any time. It also provides adjustment function of pillow/headrest position according to the user's sitting head height.

- [15] 4) Although the production cost will increase compared to that of existing products, this invention will substantially have a higher level of economical efficiency.

**Background Art**

- [16] Through this invention, we exerted our effort to achieve the improvement on overlooked issues among existing products on the field of pillow and chairs as follows:

[17] **aa) The pillow**

- [18] It is not easy for human head and neck to be fixed straight and comfortable on flat ground and hard surface of pillow because the human head is round-shape. For one example, natural materials of traditional pillows such as rice husks, buckwheat and millet have demerit to obstruct the blood circulation of head and neck after long time use, although they are comparatively easy to fix the head on the pillow. Another example is modern pillows filled with materials of normal sponge, padding and midair-yarn; while it has soft texture, it is difficult to fix the head in a stable manner and we

tilt our head left/right or forward eventually creates pain in neck and shoulder.

Recently, latex-form and memory-form have been used for pillows to provide solution to problems of tilted head and wrenched-neck, it has been improved much but not solved completely.

- [19] In order to provide solution to problems of wrenched-neck and tilted head, proper selection of material for the pillow is necessary but essential solution on the aspect of external figure is more important. It is the goal of this invention to find solution both on external figure and internal materials of the pillow

[20] **bb) The chair (for headrest)**

- [21] We commonly know the best comfortable chair is to have 'ergonomic function' on area where the head, back, waist, arm, hips, leg are laid on. The head stands on straight by itself when we are awake or working on the chair, but the head should be fixed and supported straight by supplements after we recline backwards because neck muscle is relaxed while rest and asleep on chairs.

- [22] The chairs can not be reclined backward enough and need various aids function of keeping comfortable posture of head by supplements because the interval space of equipped chairs in long-distance transportations such as airplane, ship, train and bus is narrow. Currently, existing chairs have only flat ground and a part of juttred component near by both sides of head for simply avoiding the head's movement, instead of providing ergonomic shape insert hole on the head part of chair body where human head is placed. Thus this kind chairs can not release pains and stress of neck and shoulder mainly because it has not improved support function for head and cervical vertebra without providing essential solution to the wrenched neck. Nobody has provided solution this long standing problem until today in practical manner although other parts of chair have shown some progress. It is said to be the "heat around bush" instead of method to provide solution to the essential portion of the problem.

- [23] This present invention can provide solution to long standing problem by adding the deep 'ergonomic shape hole of head-insert' and by remodeling the chair body for assembly of 'pillow/headrest', which has not been tried for chairs yet (Fig. 2).

- [24] Somebody may worry if deep hole of 'ergonomic shape of head-insert' would give any inconvenience when sat on chairs. But it is no concern at all because human head rarely lean against the chair body when we work on the chair such as reading books, meanwhile deep hole of 'ergonomic shape of head-insert' can be used effectively for inserting and fixing of head when we sleep or rest on chairs.

[25] **cc) Main subjects for improvement**

- [26] Although the concept of 'ergonomic shape hole of head-insert' is quite simple, it was rarely adopted in pillows and chairs. However, it now became comparatively easier to implement this into variety of products due to the advance in technology, nobody has

tried it until present. For effective use of pillow/headrest, this invention has now focused on the external ergonomic figure, proper utilization of materials and remodeling-structure of applicable objects such as chairs and sofas.

## Disclosure of Invention

### Technical Problem

- [27]     **aa)** Practical use and manufacturing process of 'ergonomic shape hole of head-insert'
- [28]     **bb)** Proper selection of internal materials and exterior shells for 'pillow/headrest'
- [29]     **cc)** Remodeling of applicable objects for easy assembly/separation and unification of pillow/headrest's size for compatibility
- [30]     **dd)** Function for 'pillow/ headrest' position adjustment on chairs

### Technical Solution

- [31]     Necessary tasks and means to solution of 'pillow/headrest' depend on the following:
- [32]     **aa) Practical use and manufacturing process of 'ergonomic shape hole of head-insert'** : Commercialization of ergonomic figure and structure as main concept of this invention and effective utilization of 'drilling cutting system'(Fig. 13) and 'forming & expansion molding system' for manufacturing
- [33]     Embodiment of figure for 'ergonomic shape hole of head-insert' is required in advance of commercialization and manufacturing of 'forming of head shape-hole'(called 'pillow/headrest' after this). Embodied figure looks after the 'shape of half-sphere'(drawing code 1) like the back of human head and the 'shape of half-cylinder' (drawing code 2) like the back of human neck as Fig.1 & Fig.3. The application idea of combined figure with 'shape of half- sphere' and 'shape of half-cylinder' for pillows and chairs is a simple concept as 'the egg of columbus' but practically there has not been any instances to apply such ideas to pillows and chairs so far.
- [34]     In the past, the reason why 'ergonomic shape hole of head-insert' was not made on the pillow was the character of natural materials itself (such as rice husks, buckwheat, millet, etc) that was impossible to make fixed 'shape of half-sphere and half-cylinder'. Although the internal materials have newly substituted to latex-form, memory-form and sponge, the process of 'extrusion press molding system' prevented the pillows from its production with shape of half-sphere and half- cylinder. Currently there has been an improvement in technology to shape like 'ergonomic shape hole of head-insert' with latex-form, memory-form by 'forming & expansion molding system' but no attempts were made to utilize it in field of the pillow.
- [35]     And also in the field of chair manufacture, due to the internal materials, exterior shells and the manufacturing process, manufacturer of chairs were in no position of adopting the accurate figure of 'shape of half- sphere' and 'shape of half-cylinder' on their products. Even making 'ergonomic shape hole of head-insert' on chairs, they

could not find methods to customize the head size with standard size of hole and to adjust the position of hole for everybody in conventional system of production and traditional structure of chairs. It can be inferred that, in spite of demands for such inventions, the conventional system of production could not commercialize an 'ergonomic shape hole of head-insert' due to the difficulties in standardization of hole size, limitation of mass-production and adjustment of hole position. Even advanced structure of chair such as headrest-attached type (including driver's seat of car) was not equipped with 'ergonomic shape hole of head- insert' due to different purposes of use and internal/external materials of headrest.

- [36] 'Ergonomic shape hole of head-insert' of this invention in fields of pillows and chairs has not been utilized for commercialization in public and has not yet been applied for patent with progressed function of combined-structure after embodiment of the advanced figure. Thus this invention is the first attempt with the concept of practical use and commercial utilization for various fields as function of 'pillow/ headrest' after embodiment of 'shape of half-sphere' and 'shape of half-cylinder' and reconstitution of combined-structure with applicable objects (pillow and chairs, etc)
- [37] There are two kinds of manufacturing methods of 'ergonomic shape hole of head-insert' in this invention.
- [38] The first method is 'forming & expansion molding system' with materials of latex-form, memory-form and sponge. It is a normal production method with existing skills, which does not seem difficult to proceed the production of this invention.
- [39] The second method is 'drilling cutting system' which uses a drilling machine (drawing code 14 of Fig. 13) to make 'ergonomic shape hole of head-insert' on basis forming products (drawing code 16 of Fig. 13) of memory-form and sponge which was prepared by the system of 'expansion block molding.' Drilling machine can easily cut memory-form and sponge due to their soft texture, (excepting latex-form due to drilling difficulty) and the cut surface does not necessarily be precise and neat because products of 'pillow/headrest' will be used after covered by textured fabrics as exterior shell. In case of memory form, it requires special process of quick freezing, because it becomes much flexible and soft due to high temperate in summer season and becomes difficult to do drilling-cut, Tools and the process of drilling-cut refers to the Fig.13. Regarding the process of mass production, basis forming products is drilled for making 'ergonomic shape hole of head-insert' and is cut for size of height and each piece one by one moving along the conveyor belt. Lastly, hole of air-flow can be made on pillow/headrest by drilling of small diameter as much as necessary.
- [40] **bb) Proper selection of material for 'pillow/headrest' and of exterior** shell fabrics necessary to reveal curve-line of 'ergonomic shape hole of head-insert' and soft hand-feel with flexibility.

- [41] 1) For function of main pillow in bed and sub-pillow
- [42] Latex-form, memory-form and sponge are used for manufacture of pillow (but memory-form is excepted for main pillow in bed especially due to easy variation according to the temperature, for example, distorted by weight of human head in warm temperature and hard hand-feel in cold temperature).
- [43] 2) For headrest function of sofa and chairs
- [44] Latex-form, memory-form are used for headrest function of sofa and chairs. (Sponge is excepted due to poor hand-feel)
- [45] 3) For exterior shell fabrics of 'pillow/headrest' should be soft and elastic to reveal curve-line of 'ergonomic shape hole of head-insert' as much as possible. Not only the function but also appearance is important for exterior shell and should be anti-flame (modacrylic fibers is recommendable as non-flammable material) for prior prevention of fire. Therefore proper exterior shell would be spandex knitted fleece fabric which has proper function of surface softness, flexibility and appearance.
- [46] **cc) Embodiment for remodeling structure of applicable objects and assembly method with 'pillow/headrest', and relatively condition of standardization & unification for 'pillow/headrest'**
- [47] 1) Bedroom Pillow
- [48] The 'combined model' which gathers 'basic model'(drawing code 3 of Fig. 4) and 'extension model'(code 4 of Fig. 4) are manufactured one by one as separated structure instead of all-in-one and are inter-combined automatically by exterior shell during the usage. Later they can be divided after opening the zipper and exterior shell can be removed for washing. Some exceptional height and external size of 'basic & extension model' of 'pillow/headrest' can be adjusted in various according to special requests during the process of production. For some cases, size of 'basic model' can be enlarged without 'extension model' for following of wide requirement of consumers. And also 'ear recess' (drawing code 5 of Fig. 4) is provided for comfortable sleeping without crooking of ear during side turning of body and face. We often move body when sleeping if we do not feel comfortable on our head and neck but we enjoy deep sound sleep for long period of time in straight posture with little movement, if head and neck are in comfortable condition.
- [49] - 'Basic model'(code 3 of Fig. 4) : Main area used for sleeping straight is same as 'standard model' of 'pillow/headrest' in this invention.
- [50] - Extension model (code 4 of Fig. 4) : this area is used during body movement to right and left, and may be useful in relieving pain of neck and shoulder because height of 'extension model' is close to height of shoulder.
- [51] 2) Pillows in outdoor activities such as camping and picnic
- [52] The pillow of 'standard model' of pillow/headrest' (drawing code 3) can be used

under back of the neck/head in normal way and the height of pillow can be adjusted with attached 'triangle shape panel' (drawing code 34 of Fig.7) with a velcro tape (drawing code 35 of Fig.7), if necessary.

