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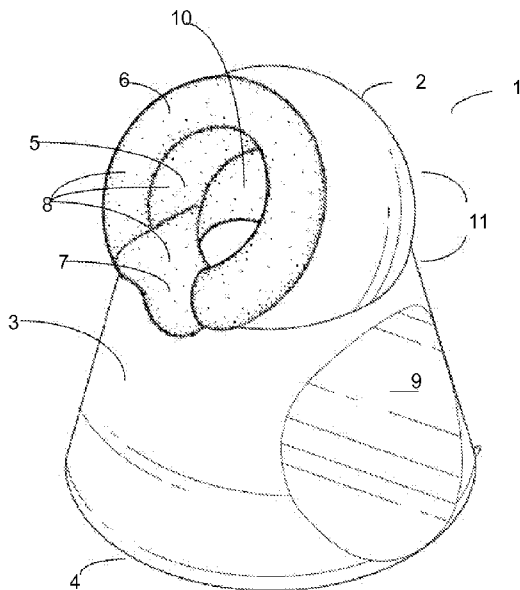
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- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

[Continued on next page]

- (54) Title: EXPANDABLE AND COLLAPSIBLE PILLOW STRUCTURE

FIG. 1



(57) Abstract: A supporting pillow structure for a user to sleep or to perform sedentary activity facing down toward the pillow structure with the user's hands and arms placed below their face. Embodiments of the pillow structure may be configured to provide users with comfort and support while the user is seated leaning forward at a desk or table. Embodiments may be further configured to expand and compress, for example to inflate and deflate, into a compact easy to carry package.

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## EXPANDABLE AND COLLAPSIBLE PILLOW STRUCTURE

### CROSS REFERENCE TO RELATED APPLICATION

[001] This application claims priority to US provisional application number 62/085,305, filed on November 27, 2014, the entire content of which are incorporated by reference in their entirety herein.

### TECHNICAL FIELD

[002] This disclosure relates in general to pillows and more specifically to a collapsible pillow structure having a cavity in the pillow structure and openings from the outside of the structure to the cavity so that users can rest face-down on the structure and place their hands and arms into the structure and be able to view an item placed into a cavity in the middle of the pillow structure through the opening for their face.

### BACKGROUND

[003] There are many bedding products, including mattresses and pillows designed to increase a user's comfort while lying down to sleep or rest or perform sedentary activities. Some major concerns for people lying down or sleeping are related to breathing, pressure, stress, alignment, and overall comfort. These concerns can be greater for overweight users, athletic users, and pregnant women.

[004] Most pillows are designed to provide support for the user's head and neck while the user lays down on their back or side. Some designs are created to keep the user's spine in alignment while the user sleeps on their side or back. These pillows may be designed with curves upward to provide further support in the area at the base of the skull for the user sleeping on their back or at the neck and jawline of the user sleeping on their side. Some pillows are manufactured out of special materials to provide support or flexibility and to contour to the user's unique shape. However, not all people prefer to lay down or sleep on their back or side, and the above mentioned specially designed pillows are not comfortable for a user who chooses to sleep on their front facing the pillow.

[005] Some people prefer to sleep or rest face-down to increase their comfort and alleviate their concern with breathing, loss of circulation, and pressure. For example, some people

sleep face down because they are uncomfortable sleeping on their back due to breathing problems, such as a closing of their airway or sleep apnea. Some people sleep face down because they find that sleeping on their side will cause their arms to fall asleep or their spine to feel mis-aligned. Many people toss and turn throughout the night trying to get comfortable or reposition their body to relieve some stress on their arms, hips, neck, head, and back.

**[006]** Sleeping face-down on a standard pillow can cause issues with airflow, breathing, and temperature control. Sleeping facing down can also cause problems with blood circulation in the arms if the arms are pressed under the body. It can also cause breathing problems or issues with air flow or circulation when the user is facing the pillow. Further, issues with temperature control can be caused by breathing into a pillow pressed against the user's face. Some users turn their head sideways when sleeping face-down to increase airflow and temperature control. This can cause a strain on the user's neck, arms, and back if the user turns their head to sleep with their current pillows.

**[007]** Pillows have been designed to help provide a place for an adult's face to lay, or a hole, which allows room for the user to breathe, for example U.S. Design Patent No. D277,059 (Boone).

**[008]** Some users take stress off their neck when they sleep on their front by placing their arms or hands under the pillow to prop the pillow up to. This can cause a loss of blood circulation to the arms or hands with their arm placed under the pressure of the body, head, or pillow. One attempt to solve this problem of creating space under a pillow is U.S. Patent No. 3,883,906 (Sumpter), which provides tunnel-like openings for the arms of a sleeper. Sumpter provides that the user's arms would be extended above the user's head and parallel to their body underneath the pillow.

**[009]** The problems described above also occur when the user tries to perform sedentary tasks when resting on their front facing a pillow structure. For example, users seek a comfortable way to perform sedentary tasks, such as reading email or typing on an electronic device, reading books, or performing tasks on their mobile devices, cell phones, or tablets while resting. These tasks can include many different tasks on various devices or objects, such as reading and writing emails and text messages; watching videos, such as sports, movies and television shows; surfing the internet; reading the news and gossip; shopping online; and other tasks requiring limited ability to move. With the proliferation of smaller devices capable of performing these tasks and other tasks, people are more likely to perform these tasks on a smaller device and at various locations. Although these tasks may take place while the user is seated, such as at a desk, on an airplane, or at a table, these tasks may

alternately take place while the user is leaning forward while seated or while the user is lying down. Many people perform these tasks in bed. Some people are not comfortable lying on their back while holding a book or mobile device, cell phone, or tablet above them for an extended period of time. Holding an object above your face for an extended period of time can be uncomfortable. Some people are not comfortable lying on their side for an extended period of time holding a book or device. Lying on one's side limits the ability of one arm or hand to hold the book and turn the page or to touch the device. Further, many new devices contain technology that automatically turns the image on the device based on how the device is oriented, assuming the user is not lying sideways, so that a user reading a website or looking at a picture or video with their head turned sideways must awkwardly turn (or change the settings on their device).

**[010]** Another problem people have while lying down is comfortably listening to audio through headphones. Some people listen to music, books "on tape," audio with video, or other sounds such as "white noise" while resting. People place headphones over their ears or place earbuds into their ears while leaning forward in a seated position or while lying down. Many headphones that cover the user's ears or earbuds inserted into the ear are not comfortable when the user's head is against a pillow or against the user's arm or another object. Pressure from an object against the headphones or earbuds, even from a relatively soft object such as a pillow, can cause discomfort to the user.

**[011]** There is a need to design a comfortable pillow structure that allows the user to rest facing down towards a pillow structure, while the user's arms and/or hands are comfortably placed underneath the user's head at an angle substantially perpendicular to the user's body as this would allow the user to rest comfortably and position their arms in a manner that allowed flexibility in the user's movements and allow the user to perform sedentary activities. There is also a need to design a pillow structure that allows a user to read or use a mobile device while laying face down on the pillow. Lastly, there is a need to design a pillow structure that would accommodate wires, power cords, or headphones or earbuds as well as providing a source of light for reading or using a mobile device while laying face down on the pillow.

## SUMMARY

**[012]** The disclosure is directed to an expandable and collapsible pillow structure for a user to rest facing down toward the pillow structure. The pillow structure is designed to be used

on an elevated surface such as a table, desk, or airplane tray table. The user is usually in a seated position when using the pillow structure. The pillow structure has a top surface, at least one side surface, a base, and an internal cavity in the pillow structure. The top surface is generally hemispherical in shape and forms a top pillow portion. The at least one side surface is generally frustoconical in shape and forms a pedestal pillow portion. The top pillow portion sits on top of the pedestal pillow portion. The base is generally where the pillow structure contacts the elevated surface. In one embodiment, the base can be generally rounded and/or generally flat. In another embodiment, the base can be the lower or bottom edge of the pedestal pillow portion, i.e., the side opposite of where the top pillow portion sits. In another embodiment, the base can be attached to the lower or bottom edge of the pedestal pillow portion. The pillow structure has at least three openings, of which at least one extends through the top surface of the top pillow portion and at least two extend through the side surface of the pedestal pillow portion. The at least two side openings are on opposing sides and extend inward from the outer edge of the side surface forming a bored out or tunnel shaped passage through the pedestal pillow portion. The bored out passage can be dimensioned to receive the arms of a user through each opposing arm opening. The internal cavity provides fluid communication between each opening, that is, the internal cavity is accessible from the face opening and the arm openings. The pedestal pillow portion and the top pillow portion can be in an expanded configuration, or in a collapsed configuration. When in an expanded configuration the bored out passage for the arms is can structurally bear one or more applied loads received by the at least one face opening without being substantially deformed, thereby relieving pressure loading internal to the bored out arm receiver caused by the one or more applied loads when the pillow is in use.

