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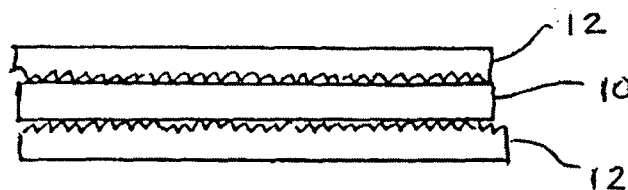
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(54) **Infant mattress**

(57) An infant mattress for underlying an infant is provided. The infant mattress is made of three layers of a foam material; an inner layer (10) comprised of an open or closed cell foam material, preferably urethane, and two outer layers that sandwich the inner layer therebetween, comprised of a visco-elastic foam material (12), preferably urethane. An outer cover surrounds all three layers and is cleanable and anti-microbial. The inner lay-

er is of a less resilient, or stiffer material than the outer layers that are comprised of a visco-elastic material and are slow to spring back upon being indented by the weight of the infant to evenly distribute the weight of the infant. The outer and inner foam layers are preferably secured together by a mechanical retaining means, one of which is a stripe of adhesive located only around the perimeter of the foam layers.

FIG. 3



Description

Background of the Invention

[0001] The present invention relates to a mattress, and, more particularly, to a comfortable mattress for underlying an infant.

[0002] In general, with an infant being treated in an infant apparatus or, for that matter, simply resting on a piece of furniture, such as a crib or the like, it is intended that such infant be maintained in a safe, comfortable environment. To that end, there is normally used an infant mattress that underlies the infant for support and comfort of that infant.

[0003] There are, of course, a number of requirements for an infant mattress, that is, it must not only be comfortable and support the infant, but it also needs to be relatively easy to manufacture in order to be commercially viable and also preferably should be anti-microbial. The mattress should have a support surface that is developmentally friendly and have as few as possible pressure points. At present, many of the existing infant mattresses develop pressure points in certain areas of the body of the infant in contact with the mattress because the mattress does not conform to the body uniformly in distributing the weight of the patient. The pressure points result in discomfort and may produce skin ulcers. As a result, many users of such mattresses use secondary developmentally friendly materials to reduce the pressure points with such mattresses.

[0004] The normal mattress also should have a cover that is cleanable and comprised of an anti-microbial, non-toxic material for the safety of the infant and be cleanable with all of the normal hospital disinfectants and should be liquid resistant and not be permeable to liquid or absorb liquid.

[0005] It would thus be advantageous to have an infant mattress having all of the aforementioned qualities and yet be easy and relatively inexpensive to produce.

Summary of the Invention

[0006] Now, in accordance with the present invention, there is provided an infant mattress that is comprised of a material that is inherently designed to disperse pressure points and evenly distribute the pressure load over a large area of the mattress thereby being a good, developmentally friendly mattress.

[0007] In the construction of the present mattress, there are a plurality of layers of a foam material, that is, there is an inner foam layer comprised of an open or closed cell urethane foam, and with two outer foam layers comprised of a visco-elastic foam material, which also may be a urethane foam. The outer foam layers sandwich the inner foam layer therebetween.

[0008] In the present invention, the outer foam layers are of a visco-elastic material whereby the foam recovers very slowly from an indentation that is made by a body

pressed into the visco-elastic material. As such, with an infant positioned on the mattress, the outer foam layer will more evenly distribute the weight of the infant over the mattress and avoid pressure points. As a feature of the present invention therefore, by having the outer foam layers the same, both visco-elastic having the same properties, the caregiver can place the mattress underneath the infant without the need to make sure a particular side is facing upwardly to receive the infant. The density of the outer foam layers can be in the range of about 1.0 to about 5.0 pounds per cubic foot (16 to 80 kg per cubic metre) with a preferred density of about 3.0 pounds per cubic foot (48 kg per cubic metre).

[0009] On the other hand, the inner foam layer is an open or closed cell foam that has a faster memory such that the material returns rapidly to its original configuration when a body causing an indentation has been removed. The combination of the two outer foam layers having a slow to recover material with the inner foam layer having a more rapid recovery rate brings about the particularly desirable properties of the present mattress. The density of the inner foam layer can be in the range of about 1.0 to about 3.0 pounds per cubic foot (16 to 48 kg per cubic metre) and preferably may have a density of about 1.7 pounds per cubic foot (27 kg per cubic metre).