[53]       **3) Pillows for existing reclining chairs and automobile seats**

[54]       'Standard model' of 'pillow/headrest' (drawing code 3) can be used under neck and head when we sleep or rest on existing reclining chair and automobile seats after reclining backward. If necessary, 'triangle shape panel' can be used for adjustment of height of 'pillow/headrest'

[55]       **4) installed-headrest of chairs (office head-back chairs, reclining chair and seat of vehicle, especially passenger's seat of long distance transportations such as airplane, ship, train and buses)**

[56]       'Standard model' of 'pillow/headrest' can be used after assembly with seat/chair of which body is remodeled and restructured properly (Fig. 5 & 11). Especially the art of this item as important object of this invention will further be described in details for remolding and restructure of chair in 'MODE OF INVENTION'

[57]       **5) Headrest for sofa**

[58]       'Standard model' and variety of bigger sizes of 'pillow/headrest' can be used as pillows after putting it on place of cut-shape 'L' at head-laid area of sofa (code 6 of Fig. 6). Users can get effect of height adjustment of 'ergonomic shape hole of head-insert' of 'pillow/headrest' by the rolling movement of 'half-moon shape panel' (drawing code 44 of Fig 6), which is attached down of pillow/headrest'. For proper rolling movement function of 'half-moon shape panel' at the users' request, its material should be harder and in a shape of round circle. As for the 'pillow/headrest for back-seat of private car, 'half-moon shape panel' can be used as same as sofa.

[59]       **6) Headrest for back seat of private car**

[60]       During the course of production for back seat of the private car, the seat is remodeled with the 'square shape inset hole' installed together with the 'standard model' of 'pillow/headrest' (method and shape of assembly referred to the Fig. 8 and drawing code 10 of Fig. 9). Another method is remodeling the body of the seat with shape of 'L' as same as sofa. Because this back seat of private car cannot be reclined backward like sofa, 'half-moon shape panel' (drawing code 44 of Fig. 6) will be useful for height adjustment of 'ergonomic shape hole of head-insert'

[61]       For complete assembly and compatible use with various applicable objects, external shape of 'pillow/headrest' should be unified in one size which is expected to be about 26cm~28cm of width, 18cm~20cm of length and 10cm~12cm of height. As shown in Fig. 1 shows, drawing code 'a', indicating the width of 'pillow/headrest' , is the basis for standardization of square shape inset holes of applicable objects and 'pillow/headrest'. It becomes unchangeable once fixed in one size for the compatibility and easy



assembly for 'pillow/ headrest' with applicable objects. The drawing code 'b', indicating the length of 'pillow/ headrest', is adjustable portion of 18 to 20cm depending on the applicable objects and sometimes, on circumstances. The drawing code 'c', indicating the height of 'pillow/headrest', categorizes the size of 'ergonomic shape hole of head-insert' into the size group of S/M/L that is classified based on survey of standardized head size. Exceptionally for bedroom pillows, the height and external size can be changed under the adjustment of production procedure as per consumer requirement.

[62]     **dd) The position adjustment function for 'pillow/headrest' of chairs.**

[63]     We have two kinds of installation methods so that the low/high position of 'pillow/ headrest' can be adjusted anytime according to the user's sitting head height (Fig. 11).

[64]     **1) Type A (Fig. 10)**

[65]     Users can adjust the low/high position of 'pillow/headrest' to their sitting head height by the direct attach and detach feature when sitting on chairs with 'pillow/headrest' installed. Velcro tape (drawing code 11 of Fig. 10) is attached to both sides of 'pillow/ headrest' and 'square shape insert hole' to fix the adjusted position (or other exterior shell fabrics with such function as velcro tapes can also be used). The type A will be used for production of new chairs or for airplane seats due to the lower risk of theft than that of transportations. As for the remodeling of existing chairs, the method of 'aid component tray-insert' (Fig. 14) will be appropriate.

[66]     **2) Type B (Fig. 12)**

[67]     This installation method of 'pillow/headrest' on chair body is an indirect insert method using box-shaped 'aid frame' components (drawing code 9 of Fig. 12). This 'aid frame' can install 'pillow/headrest' and is inserted into the 'square shape insert hole' of chair body. Metal or strong synthetic resin will be used as its material and the size of 'aid frame'(drawing code 12) will be less than 'pillow/headrest' so that it should not touch the human head when sitting on chair. 'Insert pole' (drawing code 8) is inserted into 'hole' of tube shape (drawing code 13) for assembly and position adjustment of 'pillow/headrest' with chair body. This method can be used for new production only and for seats of trains and buses due to the low risk of theft.

### **Advantageous Effects**

[68]     **aa) Convenience and efficiency :** Enhancement in comfortable living

[69]     **1)** For sleeping and watching TV in bed (using it as main and aid pillow)

[70]     **2)** For sleeping in outdoor camping areas (hand-carrying in rucksack and separating from pillow/ headrest'-installed back seat of private car)

[71]     **3)** For sleeping on passenger's seat of long distance transportations such as airplanes, ships, trains and buses

[72]     **4)** For relaxing and sleeping on reclining chairs and office chairs with head-back

support

[73] 5) For relaxing and sleeping on sofa or on back seat of automobile

[74] 6) For relaxing and sleeping on driver's seat of private car after reclining backward (simply by laying the neck and the head on 'pillow/headrest'. Existing driver's seats are not suitable to relax on or sleep on due to the uncomfortable shape and hard texture).

[75] 7) For relaxing on and sleeping on existing reclining chairs (same method as driver's seat of car)

[76] **bb) Practicality**

[77] 1) The 'pillow/headrest' is standardized in size and shape: it can be used for multi-purposes and compatible use.

[78] 2) 'Pillow/headrest' comes in small size : it very handy and portable. Practical method of hand-carry is to down size the 'pillow/headrest' after putting it inside of poly-bag (called clean-bag) to press it flat and tying the mouth of the bag tight to keep it flat shape in vacuum until un-packing for using

[79] **cc) Economics**

[80] 1) To save natural resources and to lower the production cost by recycling the existing chairs.

[81] 2) To enjoy high business value with substituting application to variety of other fields.

### **Brief Description of Drawings**

[82] Fig. 1 is a perspective view of standard 'pillow/headrest' which is a core device in this invention.

[83] Fig. 2 is a cross sectional view of status of pillow/headrest when sitting on chairs.

[84] Fig. 3 is a front view of 'ergonomic shape hole of head-insert' which is fundamental concept of this invention.

[85] Fig. 4 is a perspective view of 'combined model' of pillow which is consist of 'basic model' and 'extension model' for using in bed.

[86] Fig. 5 is a perspective view of 'pillow/headrest' combined with chair body.

[87] Fig. 6 is a status view of 'L' cut shape of sofa head and placement of 'pillow/headrest' and additional status view of assembly of 'half-moon shape panel' with 'pillow/headrest' and function of direction/height adjustment.

[88] Fig. 7 is perspective view of several assembly status of 'standard model' pillow with 'triangle shape panel' for height adjustment and view of velcro tape attached to pillow and panel.

[89] Fig. 8 is a perspective view of status of standard 'pillow/ headrest' installed on back seat of private car.

[90] Fig. 9 is a perspective view of remodeled back seat of private car.

- [91] Fig. 10 is an illustrative view of assembly status of 'pillow/ headrest' with chair body by type A of adjustment function for low/high position of 'pillow/headrest' and position view of velcro tape which is attached to both side of pillow/headrest and insert-hole of chair.
- [92] Fig. 11 is a perspective view of adjustment status for "pillow/headrest' of chair
- [93] Fig. 12 is an illustrative view of assembly status of 'pillow/headrest' on 'aid frame' with chair body by type B of adjustment function for low/high position of 'pillow/ headrest', and a view of shape and assembly status of 'aid frame' which 'pillow/ headrest' can be installed on.
- [94] Fig. 13 is a sectional and plane view of process for 'drilling cutting system' which is one of production method for 'ergonomic shape hole of head-insert' and a perspective view of drilling tool.
- [95] Fig. 14 is an illustrative view of assembly process for 'aid component tray-insert' with pillow/headrest and chair body.
- [96] Fig. 15 is an illustrative view of actual remodeling procedure of existing chair by the method of 'aid component tray-insert'
- [97] Fig. 16 is a perspective view of self-separation and self- assembly of 'aid component tray-insert' for adjustment of its depth/ height.
- [98] Fig. 17 is a perspective view of 'square shape insert hole' for installment of 'pillow/ headrest' on head part of chair body as 'body type' which is made by the 'injection molding' system or 'forming expansion molding' system
- [99] Fig. 18 is a perspective view of 'ergonomic shape hole of head-insert' on head part of chair body as 'direct type' which is made by the 'forming expansion molding' system or 'drilling cutting' system, and is a perspective view of its assembly status.
- [100] Fig. 19 is a sectional plane view of fundamental concept to embody the 'ergonomic shape hole of head-insert' according to size group of 'S/M/L' (example for size group of S/L)
- [101] \* **Explanations on drawing codes of Fig.**
- [102] 1. 'Shape of half sphere' which copies the back shape of human head as a part of 'ergonomic shape hole of head-insert'
- [103] 1-2. Area which is a 'shape of half-cylinder' (not 'shape of half-sphere')
- [104] 2. 'Shape of half-cylinder' which copies the back shape of human neck as a part of 'ergonomic shape hole of head-insert'
- [105] 3. 'basic model' of pillow as 'standard model' of 'pillow/ headrest' ('molding of head shape hole')
- [106] 4. 'extension model' which is a part of bed pillows
- [107] 5. ear-recess that belongs to the 'extension model' of pillow
- [108] 6. remolded figure of "L" letter shape on head part of sofa

- [109] 7. normal sofa pillow
- [110] 8. insert pole of 'aid frame' for assembly with chair body
- [111] 9. figure of 'aid frame' (slightly smaller size than 'pillow/headrest')
- [112] 10. Remodeled figure of back seat of private car for installment of 'pillow/headrest'
- [113] 11. Velcro tape attached to both side of 'pillow/ headrest' and 'square shape insert hole'
- [114] 12. Smaller sized 'aid frame' compared to pillow/ headrest
- [115] 13. Insert tube hole for inserting pole of 'aid frame' on chair body
- [116] 14. Shape of drilling tool for 'drilling cutting' system
- [117] 15. Cross sectional view of 'ergonomic shape hole of head-insert' made by 'drilling cutting' system
- [118] 16. Basic forming products, created from 'expansion block molding' system, that will be used to manufacture the 'pillow/ headrest' through the 'drilling cutting' process. They can be in one unit or block shape depending on the situation. They can be cut in parts by cutting knife at the final stage after the 'drilling cutting' process.
- [119] 17. Cross sectional view of 'pillow/headrest' made by
- [120] the 'drilling cutting' system
- [121] 18. Cutting knife to cut into certain units of pillow/headrest after the 'drilling cutting' process. The size (height) of pillow/headrest' is determined by this knife cutting.
- [122] 19. Remnants from the knife cutting process of 'pillow/headrest.' They determine the size (height) of 'pillow/headrest'; the more they cut off, the lower the height of pillow/headrest (drawing code c) becomes.
- [123] 20. 'Aid component tray-insert'
- [124] 21. Upper part of chair body made by with square shape insert hole of 'pillow/headrest'
- [125] 22. square shape insert hole which is made by 'injection molding' system or 'forming expansion molding' system for assembly of 'pillow/headrest'
- [126] 23. Protruding part on both right/left inside wall of square shape insert hole to avoid slippage of 'pillow/headrest'
- [127] 24. Upper part of chair body made by 'forming expansion molding' system or 'drilling cutting' system with 'ergonomic shape hole of head-insert'
- [128] 25. Remainder exterior shell on top line of chair head from cutting for making square shape insert hole after remodeling of existing chairs, which will later be pasted into top inside of 'aid component tray-insert'
- [129] 26. Edge wing of 'aid component tray-insert' pasting the cut-area of exterior shell
- [130] 27. Bottom piece of 'aid component tray-insert'
- [131] 28. Border piece of 'aid component tray-insert' of which height should be adjusted according to the thickness of remodeled existing chair body