**[013]** In one embodiment, the face opening has a rim for the user's face to lean into the pillow structure for support. In another embodiment, the face opening also has a cut out at the lower edge. The cut out can provide additional support for the chin or provide additional air flow near the mouth. In another embodiment, the face opening is substantially circular. In another embodiment, the face opening is at an angle.

**[014]** In one embodiment, the above described pillow structure has an additional opening on the side surface. The additional opening also communicates with the internal cavity. In another embodiment, the additional opening provides extra air flow to the internal cavity. In another embodiment, the additional opening can be sized to receive an externally positioned power supply cable or headphone wire into the internal cavity.

[015] In one embodiment, the bored out arm passage can be dimensioned to hold both arms and hands. In another embodiment, the bored out arm passage can be dimensioned to allow extra room around both arms and hands.

[016] In one embodiment, the above described pillow structure can be expanded or collapsed by adding or removing air or gas. In another embodiment, at least one valve can be used to control the addition or the removal of air or gas. In another embodiment, a pump can be used to facilitate the addition or the removal of air or gas. In another embodiment, the pump is separate from the pillow structure such as a hand held bike pump or small foot pump. In another embodiment, the pump can be integrated into the pillow structure. In another embodiment, a carbon dioxide cartridge can be used to inflate the pillow structure. In another embodiment, the pump can have an automatic shut off valve that turns the pump off after a certain amount of time or once a certain air pressure is reached.

[017] In one embodiment, the above described pillow structure can be made from a material that is puncture resistant and capable of being hermetically sealed. In another embodiment, the material can also be flexible to fold or roll up when in a collapsed state yet rigid enough to maintain form when in an expanded state. In another embodiment, the material can have multiple textures or different textures from one side to the other, either left to right or front to back. In another embodiment, two or more different materials can be used to make the above described pillow structure. For example a softer material can be used to make the face opening to increase user comfort. Alternatively, a soft surface cover or coating can be used to make the face opening. Non-limiting examples of materials that can be used to make the above described pillow structure include plastics, canvas, polymers, films, vinyl, polyvinyl chloride, urethane, rubber, treated fabrics, memory foam or beaded foam, down, feathers, or other pillow or foam materials, cotton, fleece, animal skin, polyester, felt, synthetic fabrics, etc.

[018] In one embodiment, the above described pillow structure can also include a locking mechanism. The locking mechanism provides additional support when the pillow is in use.

[019] In one embodiment, the above described pillow structure can also include a carrying and/or storage case. The shape and size of the case will depend on the shape and size of the collapsed pillow structure. The carrying case can also include a device for attaching the case to another object such as a clip or carabineer.

## BRIEF DESCRIPTION OF THE FIGURES

- [020] Figure 1 is a perspective view of a non-limiting embodiment of an expandable/collapsible pillow structure in an inflated or expanded configuration.
- [021] Figure 2 is a perspective view of a non-limiting embodiment of an expandable/collapsible pillow structure in a fully compressed or deflated configuration.
- [022] Figure 3 is a side view of a non-limiting embodiment of an expandable/collapsible pillow structure in in an inflated or expanded configuration.
- [023] Figure 4 is a perspective view of a non-limiting embodiment of an expandable/collapsible pillow structure during initial stages of compression or deflation of the pillow structure.
- [024] Figure 5 is a perspective view of a non-limiting embodiment of an expandable/collapsible pillow structure in a later stage of compression or deflation of the pillow structure.
- [025] Figure 6 is a perspective view of a non-limiting embodiment of an expandable/collapsible pillow structure in a later stage of compression or deflation of the pillow structure.
- [026] Figure 7 is a perspective view of a non-limiting embodiment of a carrying case configured to hold and transport the compressed or deflated pillow structure shown in figure 2.
- [027] Figure 8 is a perspective view of a non-limiting embodiment of a compressed or deflated pillow structure folded in half to yield a half-circular shape.
- [028] Figure 9 is a perspective view of a non-limiting embodiment of a compressed or deflated pillow structure folded in quarters to yield a quarter-circular shape.
- [029] Figure 10 is a perspective view of a non-limiting embodiment of a carrying case.
- [030] Figure 11 is a side view of a non-limiting embodiment of an expandable/collapsible pillow structure.
- [031] Figure 12 is a side view of a non-limiting embodiment of an expandable/collapsible pillow structure during initial stages of compression or deflation of the pillow structure.
- [032] Figure 13 is a perspective view of a non-limiting embodiment of an expandable/collapsible pillow structure in a fully compressed or deflated configuration.
- [033] Figure 14 is a side view of a non-limiting embodiment of an expanded pillow structure with the locking mechanism locking it open.

[034] Figure 15 is a side view of a non-limiting embodiment of an expanded pillow structure with the locking mechanism locking it open.

[035] Figure 16 is a perspective view of a non-limiting embodiment of an expanded/collapsible pillow structure in an inflated or expanded configuration.

[036] Figure 17 is a perspective view of a non-limiting embodiment of an expanded pillow structure in use by a person.

## DESCRIPTION

[037] The disclosure is directed to an expandable and collapsible pillow structure (herein referred to as pillow structure). In one embodiment, the pillow structure is designed to be used on an elevated surface such as a desk or table top. In another embodiment, the pillow structure is designed to be used on a fold down tray table such as those on the back of an airplane seat. In another embodiment, the pillow structure is designed to be used when the user is seated near an elevated surface. In another embodiment, the pillow structure is designed to be used by a person traveling. In a non-limiting embodiment, the pillow structure is designed to be compressed or collapsed into a smaller size for ease of carrying or packing. In one embodiment, the pillow structure is inflatable and deflatable.

[038] Disclosed hereinafter and shown in accompanying figures 1 to 16 are non-limiting embodiments of an expandable/collapsible pillow structure that further includes the capability of assuming two configurations: a first expanded or inflated configuration with non-limiting embodiments shown in figures 1, 3, 11, 14, 15, 16, and 17 and a second collapsed, compressed or deflated configuration with non-limiting embodiments shown in figures 2, 8, 9, and 13. The second configuration, i.e. collapsed/deflated configuration, provides a compact, easily portable package. The first configuration may be referred to as an “expanded” or “inflated” or “user ready” pillow structure and the terms are used interchangeably throughout the specification. The second configuration may be referred to as a “collapsed” or “compressed” or “deflated” or “stored” or “packed” pillow structure and the terms are used interchangeably throughout the specification. When the terms “one,” “a,” or “an” are used in this disclosure, they mean “at least one” or “one or more,” unless otherwise indicated

[039] In some embodiments the first configuration can be deflated and compressed to form the second configuration, and the second configuration can be inflated and expanded to form the first configuration. In other embodiments expansion may be accomplished without

manually or automatically inflating with air. Likewise, in other embodiments compression may be accomplished without manually or automatically deflating.

**[040]** Figure 1 illustrates a perspective view of a non-limiting embodiment of the pillow structure in the first configuration. In this configuration, pillow structure 1 is in its expanded form, suitable for use as a pillow in a situation where a user is seated near a raised surface such as coach seating on an airplane. In one embodiment, the general shape of the pillow structure in this configuration is similar to the pillow described in US patent number 9,131,792, entitled “Pillow Structure”, the entire contents of which are hereby incorporated by reference in their entirety.