[0010] Despite the aforementioned relative densities of the inner and outer foam layers, i.e. the outer foam layers have a higher density than the inner foam layer, however, the outer foam layers give more easily than the inner foam layer, the reason being that the outer foam layers are made of the visco-elastic material while the inner foam layer is made of the open or closed cell foam that is actually stiffer, and gives less easily, than the outer foam layer but is a less dense foam material. Accordingly, while the various foam layers can be described by means of their densities, those densities are not indicative of the give or firmness of the foam layers themselves where the different foam layers are or are not visco-elastic.

[0011] The outer foam layers can be preferably mechanically captured and retained to the inner foam layer and that mechanical retaining can be carried out through the use of an adhesive, stitching, Velcro fastening system or other mechanical securing means. In one embodiment, an adhesive is used for the mechanical retaining means and, in the preferred embodiment, the adhesive can be in the form of a stripe of adhesive applied only around the outer periphery of the mating surfaces of the inner foam layer and the outer foam layers, thereby leaving a large center area of the mating surfaces having no adhesive at all. By that technique, the center areas of the inner and outer foam layers are free to move with respect to each other.

[0012] In the embodiment shown, the shape of the mattress is rectangular, with the shorter of the opposite sides being rounded and with the adhesive stripe that is between about 0.25 and 2.5 inches (0.6 to 6.3 cm) in width, preferable about one inch (2.5 cm), surrounding the outer periphery of the mattress. Of course, the mattress may

have other shapes and the adhesive stripe may only extend substantially around the outer perimeter of the mattress. The important feature of the particular affixation of the outer foam layers to the inner foam layer is that with the use of the perimeter adhesive stripe, the abutting inner areas of the various foam layers are free from any adhesive and, therefore, movement is allowed between the various layers of the foam material inwardly of the adhesive stripe. As an alternative, there can be no affixation between the outer foam layers and the inner foam layer.

[0013] As another feature of the present mattress that may be incorporated into the construction, there may be micro-convolutes that are formed on the interior surfaces of the outer foam layers so as to extend inwardly to contact both surfaces of the inner foam layer. As such, the micro-convolutes actually contact the surfaces of the inner foam layer in sandwiching the inner foam layer between the outer foam layers.

[0014] Finally, there is an outer cover that surrounds and encloses the three foam layers and that outer cover is comprised of a material that is anti-microbial, cleanable and non-toxic so as to not harm an infant positioned thereon as well as liquid resistant. The means of securing the outer cover to the layers of foam material can be by a stitching, RF or HF welding, zippering, Velcro fastening system or any other suitable means. The outer cover may be removable for cleaning and can have one side openable so as to facilitate the insertion and removal of the foam layers therefrom.

[0015] The outer cover preferably surrounds the three foam layers or composite foam structure with sufficient clearance around the outer perimeter of the foam layers in order to allow the foam layers to expand when the infant is placed thereon and the expanding perimeter is not restrained by the dimensions of the outer cover. Thus, the layers of foam can freely expand under the deformation imposed by the infant so as to avoid a hammock effect where that expanding perimeter of the foam layers is hampered or restrained by the outer cover.

[0016] Other features of the present infant mattress and method of making the same will become more apparent in light of the following detailed description of a preferred embodiment thereof and as illustrated in the accompanying drawings.

Brief Description of the Drawings

[0017]

Figure 1 is an exploded side view illustrating the layers of foam that are used to make up the present mattress;

Figure 2 is a top view of the mattress of the present invention illustrating the application of the adhesive stripe;

Figure 3 is a side view of the foam layers of the

present invention secured together; and

Figure 4 is a top perspective of the mattress of the present invention and illustrating the outer cover enclosing the composite foam structure.

Detailed Description of the Invention

[0018] Taking, therefore, Fig. 1, there is shown a side, exploded view of the various components that make up the present mattress. As can therefore be seen, there is an inner foam layer 10 and a pair of outer foam layers 12 that basically sandwich the inner foam layer 10 therebetween when the mattress is assembled.