- [132] 29. Enlarged view of assembly status of bottom piece and border piece. Because 'aid component tray-insert' itself has a wing, it should be produced through 'injection molding' system by separating the bottom piece and border piece in order to enable the depth/height adjustment function. (Although the assembly is not very solid, it doesn't come off easily as long as the wing of 'aid component tray-insert' is pasted with exterior shell and it is fixed by the screw on the chair body).
- [133] 30. Screw hole of 'aid component tray-insert' to fix at the chair body
- [134] 31. Protruding parts on both right/left inside wall of 'aid component tray-insert' to avoid slippage of 'pillow/headrest'
- [135] 32. Bonding pole of upper part and chair body for 'body type'
- [136] 33. Bonding pole of upper part and chair body for 'direct type' with low/high position adjustment of 'ergonomic shape hole of head-insert'.
- [137] 34. 'Triangle shape panel'
- [138] 35. Velcro tape for assembly of 'pillow/headrest' and 'triangle
- [139] shape panel'
- [140] 36. 'Square shape insert hole' where 'aid component tray-inert' will be placed after cutting upper part of existing chair with electric saw for remolding
- [141] 37. Cutting line which is marked for easy cut with electric saw.
- [142] 38. Cut edge of exterior shell which will be pasted on edge wing of 'aid component tray-insert'
- [143] 39. Plane section view of small size ('S') of 'ergonomic shape hole of head-insert'
- [144] 40. Plane section view of big size('L') of 'ergonomic shape hole of head-insert'
- [145] 41. Remodeled existing chair body with 'square shape insert hole' for installment of 'pillow/headrest'
- [146] 42. Cutting line to build the small-sized pillow/headrest
- [147] 43. Cutting line to build the large-sized pillow/headrest
- [148] 44. 'Half moon shape panel' for sofa and back seat of private car.
- [149] 45. Normal cushion with waist support.
- [150] 46. Velcro tape for assembly with 'half moon shape panel' and 'pillow/headrest'
- [151] 47. A perspective view of the frame (one kind of 'aid frame') to assemble the head part of chair and chair body in 'direct type.' The size and shape come at reasonable standard and it is equipped with sitting height adjustment function.
- [152] 48. Upper part of chair body with different reclining angle and shape in every chairs.
- [153] 49. Enlarged and adjusted standard 'pillow/headrest' in external size for wide convenient use according to consumer's requirement in necessity.
- [154] a. Width of 'pillow/headrest'
- [155] b. Length of 'pillow/headrest'
- [156] c. Height of 'pillow/headrest'

## Mode for the Invention

[157] More details on the core points of this invention will be described in this column.

[158] **aa) Dimension resolution and manufacturing of 'ergonomic shape hole of head-insert'**

[159] In order to customize the 'pillow/headrest' to every user, 'ergonomic shape hole of head-insert' should be produced in three size groups of S/M/L based on survey on standard size of human head ( For bedroom pillows, production may be separately made for infants and children, if necessary). During production of 'pillow/headrest', cutting knife (drawing code 18 of Fig. 13) can be used for classification of 'ergonomic shape hole of head-insert' into the size group of 'S/M/L' in 'drilling cutting system' as shown in drawing code 19 of Fig. 13.

[160] The concept of dimension resolution for 'ergonomic shape hole of head-insert' is based on the fact that centre of gravity of human head and neck is placed on one point as shown in Fig. 19. The insert hole size for head and neck are fixed according to the same diameter (estimated to be 20CM for head and 14CM for neck) and to each different circle length of S/M/L size group. According to the circle length of both head and neck, size of 'ergonomic shape hole of head-insert' varies according to the size group of S/M/L under the principle that the bigger the size of head is, the thicker the width of the neck is (drawing code 40 for size 'L' , drawing code 39 for size 'S'). Bigger head size means longer length of head circle and high cutting position (drawing code 42 & 43 of Fig. 19) by placing closer to the centre of circle because the length of circle varies according to the cutting position of circle instead of difference in diameter. As a result, the height of "pillow/headrest' (drawing code 'c' of Fig. 19) is fixed naturally at size groups of S/M/L.

[161] In general, diameter of drilling tool should change according to the size of 'ergonomic shape hole of head- insert'. The reason to choose the other method uses unified diameter of drilling tool for size group of S/M/L is to simplify production process of 'pillow/headrest' in order to proceed whole size products in one line of manufacturing. As for 'forming & expansion molding' system , one size mold can produce necessary size selectively among whole size group of S/M/L depends on necessity of different size by adjustment of mold inside-unit, of course although it can proceed different diameter of drilling tool and different diameter of mold for each size group of S/M/L in general way.

[162] **bb) Method of restructure for chairs among applicable objects (passenger seat of airplane, ship, train, bus and office head-back chairs)**

[163] 1) Combination type

[164] - cutting hole type : it provides accurate 'square shape insert hole' on body of chair

for assembly with 'pillow/headrest'. And 'square shape insert hole' is covered with same exterior shell fabrics as chair body (such as synthetic leather, textured fabrics, etc). it is basic method and is suitable for only new production of chair (drawing code 41 of Fig. 10 and Fig. 12)

[165] - Tray insert type : It adds the 'aid component tray-insert' (drawing code 20 of Fig. 14) to 'square shape insert hole'. It is useful for both new production of chairs and recycling of existing chairs. 'Aid component tray-insert' , as one type of plastic injection molding products with the shape of tray, plays a role as a linking-device between "'pillow /headrest' and chair body. (Refer to Fig. 14). More details will be specified in next column, as this is one of the most important items in this invention.

[166] - Body type : For another type of chair, it provides a square shape insert hole (drawing code 22 of Fig. 17) to the head part of chair body (drawing code 21 of Fig. 17), made by the 'injection molding' system or 'forming expansion molding' system with synthetic resin of somewhat harder material than sponge to preserve the shape of chair without affecting the soft hand-feel. In order to improve cushioning, it can be covered with special fabrics. It is particularly useful for new production of chairs. It can also be combined with chair body as method of poll-insert (drawing code 32 of Fig. 17). For the low/high position adjustment of 'pillow/headrest', it adopts type A

[167] 2) Direct type : For more another type of chair, it provides an 'ergonomic shape hole of head- insert' on head part of chair body (drawing code 24 of Fig. 18) directly by 'forming expansion molding' system or 'drilling cutting' system with materials of latex-form, memory-form and sponge. It is useful for new production of chair. For function of both low/high position adjustment and assembly with chair body, it adopts 'aid frame' enlarging type B (drawing code 33 of Fig. 18).

[168] **cc) It now states more specified contents on 'aid component tray-insert' (Fig. 14) which can be used effectively for new production of chairs and recycling use of existing chairs, and particularly which can fulfill the purpose of standardization with restructuring of entire types of chairs.**

[169] 1) Concept : Regarding restructure for body of existing passenger seat installed in long distance transportations such as airplanes, ships, trains and buses, 'aid component tray-insert' (injection molding. and called as 'tray-insert' after this)) is designed as an aid component for the purpose that 'pillow/headrest' should be installed neatly and accurately into the 'square shape insert hole' of the seat. This method of 'aid component tray-insert' can serve possibility of effective mass working at equipped place of existing passenger seat (inside of airplane, ship, train, bus) and also is useful for a personal consumer to recycle the existing chairs. This progressed method (Fig. 14) is to cut the head part of chair body to make regular size of insert hole, restructure the applicable objects, install tray-insert' into arranged square shape insert hole and to

insert 'pillow/ headrest' into 'tray- insert'. Whole square shape insert hole of chairs should be unified to one dimension as per standard size for compatibility of 'pillow/ headrest'. This ' tray-insert' is indispensable to accomplish this purpose of compatible use.

[170]     **2) Aims of Achievement :** The aims of this invention are to reinforce (i)the assembly function and compatibility (ii) the efficiency and neat look of remodeled chair (iii) the adjustment function of tray-insert's depth(height), (iv) the locking of 'tray-insert' on chair body, (v) the low/high position adjustment function of 'pillow/ headrest'.

[171]     **3) Solutions**

[172]     - Reinforce the assembly function and improve compatibility of 'pillow/headrest'. It is automatically solved by using the 'tray-insert'

[173]     - Efficiency and neat look of remodeled existing chairs (Fig. 15).

[174]     When making square shape insert hole on existing chairs, it is much cumbersome to patch other exterior shell (synthetic leather or fabrics) on cut-area neatly but if this 'tray- insert' (drawing code 20 of Fig. 14) were inserted and locked into square shape insert hole of chair and then cut-exterior shell of cut-area is pasted with edge wing of 'tray-insert', it would save time and effort to work on the appearance of chairs.

[175]     The process of cutting head part of chair body to make precise square shape insert hole (drawing code 36 of Fig. 15) one by one requires considerable amount of time and efforts, but the process of making just square shape inset hole for installment of 'tray-insert' can easily be done with much less amount of time and efforts. In case that sizes of hole were inconsistent, it could fill the gaps with simple methods. Square shape insert hole are manufactured after the process of (i) marking its position line (drawing code 37 of Fig. 15) on center of the head part of chair body by stamp (stamp-like tool of marking cutting line for easy working) (ii) cutting left/right side lines and bottom lines of square shape insert hole position together with exterior shell of chair (drawing code 38 of Fig. 15) by an electric saw, and (iii) extracting the internal substance of square shape inset hole (drawing code 36 of Fig. 15) except for the external shell of top line (drawing code 25 of Fig. 15). For the good appearance, we conducted the next process as inserting 'tray-insert' into square shape insert hole and pasting cut- exterior shell of left/right and bottom side on edge wing of 'tray- insert' (drawing code 26 of Fig. 15), while exterior shell of top side (drawing code 25 of Fig. 15) was left without cutting. It is later pasted into top inside of 'tray-insert' which does not have edge wing because the wing is not useful for this area, as is the different case for reclining angle and shape in every chairs (drawing code 48 of Fig. 15). Also, color of 'tray-insert' will be matched to exterior shell color of chair body to further improve the appearance of the chair.