**[041]** Continuing to refer to figure 1, in this embodiment, the pillow structure 1 has a top surface 2, at least one side surface 3, and a base 4. In this embodiment, the top surface 2 is roughly hemispherical in shape and bounds a “top” or “top pillow” portion. The top surface has at least one opening 5, which may be referred to as a “top opening” or “face opening”. The top opening extends inward into the top pillow portion. The top opening 5 has a rim 6 and a cut out 7. The face opening 5, rim 6, cut out 7 may be jointly referred to as the “rim portion” 8 of the pillow structure. The rim portion is designed to provide a comfortable resting place for the user’s face. Rim 6 supports the user’s face and can be any width or shape. In one embodiment, the rim 6 can be rounded and is about an inch or two wide. In another embodiment, the rim can extend into the top opening. Cut out 7 provides additional support for the user’s face or chin to rest when the user’s face is placed in the top opening 5. Cut out 7 can also provide additional air circulation and flow near the user’s mouth when the user’s face is placed in the top opening 5. In another embodiment, the top opening is roughly circular in shape with cut out 7 located in the lower portion. The top opening can be placed anywhere on the top surface. In one embodiment, the top opening is at an angle of a slight and gradual incline. In another embodiment, the top opening is substantially at the top of the pillow structure but not necessarily at the apex of the pillow structure. In another embodiment, the angle of the top opening is between 10 and 80 degrees when compared to a horizontal axis. In another embodiment, the angle of the top opening is between 20 and 70 degrees when compared to a horizontal axis. In another embodiment, the angle of the top opening is between 30 and 50 degrees when compared to a horizontal axis. In another embodiment, the angle of the top opening is about 35 to 45 degrees when compared to a horizontal axis.

**[042]** Continuing to refer to figure 1, in this embodiment, the side surface 3 is rounded without delineated edges and roughly bounds a frustoconical or cylindrical in shape which

serves as a “pedestal” or “pedestal pillow” portion or “lower” or “lower pillow” portion. The pedestal pillow portion supports the top pillow portion. Side surface 3 has at least two openings 9 (only one visible), which may be referred to as a “side opening” or “arm opening”. Two of the at least two openings are on opposing sides of the side surface, extending inward from the sides. In one embodiment, two of the at least two openings 9 form a “tunnel” that passed through the pedestal pillow portion. In another embodiment, the tunnel is large enough to provide adequate room for a user’s arms and hands to be placed inside. In another embodiment, side surface 3 has at least three openings.

**[043]** Continuing to refer to figure 1, in this embodiment, base 4 is the pedestal pillow portion opposite the top pillow portion. In general, base 4 is the portion of the pillow structure that contacts the elevated surface upon which the pillow sits. In one embodiment, the base can be roughly circular in shape. In one embodiment the base can be disk shaped (see figure 1). In another embodiment, the base can be ring shaped, e.g. the lower edge of the pedestal pillow portion (see for example, figure 17). In another embodiment, the base is the lower or contact edge of the pedestal pillow portion. In one embodiment the base 4 is wide enough to maintain stability when the pillow structure is in use. In another embodiment, the diameter of the base 4 is smaller than the vertical height of the pillow structure. In another embodiment, the pillow is substantially taller than its horizontal length or width.

**[044]** Continuing to refer to figure 1, the pillow structure 1 in its first configuration (i.e. expanded), has an internal cavity 10. The internal cavity is formed from the joining of the at least one top opening 2 and at least two side openings 9. In one embodiment, the at least two side openings are large enough to insert an object into the internal cavity such as a mobile device, phone, table, gaming device or other device. The at least two side openings can also provide space for a power cord or wire for headphones. In another embodiment, the cavity is formed from the joining of the at least one top opening and at least three side openings. In this embodiment, the third side opening can be used to pass cords to electronic devices placed inside of the internal cavity. Alternatively, in this embodiment, the third side opening can be use to illuminate the internal cavity or increase air circulation or flow into the cavity.

**[045]** In one embodiment, the entire pillow structure can be made from one material. In another embodiment, the pillow structure can be made from at least two different materials. In another embodiment, the pedestal portion bounded by side surface 3 and base 4 and the hemispherical portion bounded by top surface 2 can be composed of a first material, whereas rim 6, cut-out region 7, optionally face opening 5 (which, in one embodiment, corresponds to the thickness dimension of rim 6), and optionally side opening 9 can be made of a second

material. In another embodiment, side surface 3 and top surface 2 can be composed of a first material, rim 6, cut-out portion 7, optionally face opening 5, and optionally side opening 9 can be composed of a second material, and base 4 can be composed of a third material.

**[046]** In one embodiment, various materials can be used to make the described pillow structure. In another embodiment, the material can be a material that is puncture resistant and capable of being hermetically sealed (i.e. holding air or gas). In another embodiment, the material can be flexible enough to fold or roll up when in a collapsed state yet rigid enough to maintain form when in an expanded state. In another embodiment, the material can have multiple textures or different textures from one side to the other, either left to right or front to back. In another embodiment, the material can be a material that is capable of expansion and collapsing. Non-limiting examples of materials include plastics, canvass, polymers, films, vinyl, polyvinyl chloride, urethane, rubber, treated fabric, memory foam or beaded foam, down, feathers, or other pillow or foam materials, materials having a soft surface (e.g. cotton, fleece, animal skin, polyester, etc.), multi-layer materials, etc.

**[047]** In another embodiment (not shown), a separate removable cover can be used. The separate removable cover can help keep the pillow cleaner. The separate removable cover can help reduce the wear and tear on the pillow structure. The separate removable cover can be made from any material that is comfortable against a user's skin. The separate removable cover can be made from a cleanable or washable material. In general, the separate removable cover is designed to maintain the face opening of the pillow structure when it is on the pillow structure. In one embodiment, the separate removable cover covers a portion of the top pillow portion, mainly the top opening. In another embodiment, the separate removable cover covers the entire top pillow portion. In another embodiment, the separate removable cover covers the entire top pillow portion and a portion of the pedestal pillow portion. In another embodiment, the separate removable cover covers the entire pillow structure. In this embodiment, the removable cover includes openings that align with the side openings in the pedestal pillow portion. The separate removable cover can be held in place using a variety of mechanisms. Non-limiting mechanisms include elastic, ties, hook and loop (e.g. Velcro® brand), frog closures, magnets, buttons, etc.).

**[048]** In one embodiment, pillow structure 1 can be inflatable/deflatable. In the inflatable/deflatable embodiment, pillow structure 1 can have portions that are inflatable/deflatable and portions that are not inflatable/deflatable. In one embodiment, the non-inflatable/deflatable portions can include the rim 6, cut-out 7, and optionally face opening 5. In another embodiment, the inflatable/deflatable portions of pillow structure 1 can

include the top hemispherical portion and the pedestal portion, together referred to as the “inflatable portion” 11 of the pillow structure. In another embodiment, the inflatable/deflatable top hemispherical and pedestal portion are joined such that air can move from the top into the pedestal or vice versa. In another embodiment, the inflatable/deflatable top and pedestal portions are separate and air cannot move from the top into the pedestal or vice versa. In this embodiment, the user can adjust the firmness of the top portion separately from the firmness of the pedestal portion. For example, the top portion can be softer than the pedestal portion or vice versa.

**[049]** In the inflatable/deflatable embodiments of the pillow structure, the inflatable/deflatable portions of the pillow structure (e.g. top surface 2, side surface 3, optionally rim portion 8, and optionally base 4) comprise multi-layer surfaces. The multi-layer surfaces have an interior region between the layers that is closed or sealed off from the exterior, and can accept and contain gas such as air pumped or blown there into. When the gas or air is pumped into the interior, the pedestal and hemispherical regions inflate and expand to assume the form of the first configuration. In one embodiment, the multi-layer surfaces include at least two layers. In another embodiment, the multi-layer surfaces include at least three layers. In another embodiment, the interior regions further include baffles or other structures that help control the air flow and/or restrict air movement.

**[050]** Figure 2 illustrates a perspective view of a non-limiting embodiment of the second configuration (i.e. compressed/deflated) of the pillow structure. In this configuration, pillow structure 1 is in its largely compressed form, suitable for convenient carrying and transport.