[176]     - Adjustment function of tray-insert's depth/height (Fig. 16)



- [177] Depth/height of 'tray-insert' should be changeable according to the depth of 'square shape insert hole' which varies depending on the thickness of existing chairs. This invention facilitates the adjustment function designed for compatible usage for every existing chairs without limitation. This 'tray-insert' should be comprised of two parties separately such as bottom piece (drawing code 27 of Fig. 16) and border piece (drawing code 26 & 28 of Fig. 16) when produced by injection molding system, because it has wing of border piece which is obstacle with depth/height adjustment of 'tray-insert'. Regarding depth/height of 'tray-insert', generally height of border piece which is just depth/height of 'tray-insert', can be made in each requested size as one piece (without separation of bottom and border), and also can be controlled by combination and separation of injection mold inside. But general method need many injection molds for production of 'tray-insert' on high cost and within limited process, while this invention can produce many kinds of 'tray-insert' of different depth/height because it combines bottom piece (drawing code 29 of Fig. 16) together with many kinds of border piece which is cut as per requested size of depth/height after injecting one kind deepest/highest size of border piece. Remainder pieces can be used for next injection production to save wasted materials.
- [178] - The locking of 'tray-insert' on chair body (drawing code 30 of Fig. 14). Process of locking 'tray-insert' to chair body is only a simple process before pasting exterior shell on 'tray-insert'.
- [179] - Adjustment function of low/high position of 'pillow/ headrest'.
- [180] In order to adjust the low/high position of 'pillow/headrest', it follows type A for assembly of 'pillow/headrest' with chair body and it needs jut on both right/left inside wall of 'tray-insert' for avoiding slippage of 'pillow/headrest' (drawing code 31 of Fig. 14)
- [181] **4) Effects :** Using of 'tray-insert' can raise efficiency by simple job process and saving of time during remodeling of existing chair. It can also enhance the value and quality of products by accurate assembly with 'pillow/headrest' and 'chair body' and additionally create practical value by enlargement of compatible advantage. Recycling of existing chair benefit both in economic aspects (saving natural resources) and eventually to increase the convenience of customers. This method of 'tray-insert' can create increasing exclusive demand of 'pillow/headrest', because it can recycle existing chair after restructuring which will lead standardization of 'square shape insert hole' of chair and pillow/headrest.

## Claims

- [1] Considering that slight or normal deep insert hole on head-laid area is not useful enough, the purpose of this invention is to place one's head and neck in most comfortable positions. The fundamental concept(Fig. 1, Fig. 3, Fig. 19) of this invention is to apply the 'ergonomic shape hole of head-insert' (drawing code 1, 1-2, 2) to pillows and any other headrest functions of chairs, seats and sofas by creating the combined figure of 'shape of half-sphere' (drawing code 1) and 'shape of half-cylinder' (drawing code 2) that copies the back shape of human head and neck
- [2] As for the production of pillows, different concept from what was done to other normal pillows, was applied that 'combined model' of 'basic model'(drawing code 3 of Fig. 4) and 'extension model'(code 4 of Fig. 4) are manufactured one by one as separated structure instead of all-in-one and are inter-combined automatically by exterior shell during usage. Also, 'standard model/basic model' of 'pillow/headrest' can be used compatibly with headrest functions of chair, seat and sofa.
- [3] Regarding the claim 2, the concept of 'pillow/headrest' height adjustment is fulfilled by 'triangle shape panel' (drawing code 34 of Fig. 7) and by velcro tape (drawing code 35 of Fig. 7) attachment on exterior shell of 'triangle shape panel' and 'pillow/headrest' for cohesion during usage.
- [4] The system and the production process of 'drilling cutting' (Fig. 13) for making of 'ergonomic shape hole of head-insert' (drawing code 1, 1-2, 2) and for production of 'pillow/ headrest'(drawing code 3). The figure of drilling tool is shown as drawing code 14 of Fig. 13.
- [5] Regarding the claim 4, the drilling tool of same diameter is used for the entire production regardless of the size of 'ergonomic shape hole of head-insert'. The production method is to decide the size of 'ergonomic shape hole head-insert' according to the cut area (Fig. 19).
- [6] As for the manufacturing of headrest for chairs ('forming of head shape-hole'), latex-form and memory- form are used as an cushioning materials instead of normal sponge
- [7] It is a newly invented concept to make a 'square shape insert hole' on head part of the chair and to install the 'pillow/headrest' onto this insert space hole (Fig. 5, Fig. 8, Fig 11), which is considered as an unprecedented way of chair manufacturing
- [8] In relation to the claim 7, the main idea is (Fig. 14) to create the linking device 'aid component tray-insert' (injection molding, drawing code 20 of Fig. 14) for

both new production and remodeling of existing chairs, to install 'aid component tray-insert' onto the 'square shape insert hole' and then to embed the 'pillow/headrest' (drawing code 3) to 'aid component tray-insert'

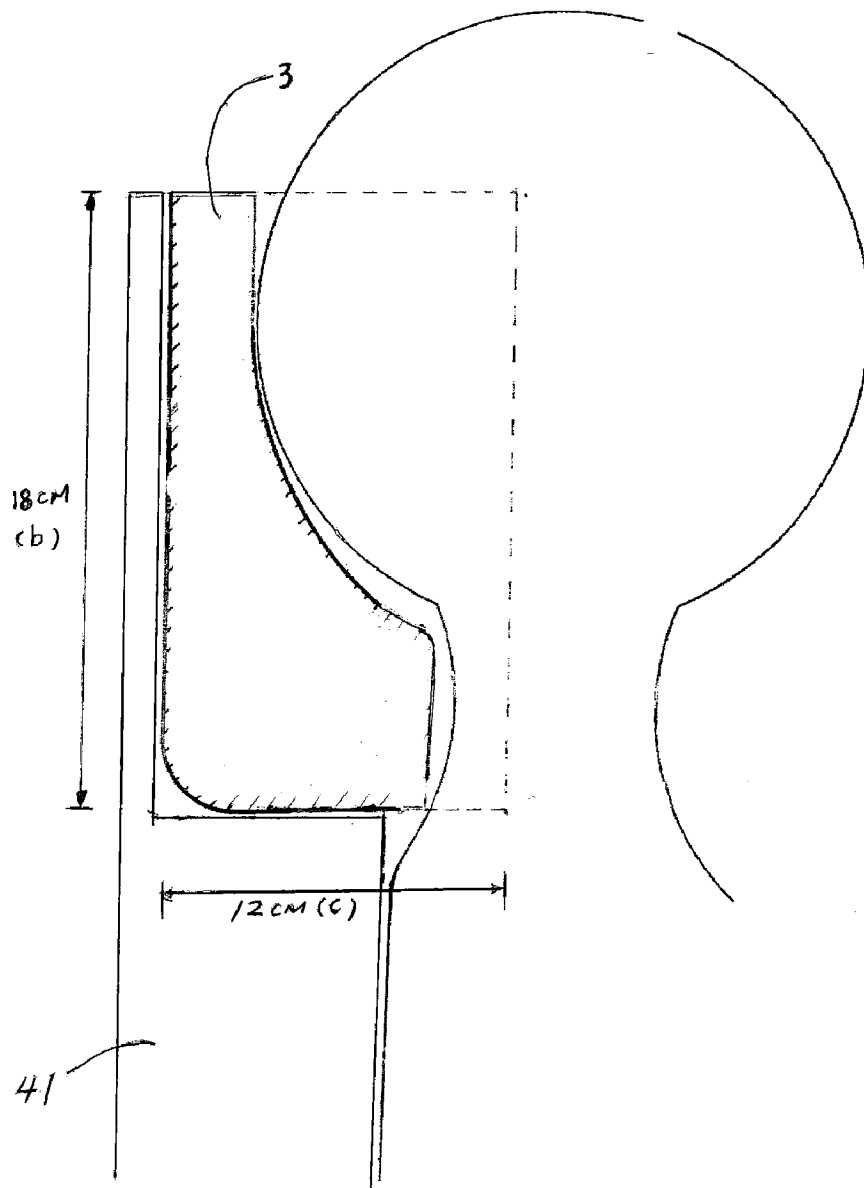
- [9] Regarding the claim 8, the depth/height of 'aid component tray-insert' should be adjusted due to the different thickness of each existing chair. The bottom piece (drawing code 27 of Fig. 16) and the border piece (drawing code 26 & 28 of Fig. 16) are produced separately by injection molding rather than together in one piece. The border piece is to be cut and to be combined with the bottom piece (drawing code 29 of Fig. 16).
- [10] In relations to the claim 8, the additional idea is to create the protruding part (drawing code 31 of Fig. 16) on both inner sides of 'aid component tray-insert' to avoid slippage by giving rubbing resistance after adjustment of height of 'pillow/headrest'
- [11] In relations to the claim 7, the 'injection molding' method or 'forming expansion molding' method was used instead of cutting the hole out chair body. This is done by creating a 'square shape insert hole' on upper part of chair body(Fig. 17). The material should be soft synthetic plastic and its assembly method of injected head part and chair body is to provide the insert pole (drawing code 32) or attachment pole. Also, we create the protruding part (drawing code 23) on both sides of 'square shape insert hole' to adjust the height of 'pillow/headrest'
- [12] In relations to the claim 7, the indirect assembly method (Fig. 12) of pillow/headrest and 'square shape insert hole' of chair body was used by using a box shape of 'aid component frame' as linking device for instalment of pillow/headrest. The size of 'aid component frame' should be smaller than that of installed 'pillow/ headrest (drawing code 12).
- [13] Regarding an another type of chair, the 'direct type' (Fig. 18) was used to make an 'ergonomic shape hole of head-insert' (drawing code 1, 1-2, 2) on head part of chair body (drawing code 24 of Fig. 18) directly through 'forming expansion molding' system or 'drilling cutting' system (Fig. 13) using the materials of latex-form, memory-form and sponge. The assembly function of with chair body was done (drawing code 47 of Fig. 18) by enlarging the size of 'aid component frame' (Fig. 12) and adjusting the position of 'ergonomic shape hole of head-inset' through the type B insert pole (drawing code 33 of Fig. 18)
- [14] As for sofas and chairs, the concept of the assembly figure of sofa body and 'pillow/headrest' (Fig. 6) is that 'pillow/headrest' can be used as a pillow placing on cutting shape of 'L' at head-laid area of sofa (code 6 of Fig. 6). The height and direction adjustment method of 'ergonomic shape hole of head-insert' of 'pillow/headrest' was done by the rolling movement of 'half-moon shape panel' (drawing

code 44 of Fig 6).

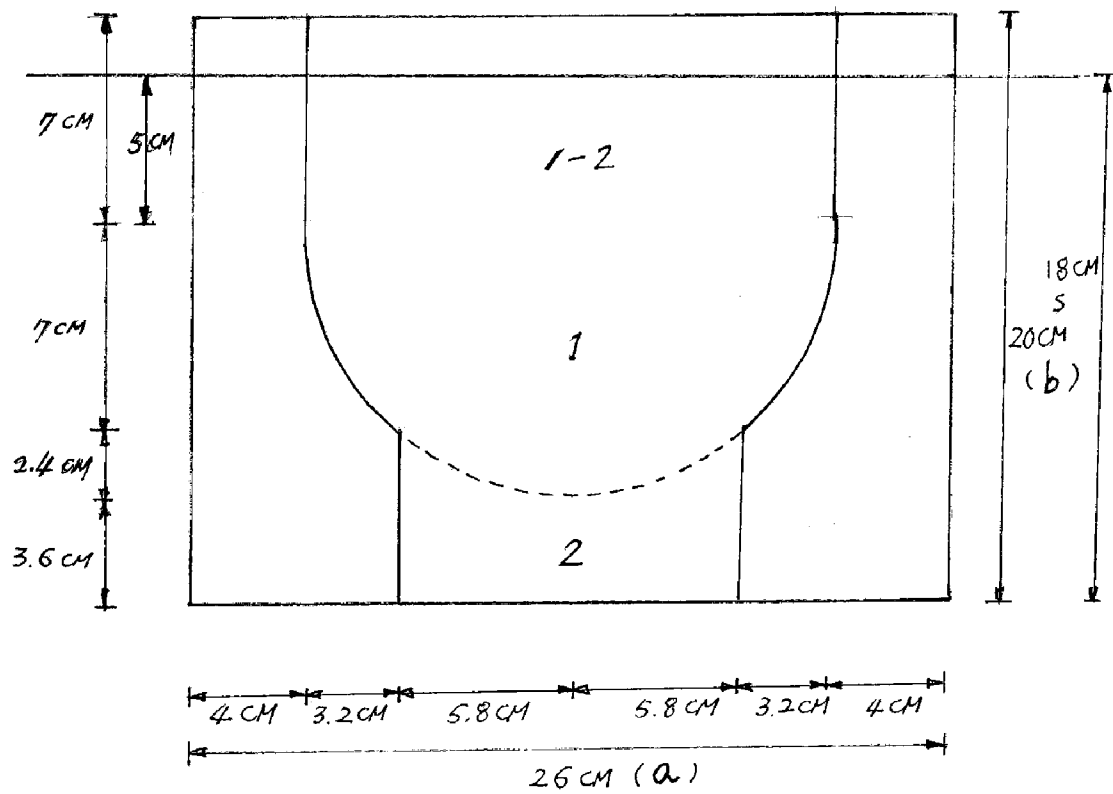
- [15] As for chairs, the concept of the assembly figure of back seats in private car is that the seat would be remodeled for 'square shape insert hole' to install the 'pillow/headrest' (Fig. 8 and 9).



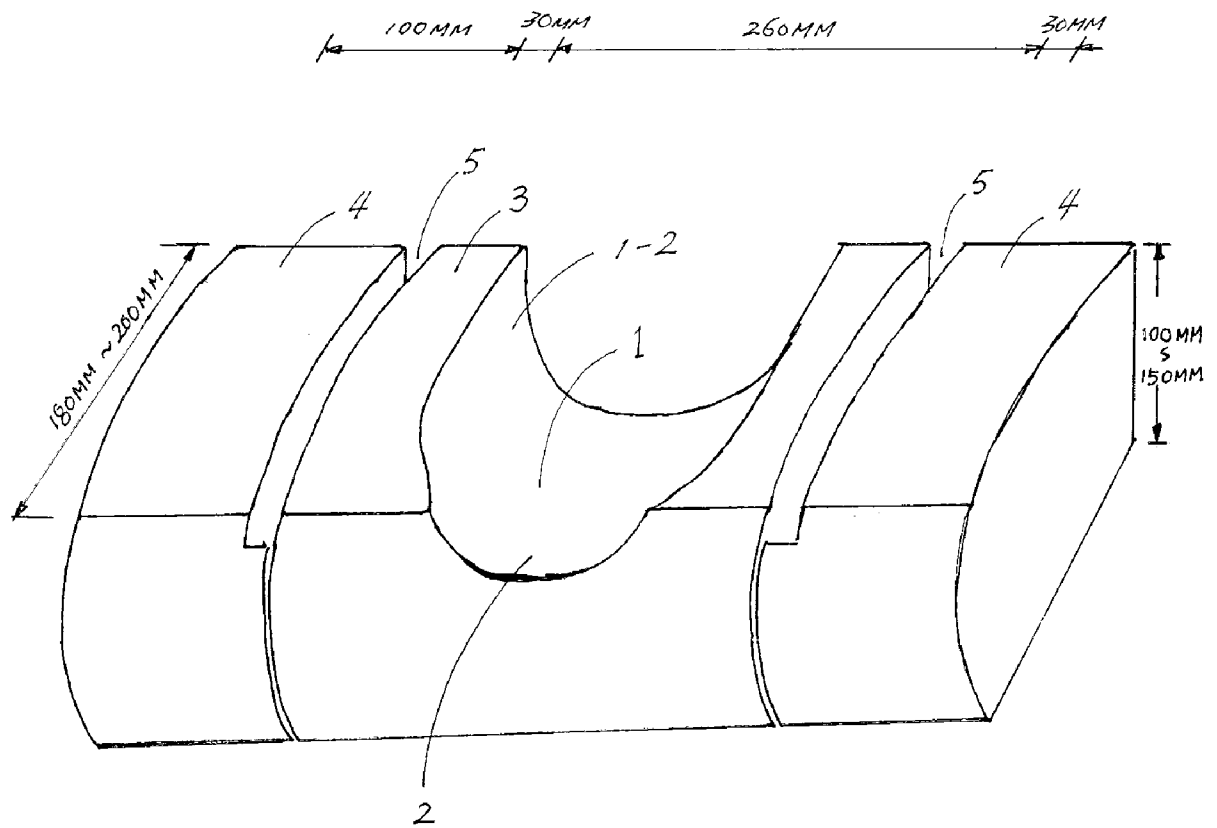
[Fig. 2]



[Fig. 3]

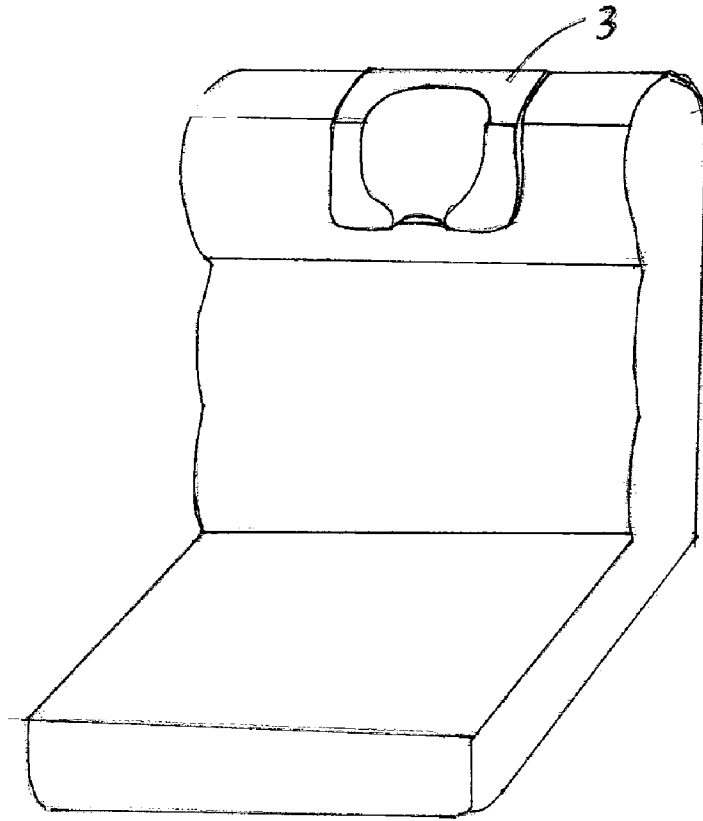


[Fig. 4]