**[051]** Figure 3 is a side view of a non-limiting embodiment of the first configuration of the pillow structure, i.e., in its fully inflated form. Visible in this view is valve 12 in its closed off position. When the pillow structure is in its inflated configuration, the valve is closed off to prevent leakage of air out of the pillow. Feature 13 is an optional pump which may be integrated into the pillow structure. Having such an integrated pump would obviate the need to either blow up the pillow structure manually (e.g. by blowing into valve 12), or to attach an outside pump such as a bellows or bicycle pump or other pump means available in the market. Integrated pump 13 could be positioned either external to (as shown in the drawing) or internal to inflatable/deflatable portion 11 of the pillow structure. No matter where the pump itself was positioned, its output would have to be pumped into the interior of inflatable portion 11, to inflate the pillow structure. In one embodiment, air would be pumped into the interior of inflatable/deflatable portion 11 via pump inlet 14, which may also include a shut-off 15 which would prevent leakage when the pump was off. Also

shown is start button 16, which could be pressed to initiate an automated inflation process. Such an integrated pump mechanism in one embodiment would be battery powered. In another embodiment, the integrated pump further includes a pressure sensor. In another embodiment, the integrated pump further includes an automatic shut off. The automatic shut off can be activated based on the amount of time the pump runs or can be tied to a pressure sensor.

**[052]** Figure 4 is a perspective view during initial stages of deflation of a non-limiting embodiment of the inflatable/deflatable pillow structure. To deflate, valve 12 is opened (which may be accomplished by pulling out valve stopper 17), allowing air to escape from the inflatable portion. Figure 4 also shows the arm opening 9 collapsing downward, and the vertical height of the pedestal portion decreasing as deflation occurs.

**[053]** Figures 5 and 6 show sequentially later stages of deflation of a non-limiting embodiment of the inflatable/deflatable seated pillow structure. Arm opening 9 collapses completely, the pedestal portion also collapses vertically, until rim portion 8 lies essentially horizontally atop collapsed inflatable/deflatable portion 11.

**[054]** As the remaining air is let out from the mostly deflated stage shown in figure 6, the pillow structure assumes the fully deflated form of the second configuration, shown in figure 2.

**[055]** Figure 7 illustrates a non-limiting example of a carrying case 18 configured to hold and transport the deflated pillow structure shown in figure 2. Closing mechanism 19 allows easy packing. Non-limiting examples of closing mechanisms include zippers (illustrated), hook and loop (e.g. Velcro<sup>®</sup> closures), and snaps. Attachment mechanism 20 enables attaching carrying case 18 to a suitcase, luggage rack, or belt by way of example. Non-limiting examples of attachment mechanisms include clips, carabiners, hook and loop (e.g. Velcro closures), and buckles.

**[056]** Figures 8 and 9 illustrate further compaction of the deflated pillow structure shown in figure 2. Figure 8 shows folding the deflated pillow structure once in half to yield a half-circular shape, and Figure 9 shows folding the deflated pillow structure two times in half to yield a quarter-circular shape. Figure 10 shows a non-limiting example of a quarter-circular carrying case, thick enough to accept the twice folded deflated pillow structure.

**[057]** Figure 11 illustrates a side view of another non-limiting embodiment of the expandable/collapsible pillow structure, in its first, i.e., fully expanded, configuration. In this embodiment, top surface 2 and side surface 3 are constructed of a plurality of accordion folds 21, for the purpose of enabling a predetermined accordion-like deflated configuration, rather

than a simple collapse during deflation, as demonstrated in an earlier embodiment. The number of accordion folds can vary; in the figure, there are numerous such folds, both on the top surface 2 of the hemispherical portion, and on the side surface 3 of the pedestal portion. However, in other embodiments, there may be a much smaller number of accordion folds.

**[058]** Other than the difference in the top surface and side surface between the accordion folds in this embodiment and absence thereof in an earlier embodiment, the two embodiments of the expandable/collapsible pillow structure share the same features as discussed in detail in paragraphs 40 through 49 above and briefly discussed below.

**[059]** As in the earlier embodiment of the expandable/collapsible pillow structure, the pedestal portion of this embodiment, bounded by side surface 3 and the hemispherical portion bounded by top surface 2, are composed of a first material, whereas the rim, face opening (which corresponds to the thickness dimension of the rim), and cut-out region, are made of a second material. The pedestal portion and the hemispherical portion are connected and inflatable. This implies that those portions of the pillow structure have an interior region between the exterior walls (i.e., the sides) that is closed or sealed off from the exterior, and can accept gas such as air pumped or blown there into. The interior of the pedestal portion and the hemispherical portion communicate with one another, i.e. are connected and form one combined interior. When the gas or air is pumped into the interior, the pedestal and hemispherical regions inflate and expand to assume the form of the first configuration. The inflatable/deflatable pedestal and hemispherical portions this embodiment of the expandable/collapsible pillow structure are together referred to as the inflatable portion 11. An optional pump (not shown) can be integrated into this embodiment similarly to the way it can be integrated into the earlier embodiment shown in figure 3.

**[060]** The rim, face opening (not shown), and cut-out regions (not shown) are together referred to as the rim portion 8. The rim portion is designed to provide a comfortable resting place for the user's face, and in some embodiments is not made to be inflatable. The rim portion may be comprised of a soft comfortable material such as memory foam or beaded foam or down or feathers or other pillow or foam materials, and may have a soft surface covering such as cotton, fleece, animal skin, polyester, by way of example.

**[061]** Figure 12 is a side view during initial stages of deflation of the non-limiting embodiment shown in figure 11. To deflate, valve 12 is opened, allowing deflation to take place. In an embodiment of the partially deflated stage, in the first step, rim portion 8 is tilted to a more horizontal position, compressing the accordion folds of top surface 2, thereby deflating the hemispherical portion.

[062] Figure 13 is a side view of the non-limiting embodiment shown in figure 11 in its second configuration, i.e. fully deflated stage. Following the full compression of the accordion folds of top surface 2, the accordion folds of side surface 3 are compressed, thereby deflating the pedestal portion and yielding the fully compressed and deflated configuration shown in the figure. In one embodiment, having the accordion folds yields a neat and compact second configuration.

[063] Figure 14 is a side view of an expanded configuration of another non-limiting embodiment of the expandable/collapsible pillow structure incorporating a locking mechanism. This embodiment may include inflatability, or alternately it may be expandable and compressible without inflation or deflation. In this embodiment, a locking mechanism 22 engages to maintain the pillow structure in its expanded configuration. The locking mechanism can take many forms, non-limiting examples include a latch that pops into place when the expansion is complete or a locking hinge. If the structure is expanded, such a locking mechanism could provide robustness to keep the structure in its fully expanded configuration, whether or not inflated. Additionally, the locking mechanism could enable a purely mechanical expansion in place of inflation. The pillow structure could be opened and then locked into its opened, expanded position.

[064] Figure 15 is a side view of an expanded configuration of another non-limiting embodiment with both accordion folds and a locking mechanism. Figure 15 also shows the accordion folds adapted to being manually unfolded (in the directions of the arrows on the figure), such that the pedestal portion and hemispherical portion, which together are referred to as the expandable portion 11, open and cause portion 11 to expand. Locking mechanism 22 is then engaged to hold the pillow structure in its open, expanded configuration. The locking mechanism 22 can then be disengaged to allow the pillow structure to close into the compressed configuration. The locking mechanism can take various forms. Non-limiting mechanical locking mechanisms include those similar to those on folding chairs or tables may be used, a hinged mechanism (shown on the figure), those similar to children's expandable plastic cups, wherein the rings click into an open configuration as the top ring is lifted and others. In some embodiments, an air inlet into the interior of the expandable portion can be included to account for the volume will increase as the structure is expanded.

[065] Figure 16 is a perspective view of a non-limiting embodiment of the expandable/collapsible pillow structure. In this embodiment, the face opening has a much larger rim and the base is the ring shaped lower portion of the pedestal pillow.