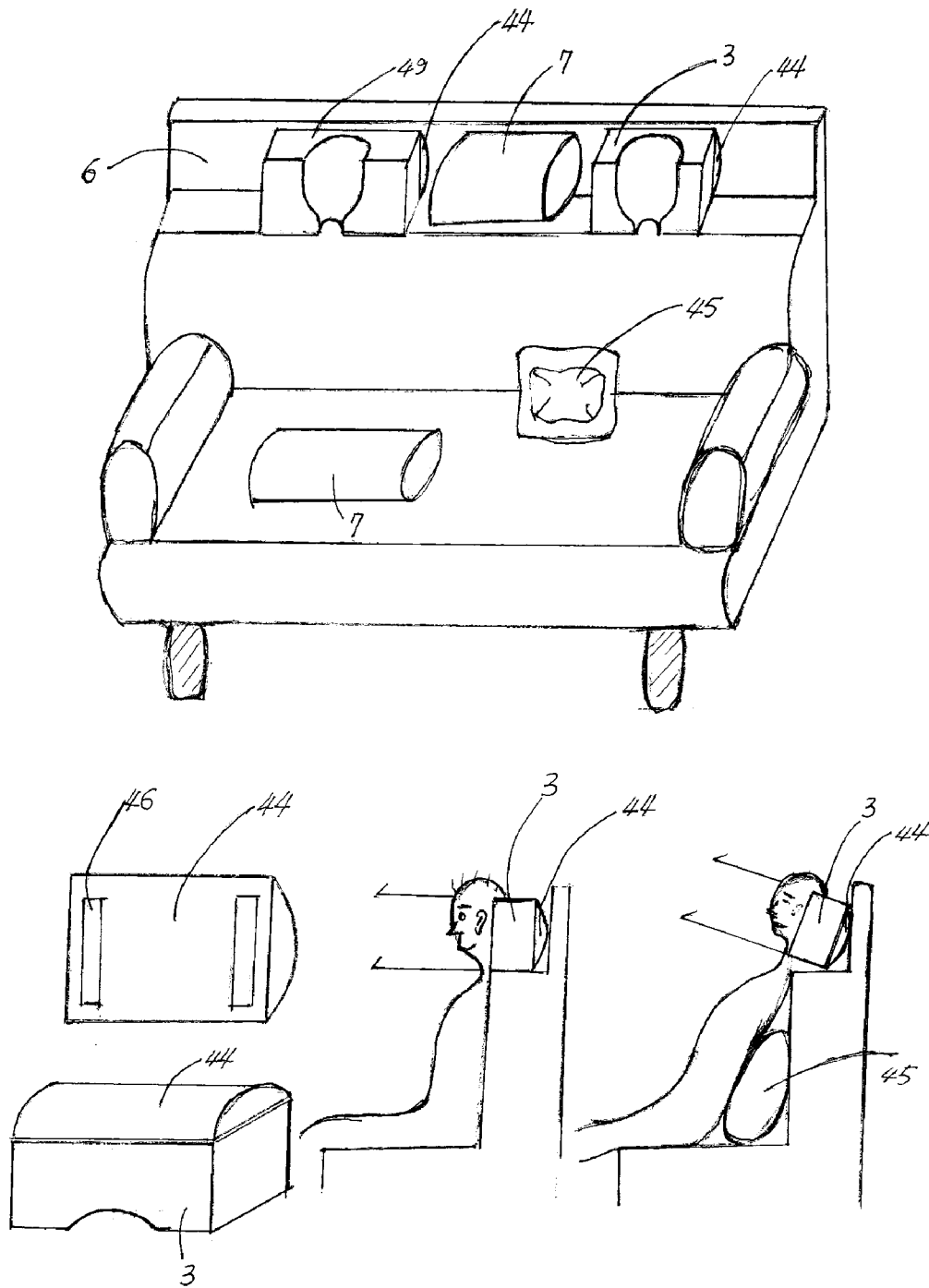




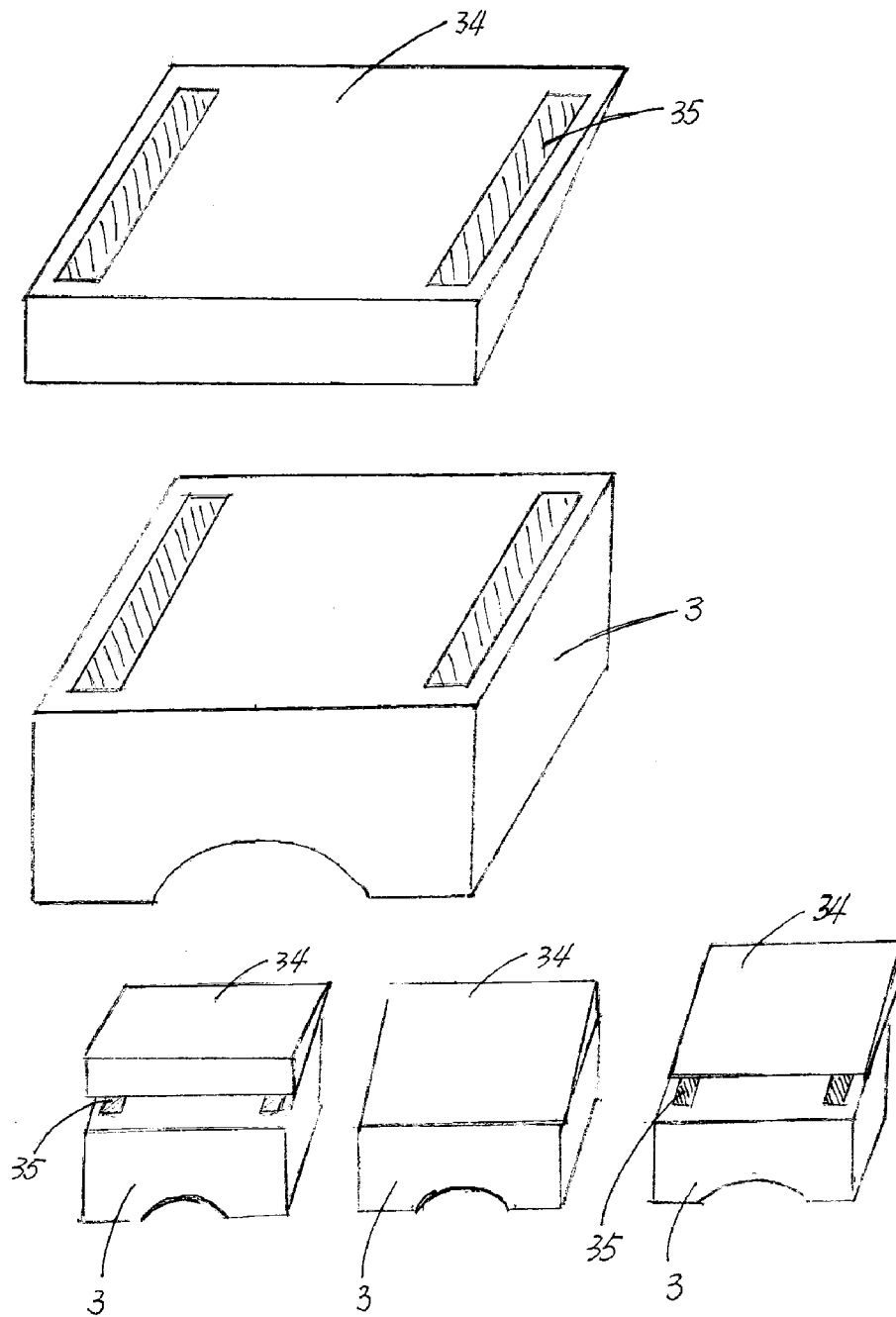
[Fig. 5]



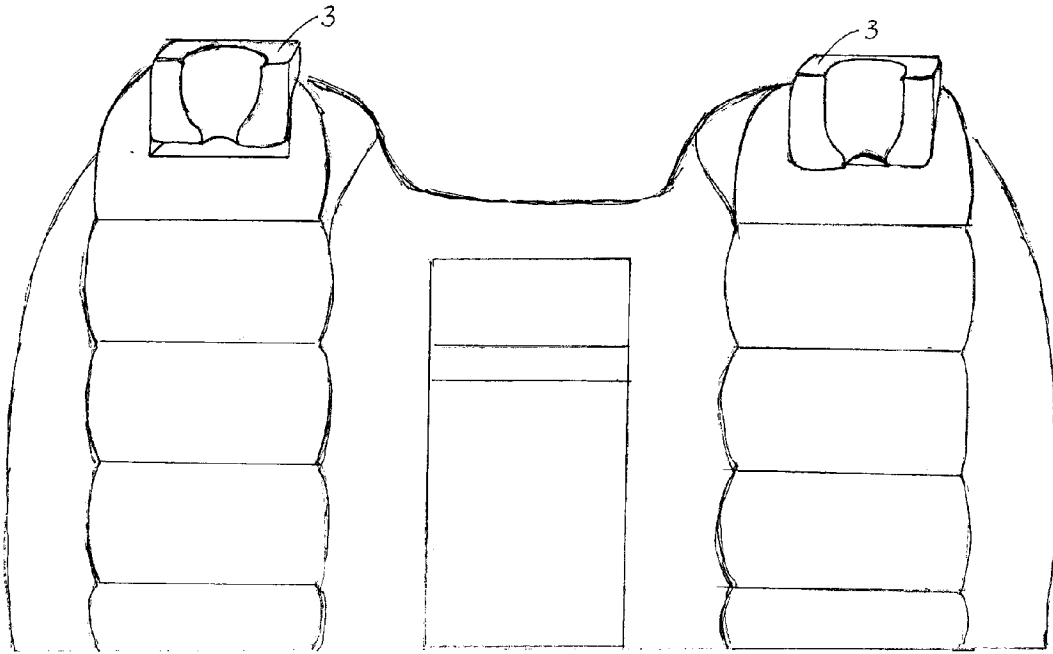
[Fig. 6]



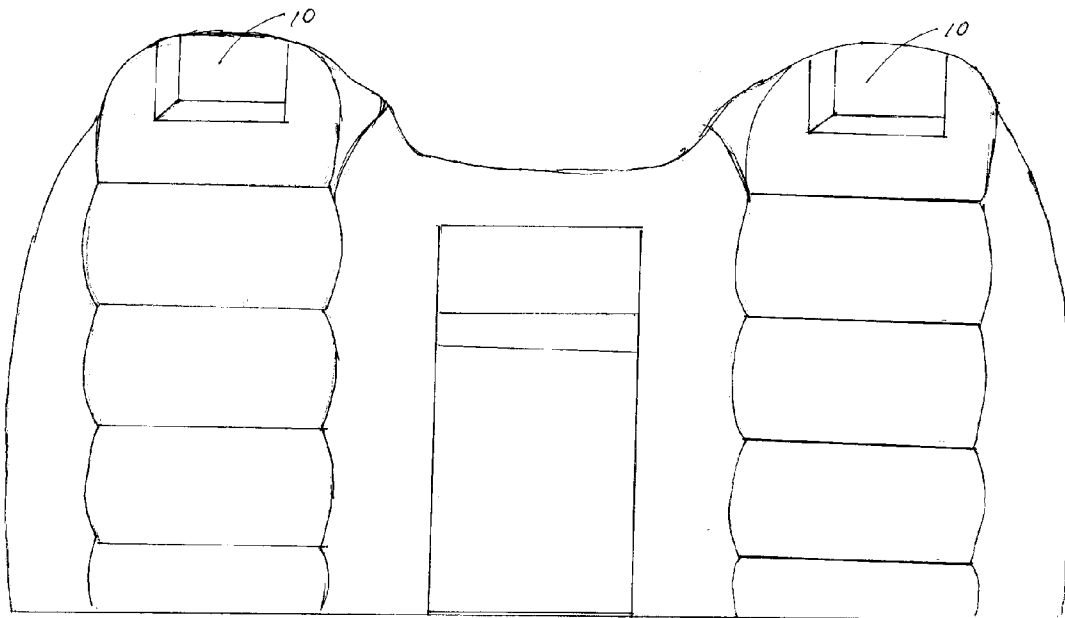
[Fig. 7]



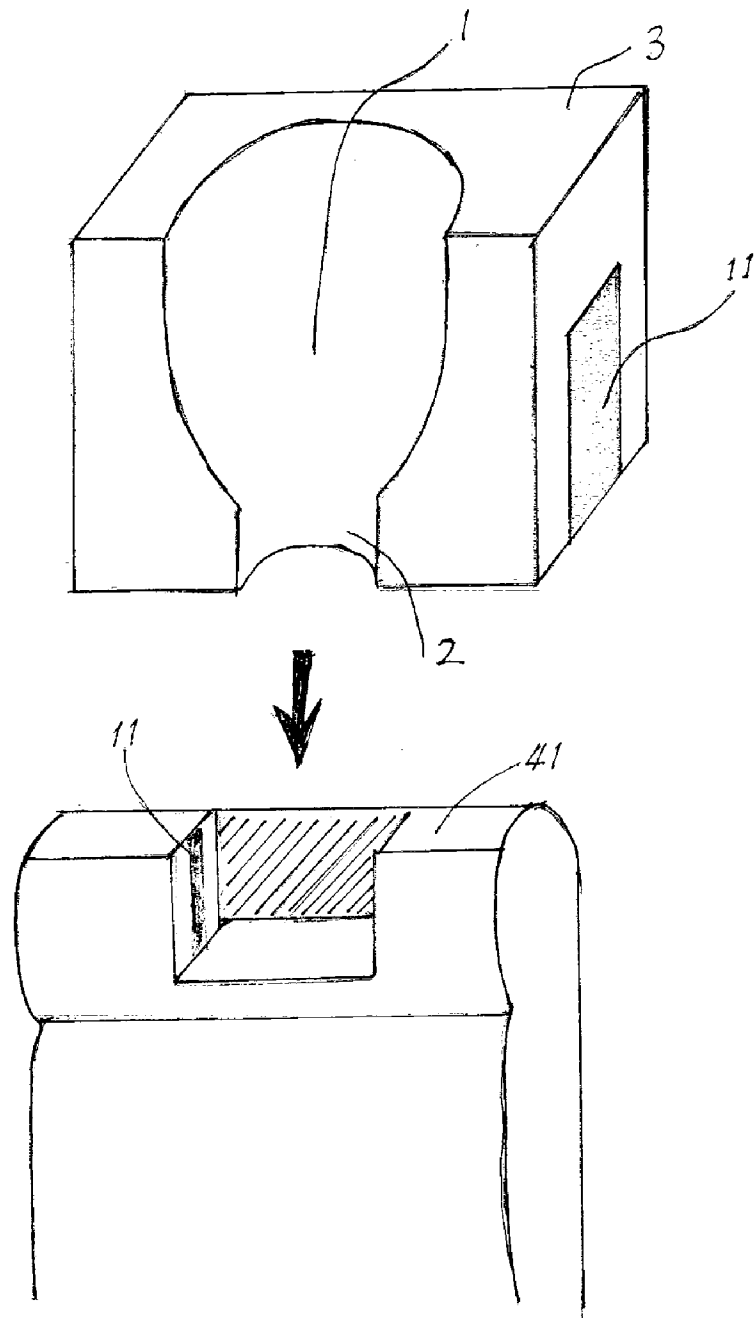
[Fig. 8]