[066] Figure 17 is a perspective view of a non-limiting embodiment of a user using the expandable/collapsible pillow structure. In this embodiment, the pillow structure is being used on the surface of a pull down tray located on the back of an airline seat. The pillow is shaped such that the user 23 is in a comfortable position that reduces strain on the neck, shoulders, arms, hands, and waist/hips. The user's head position 24 is higher than the body 25. The higher head position allows the use to place her arms 26 and hands 27 in the tunnel like side openings. The user leans forward into the pillow structure, placing her face into the top opening 5 without leaning too far at the waist or hips. The placement of the arms into the side openings leaves allows the arms to remain substantially perpendicular to the user's body 25. In another embodiment, the user can place her arms around the pedestal pillow portion instead of placing the hands and arms in the side openings.

[067] In another embodiment (not shown), the user can lay the side of her head on a section of the top pillow that does not have a top opening. In this embodiment, it may be more comfortable for the user to only place one arm and hand through the side openings.

[068] In one inflatable/deflatable embodiment, the weight of the user's head on the top pillow portion increases the air pressure in the pedestal pillow portion. The increased air pressure in the pedestal pillow portion provides additional structural support ensuring that the at least two side openings do not deform or collapse. Keeping pressure off the arms allows for proper blood circulation and reduces or prevents the arms from "falling asleep" due to lack of blood circulation. The use of a locking device can also help prevent the side openings from deforming or collapsing.

[069] While the disclosure has been illustrated and described in detail in the foregoing description, such description is to be considered illustrative or exemplary and not restrictive. The disclosure is not limited to the disclosed embodiments. Modifications to the disclosed embodiments can be understood and effected by those skilled in the art in practicing the claimed disclosure, from a study of the disclosure and the appended claims. For example, other materials can be used to manufacture the pillow structure other than those listed.

## CLAIMS

1. An expandable and collapsible pillow structure comprising:
  - a top surface bounding a substantially hemispherical top pillow portion;
  - at least one side surface bounding a substantially frustoconical pedestal pillow portion with the top pillow portion atop the pedestal pillow portion;
  - a substantially rounded base; and
  - at least three openings, including:
    - at least one face opening through the top surface of the pillow structure;
    - at least two opposing arm openings extending inward from an outer edge of the at least one side surface forming a bored out arm receiver dimensioned to receive arms of a user through each opposing arm opening;
    - a cavity in an internal region of the pillow structure and providing fluid communication between each opening, the cavity being accessible from the at least one face opening and the at least two arm openings;
    - wherein the pedestal pillow portion and the top pillow portion can be in an expanded configuration, or in a collapsed configuration; and
    - wherein the bored out arm receiver is operable to structurally bear one or more applied loads received by the at least one face opening without being substantially deformed thereby relieving pressure loading internal to the bored out arm receiver caused by the one or more applied loads when the pedestal pillow portion and the top pillow portion are in an expanded configuration.
2. The pillow structure of claim 1, wherein the at least one face opening is substantially circular.
3. The pillow structure of claim 1 or 2, wherein the face opening further comprises a rim for the user's face to lean into the pillow structure for support.
4. The pillow structure of any one of the preceding claims, wherein the expanded configuration and the collapsed configuration are achieved through an addition or a removal of air or gas.

5. The pillow structure of claim 4, wherein the addition or the removal of air or gas in the top pillow portion is separate from the addition or the removal of air or gas in the pedestal pillow portion.
6. The pillow structure of claim 4, further comprising at least one valve to control the addition or the removal of air or gas.
7. The pillow structure of claim 4, further comprising at least one pump to facilitate the addition or the removal of air or gas.
8. The pillow structure of any one of the preceding claims, wherein the pillow structure is made from at least one material.
9. The pillow structure of any one of the preceding claims, where in the pillow structure is made from at least two different materials.
10. The pillow structure of any one of the preceding claims, further comprising a separate removable cover.
11. The pillow structure of any one of the preceding claims, further comprising a locking mechanism.
12. The pillow structure of any one of the preceding claims, further comprising a carrying and/or storage case.

FIG. 1

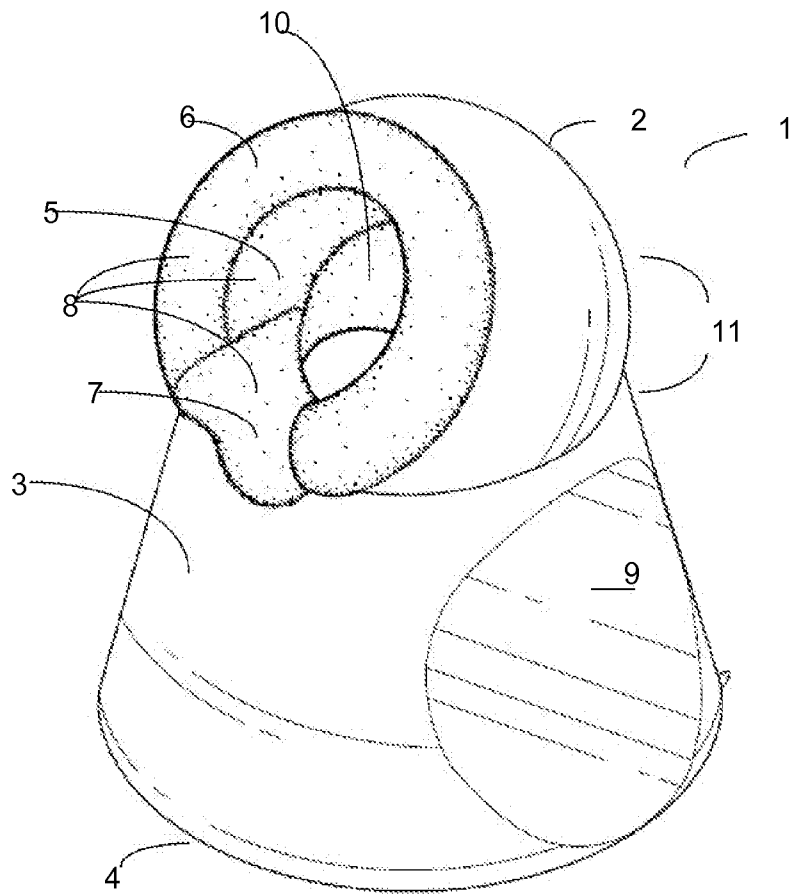


FIG. 2

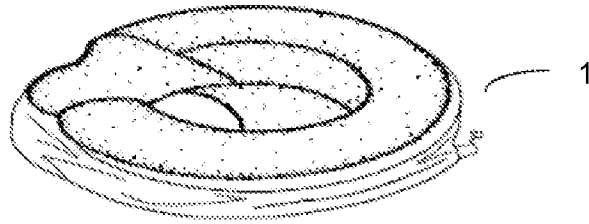


FIG. 3

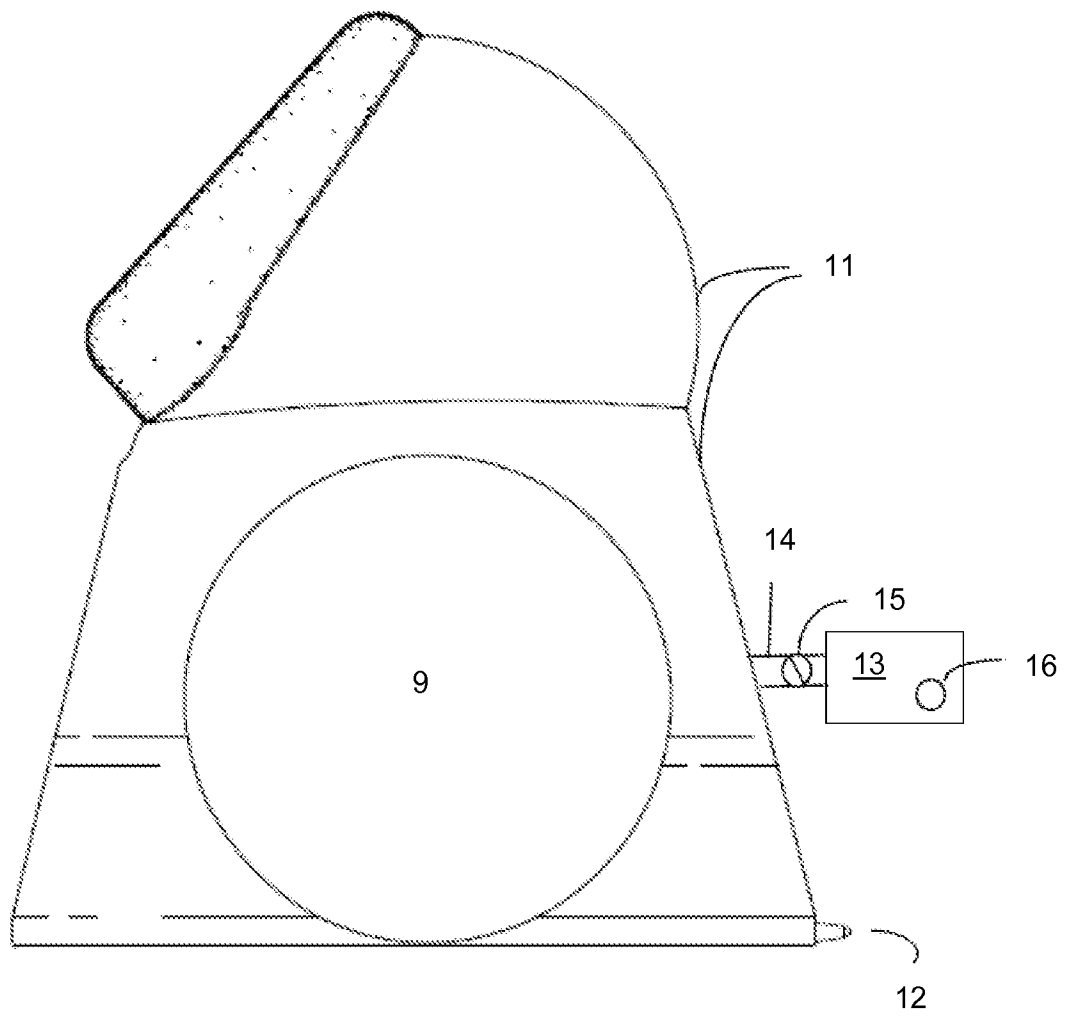


FIG. 4

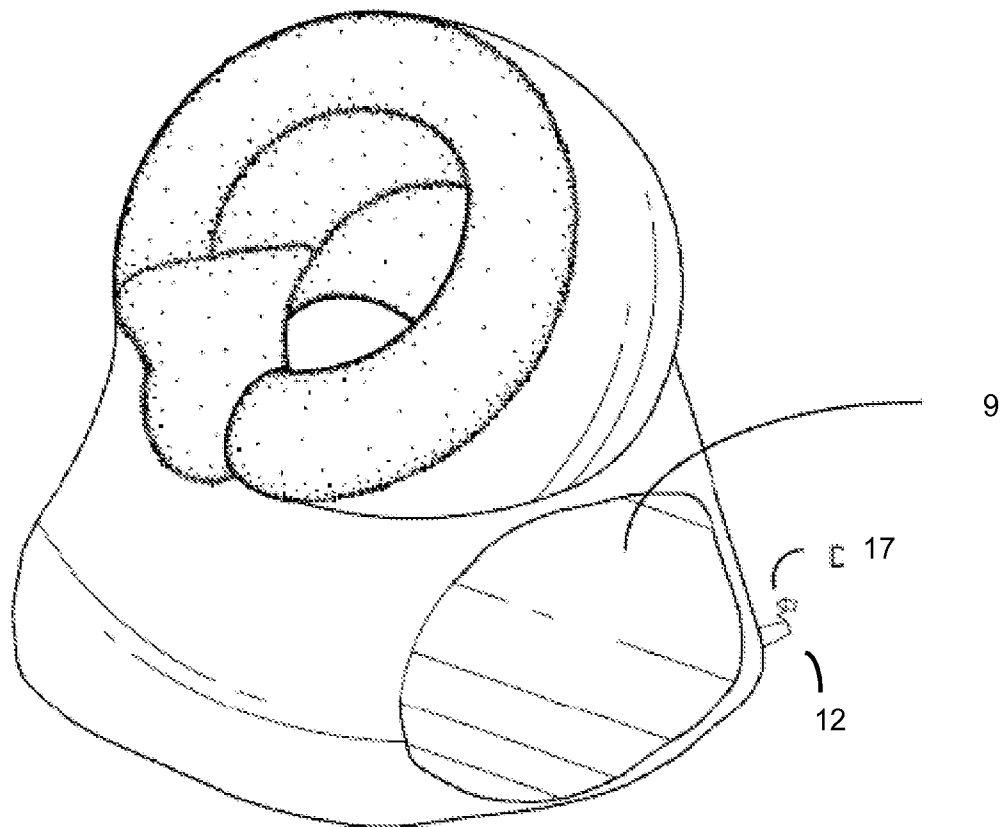


FIG. 5

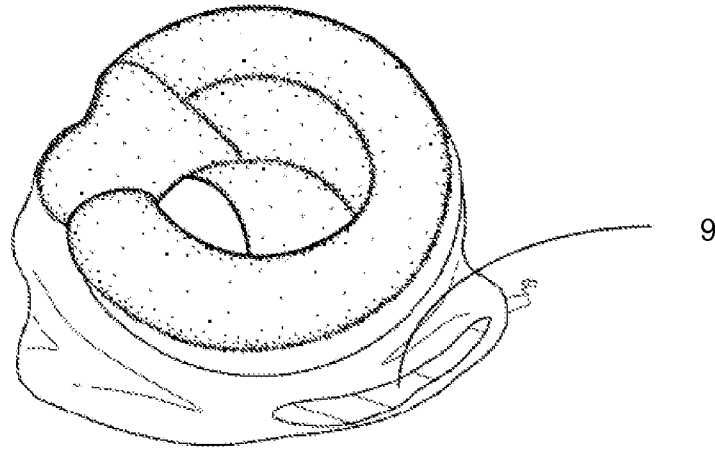


FIG. 6

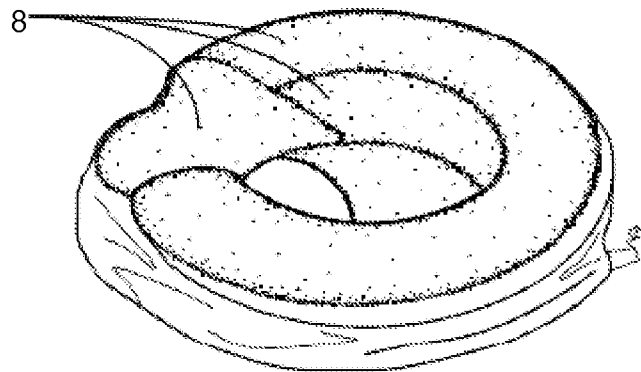


FIG. 7

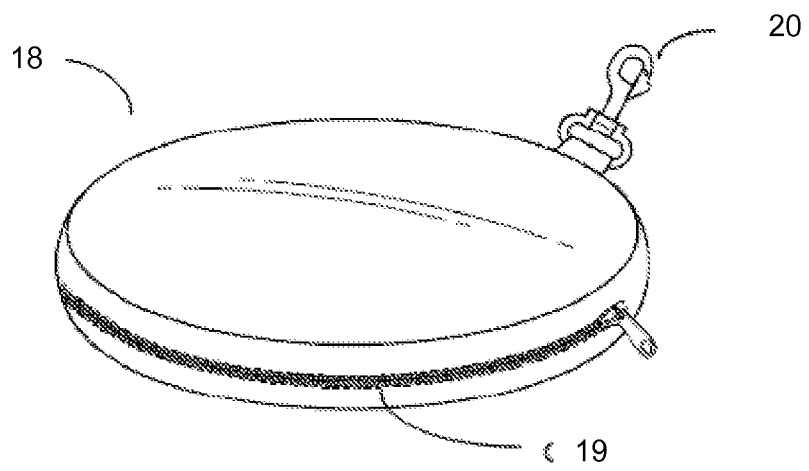


FIG. 8



FIG. 9

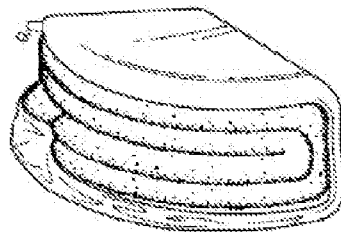


FIG. 10

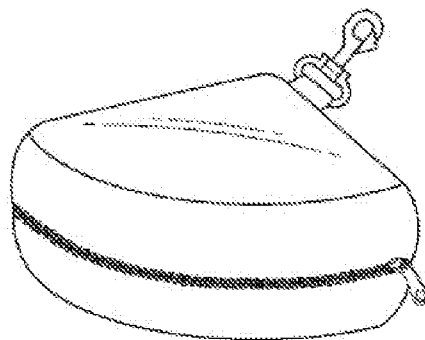


FIG. 11

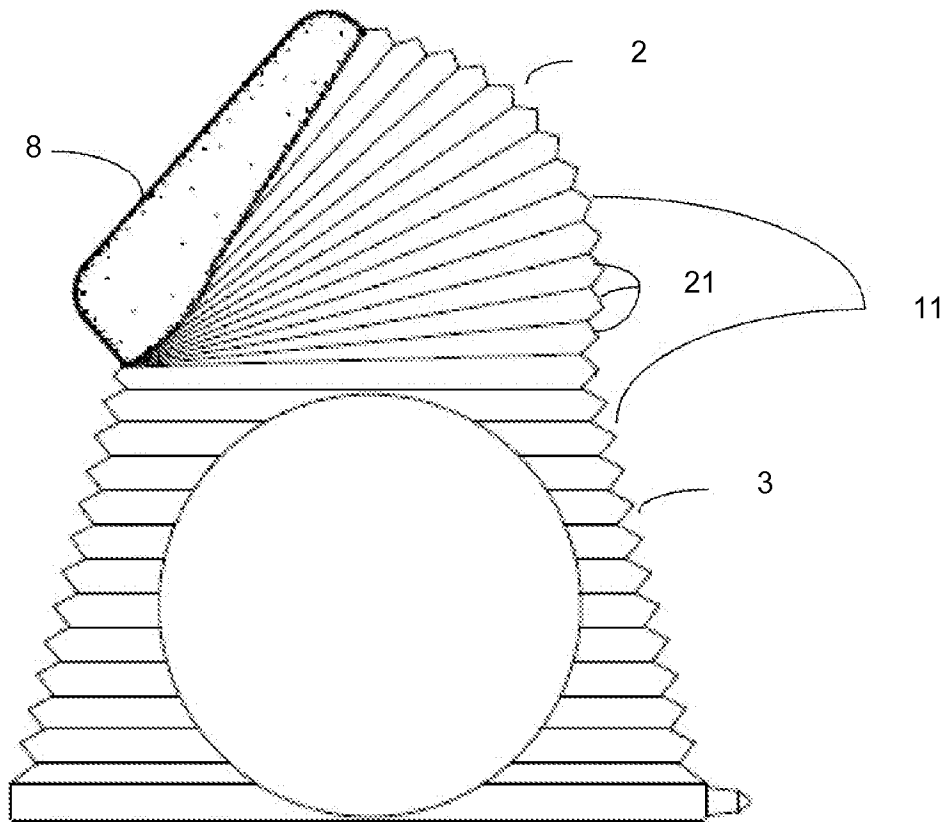


FIG. 12

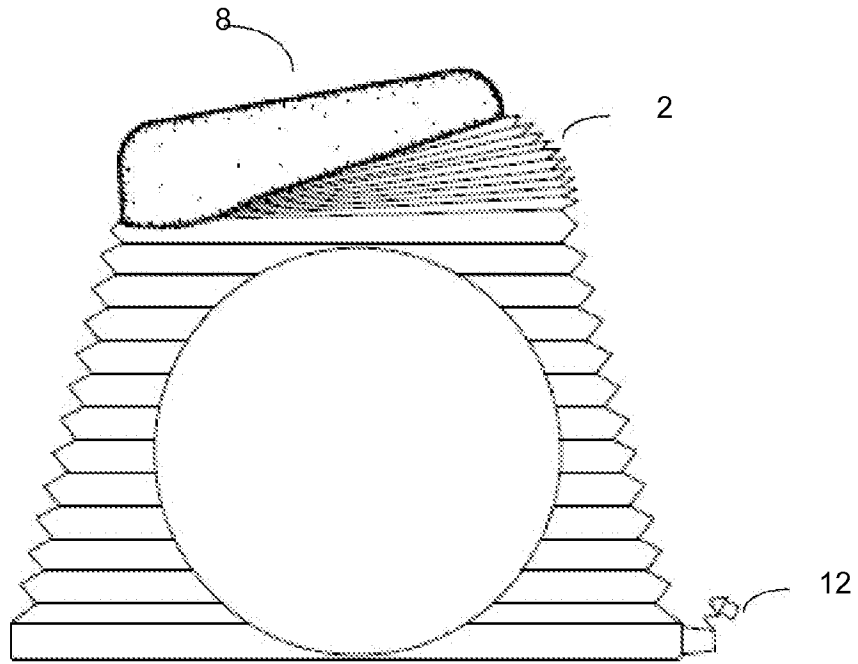


FIG. 13



FIG. 14

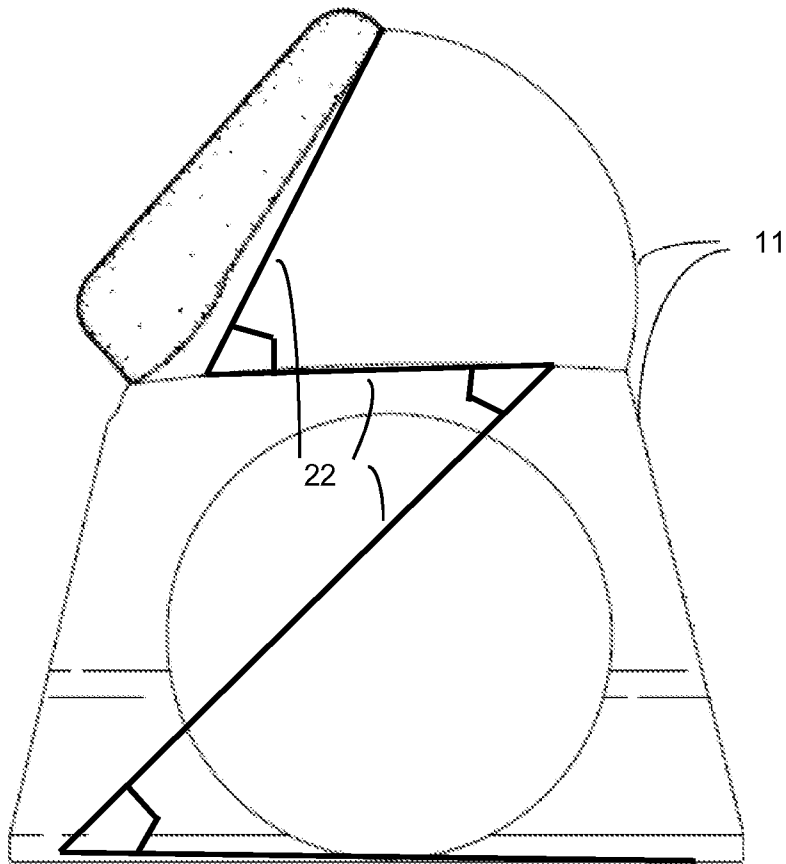


FIG. 15

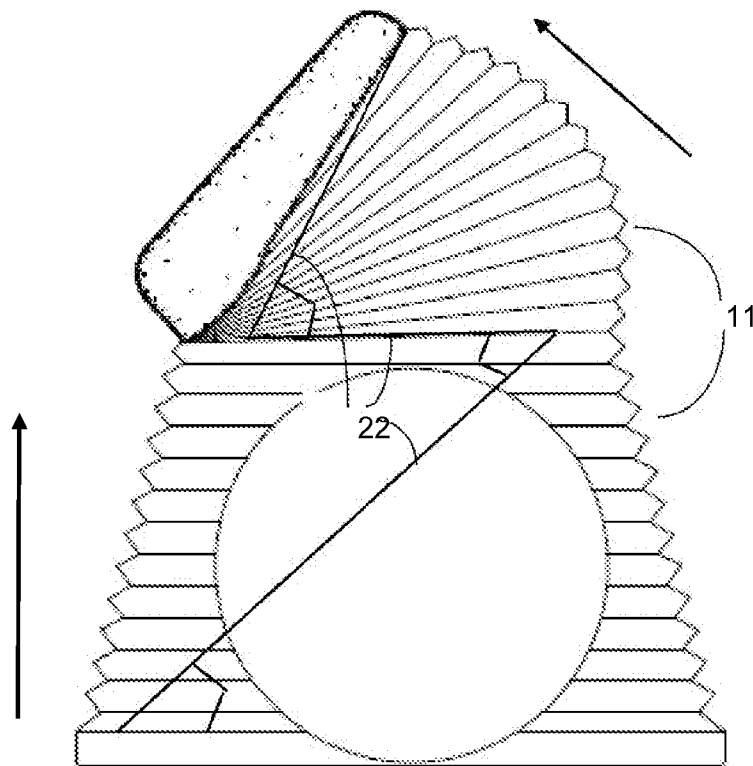


FIG. 16

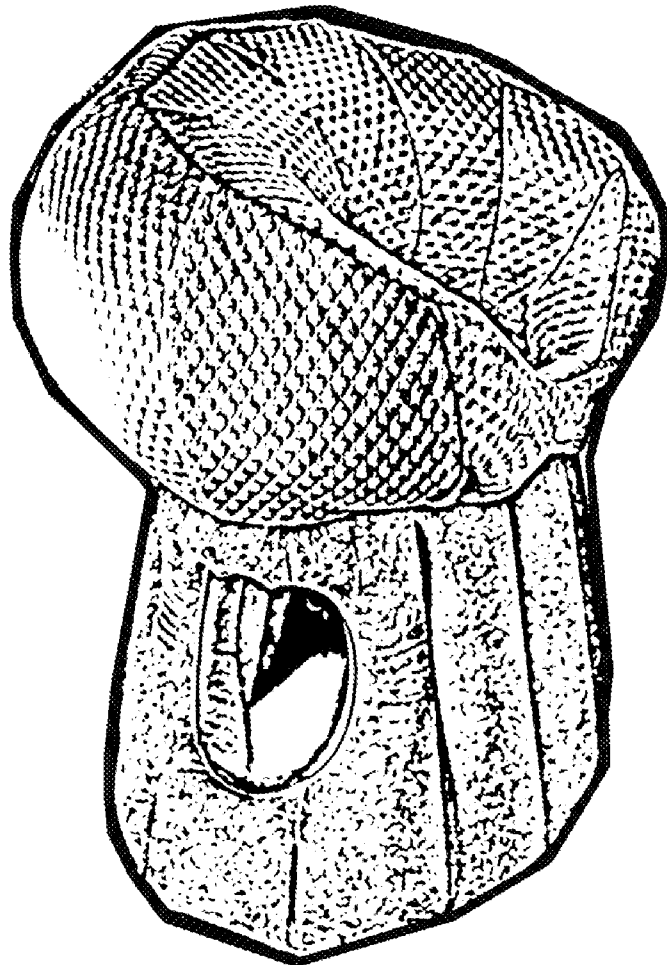
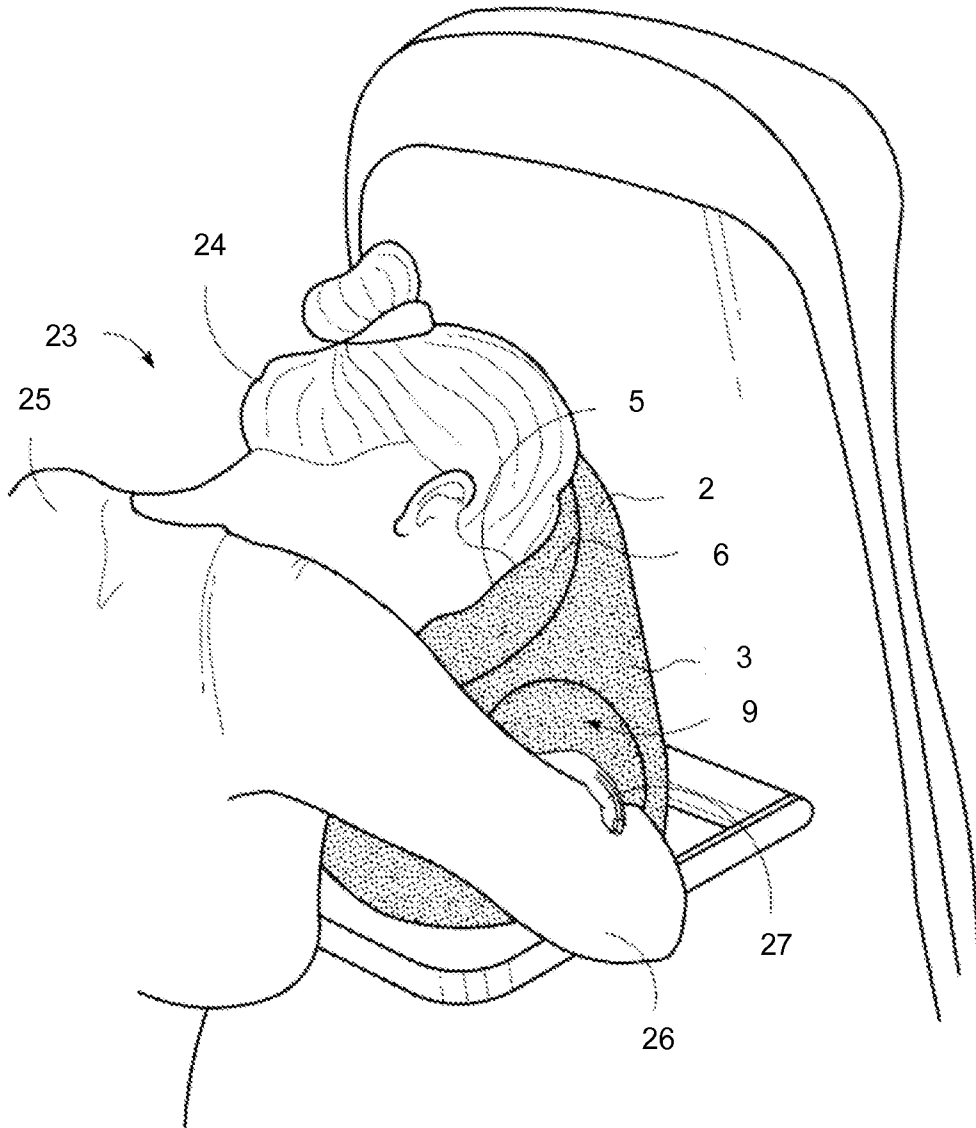


FIG. 17



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2015/062529