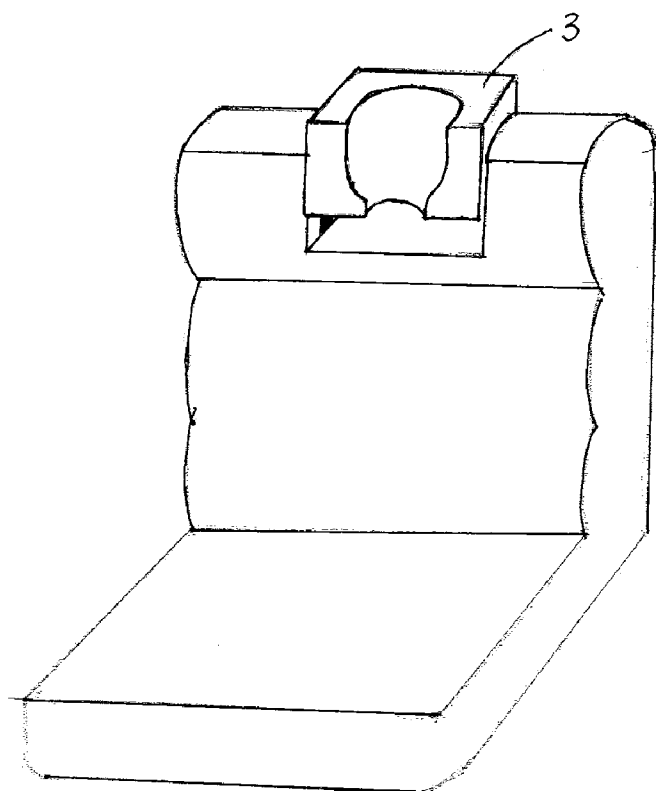
[Fig. 9]



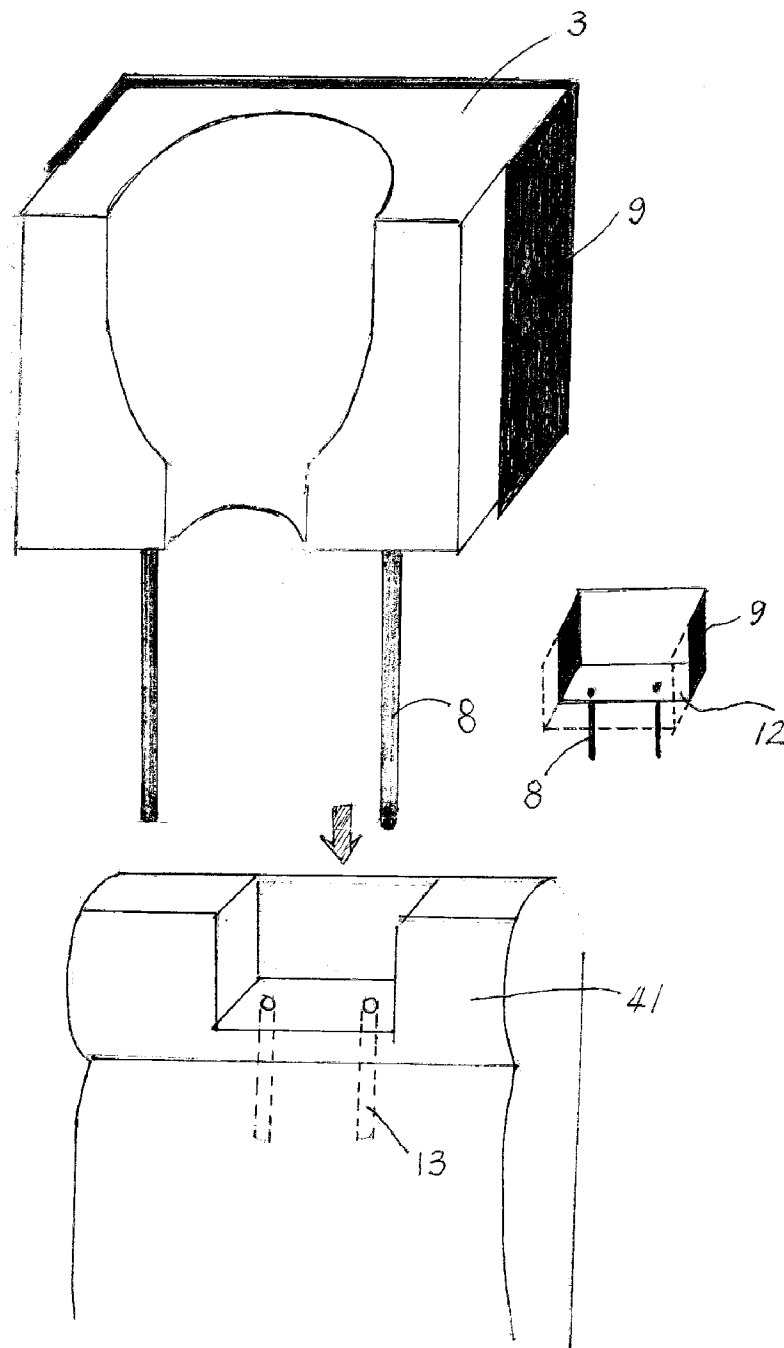
[Fig. 10]



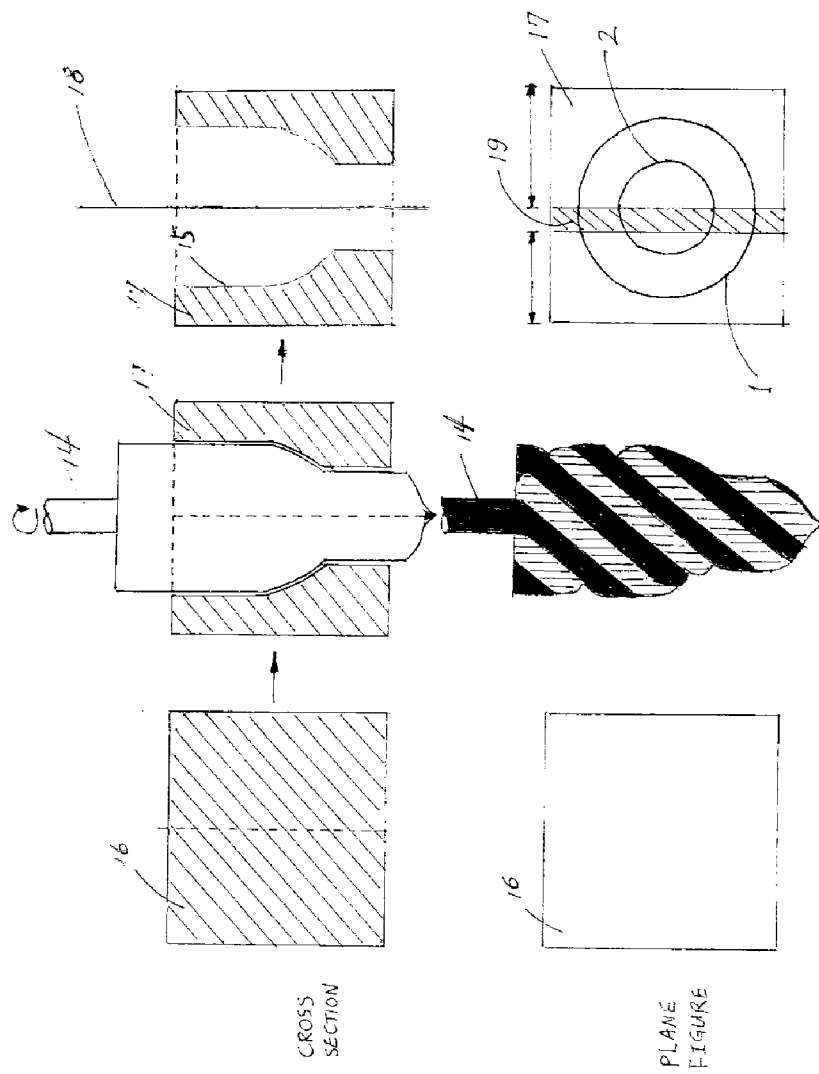
[Fig. 11]



[Fig. 12]

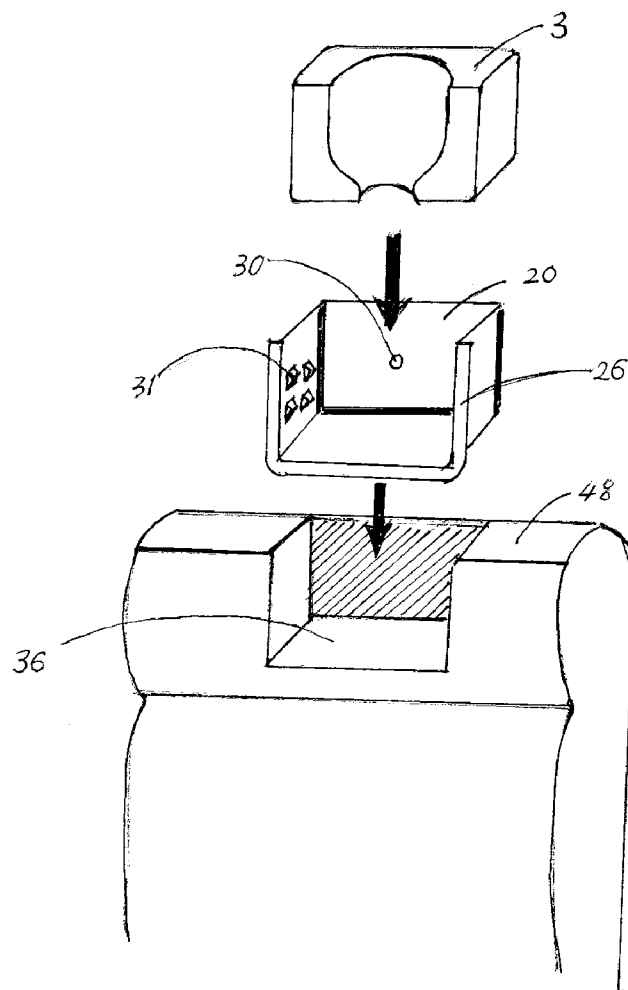


[Fig. 13]

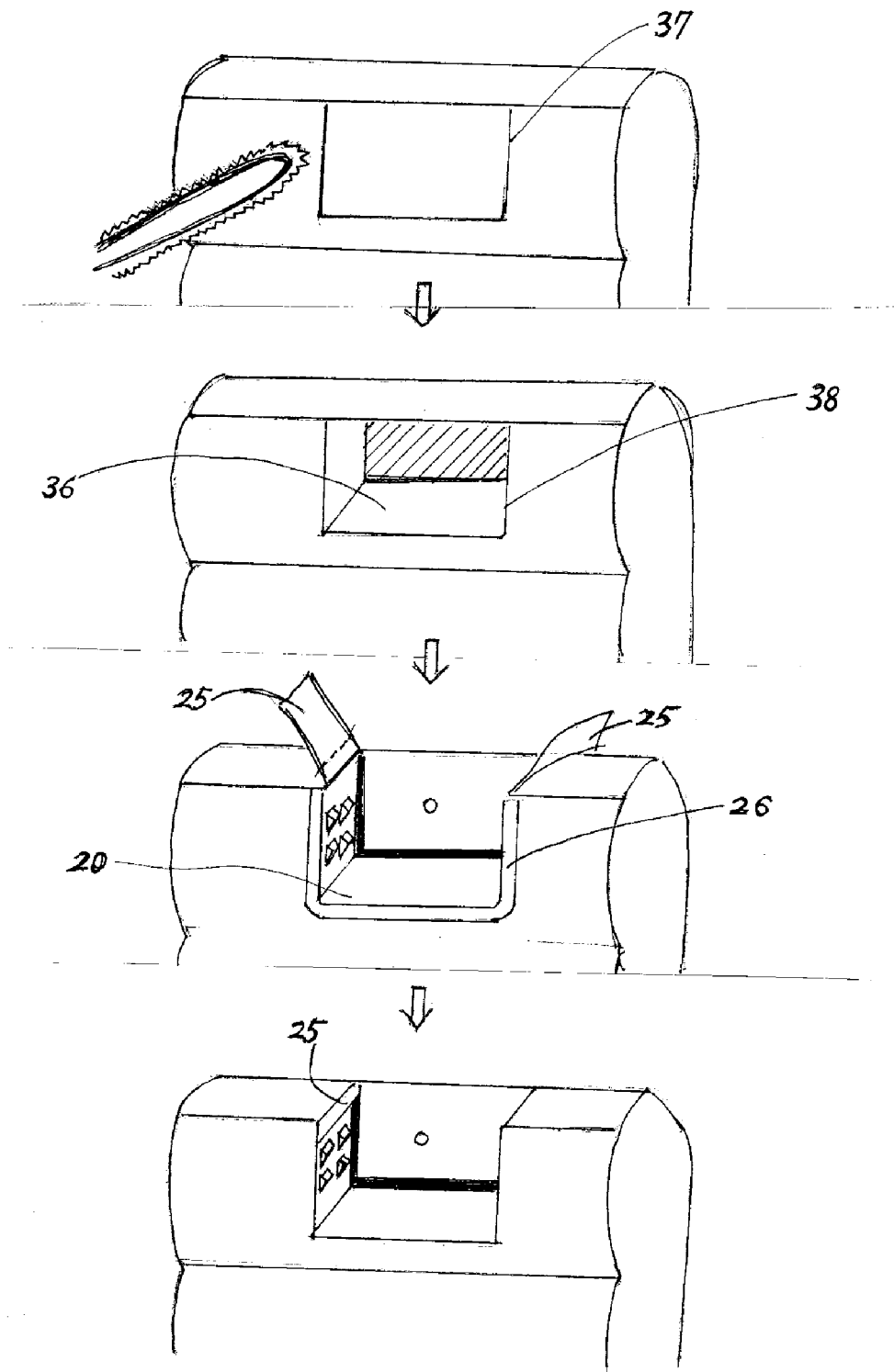




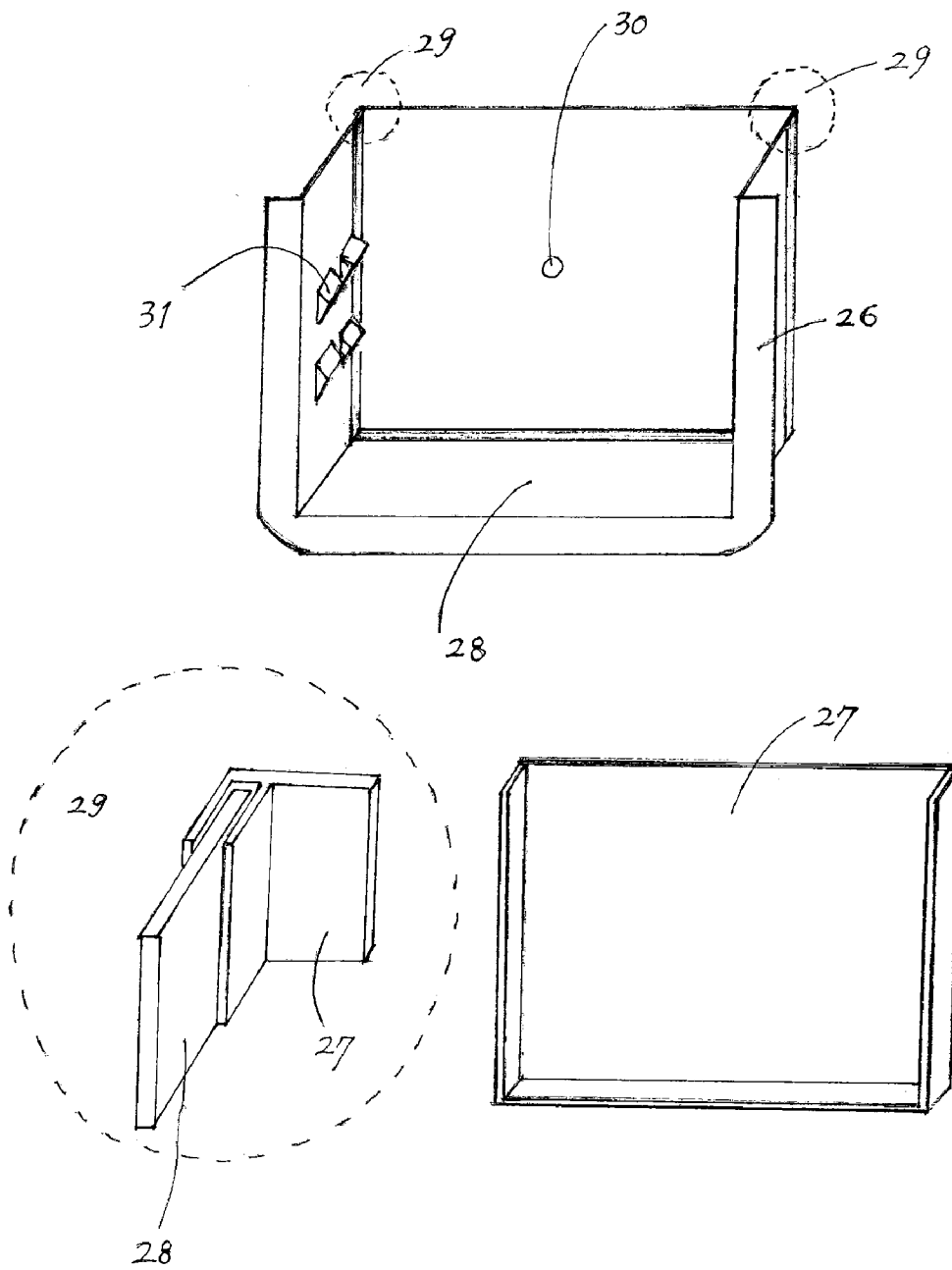
[Fig. 14]



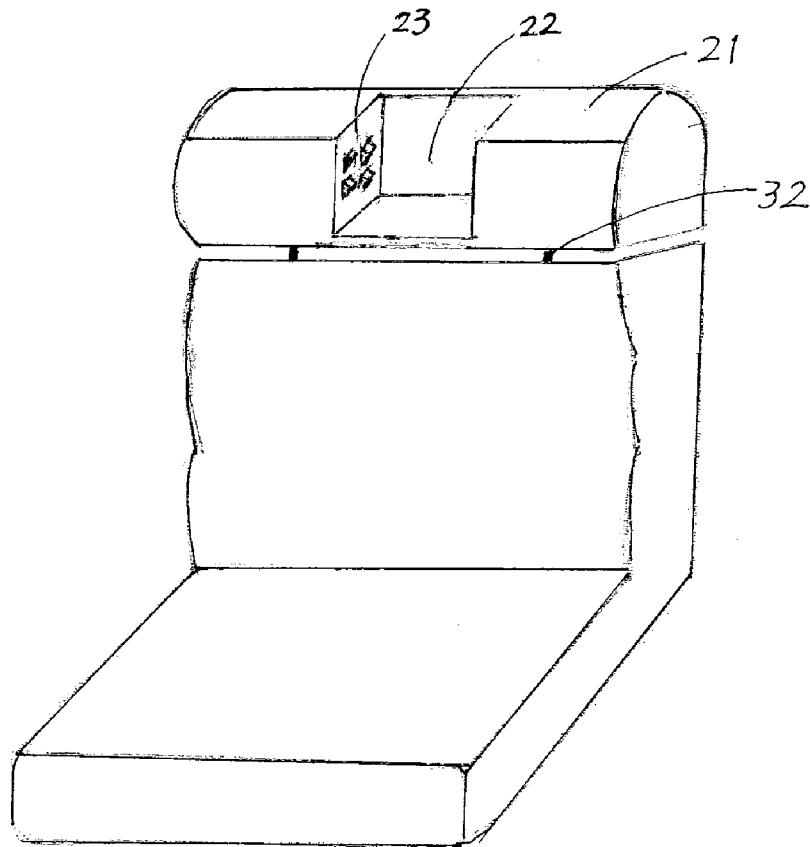
[Fig. 15]



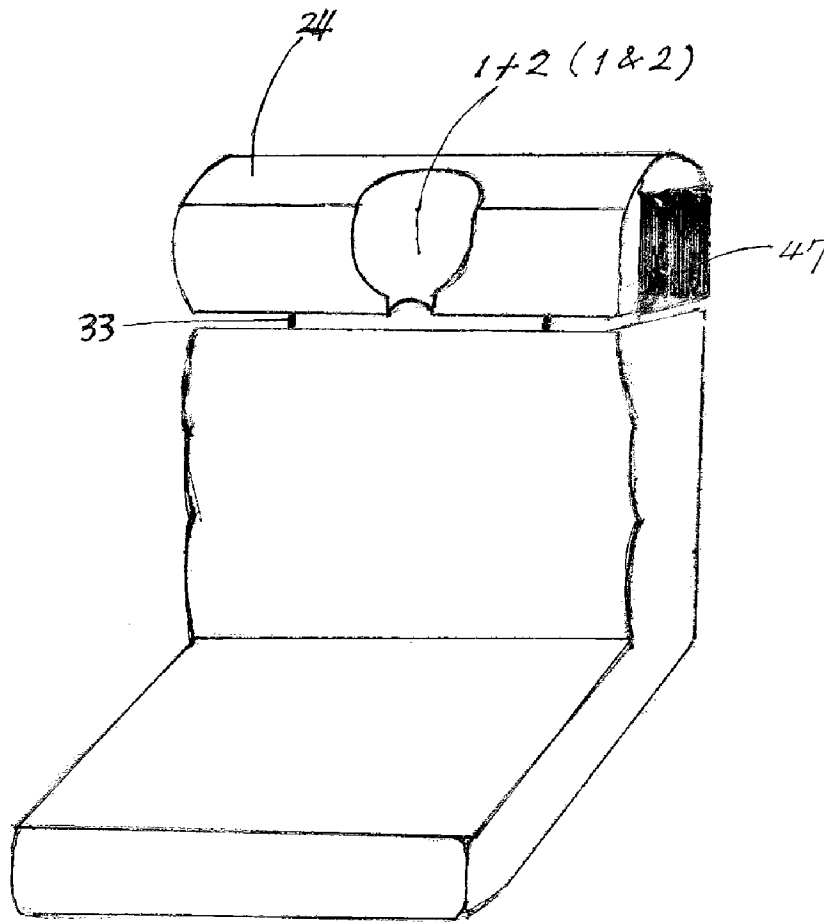
[Fig. 16]



[Fig. 17]



[Fig. 18]



[Fig. 19]