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC(8) - A47G 9/10 (2016.01) CPC - A47G 9/1063 (2016.01) According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) IPC(8) - A47G 9/00, 9/10; A61G 7/07 (2016.01) CPC - A47C 16/00, 20/026; A47G 9/10, 9/1027, 9/1063; A61G 7/072, 13/121, 2200/325 (2016.01)		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched USPC - 5/632, 636, 637, 638, 639, 644, 646, 655.3; D6/601 (Keyword delimited)		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) PatBase, Google Patents, Google Scholar, Google Search terms used: face, facial, pillow, cushion, hole, aperture, opening, inflatable, blow up, down, arm, holes, openings, cradle, support		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US D686,026 S (WAGNER) 16 July 2013 (16.07.2013) entire document	1-3
Y	US 2,688,142 A (JENSEN) 07 September 1954 (07.09.1954) entire document	1-3
A	US 2013/0276236 A1 (RASMUSSEN) 24 October 2013 (24.10.2013) entire document	1-3
A	US 2005/0177946 A1 (RILEY) 18 August 2005 (18.08.2005) entire document	1-3
A	US D718,074 S (SAVOLAINEN) 25 November 2014 (25.11.2014) entire document	1-3
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 21 January 2016		Date of mailing of the international search report 04 FEB 2016
Name and mailing address of the ISA/ Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, VA 22313-1450 Facsimile No. 571-273-8300		Authorized officer Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2015/062529

**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3.  Claims Nos. 4-12  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2.  As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

**Remark on Protest**

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.