[0019] The materials of the inner and outer foam layers 10, 12 are specially selected to achieve the overall benefit of the mattress of this invention. Accordingly, the inner foam layer 10 is an open or closed cell, elastomeric foam, such as urethane, that is relatively stiffer or less resilient than the outer foam layers 12 and can be comprised of a foam such as North Carolina Foam Ultra Cell UC-17, having a density of about 1.7 pounds per cubic foot (27 kg per cubic metre), a resilience (% rebound) of 59-66 and a total thickness of about 0.75 inches (1.9cm). The range of thicknesses for the inner foam layer 10 can be from about 0.25 inches (0.6 cm) to about 1.0 inch (2.5cm) for suitability as an infant mattress, however, it can be understood that different thicknesses would be expected based upon different uses of the present mattress. Other parameters of the inner foam layer 10 include a specific gravity of 0.015 - 0.08 and insolubility in water. In essence, the inner foam layer 10, being less resilient than the outer foam layers 12, acts as a box spring where there is give and firmness at the same time. While the material having a density of 1.7 pounds per cubic foot (27 kg per cubic metre) has been found to be a preferred density for the inner foam layer 10, other foams having different densities can be used with the present invention and generally include densities that may be within the range of about 1.0 to about 3.0 pounds per cubic foot (16 to 48 kg per cubic metre).

[0020] The outer layers 12 are each comprised of the same material and thickness and therefore provides the advantage that the caregiver can position the mattress of the present invention with either side facing upwardly and be assured that the conditions and flexibility of the mattress are the same for the infant in either orientation.

[0021] One foam material that has been found applicable for the outer foam layers 12 is North Carolina Foam Convoluted AVE3010, having a density of 3.0 +/- 0.20 pounds per cubic foot (48±0.3 kg per cubic metre) and a resilience (% rebound) of 8-16. The thickness of the outer foam layers 12 for an infant mattress can be about 0.5 inches (1.3cm) with a range of 0.25 to 0.75 inches (0.6 to 1.9cm) applicable, however, as stated, the actual dimensions would depend on the particular application for the mattress. Again, the material herein described as usable for the outer foam layer 12 is a visco-elastic foam,

and may be urethane, having a specific gravity of 0.015 - 0.08 and be insoluble in water. While the material having a density of 3.0 pounds per cubic foot (48 kg per cubic metre) has been found to be a preferred density, other foams having different densities can be used with the present invention and generally within the range of about 1.0 to about 5.0 pounds per cubic foot (16 to 80 kg per cubic metre).

[0022] As can also be seen in Fig. 1, there are a series or plurality of micro-convolutes 14 formed on the interior surfaces 16 of each of the outer foam layers 12. The micro-convolutes 14 can be conical in shape and taper inwardly in the direction of the inner foam layer 10 and act as tiny springs that allow the infant's weight to be dispersed more evenly over the surface on which the infant is positioned. Also, by facing the micro-convolutes inwardly toward the inner foam layer 10, the exterior surfaces 18 of the outer foam layers 12 are smooth to the infant. Alternatively, the use of micro-convolutes can be eliminated such that the interior surfaces 16 of the outer foam layers may be flat, relatively planar surfaces.

[0023] Turning now to Fig. 2, taken along with Fig. 1, there is shown a top view illustrating an outer foam layer 12 enclosing an inner foam layer 10. There can be seen in Fig. 2, an adhesive stripe 20 that is placed on the interior surface 16 of the outer foam layer 12, or alternatively, on the exterior surface 17 of the inner foam layer 10 and the adhesive stripe 20 surrounds the peripheral edge or perimeter of the outer foam layer 12. In Fig. 2, the adhesive stripe 20 surrounds the entire perimeter of the outer foam layer 12, however, it is understood that the adhesive stripe 20 may only be placed substantially around the perimeter of the outer foam layer 12. In the embodiment shown and used for an infant mattress, the adhesive stripe 18 is preferably from about 0.25 inches (0.6cm) to about 2.5 inches (6.4 cm) in width and, more preferably, about 1 inch (2.5cm) in width and can be sprayed on to the appropriate surface or applied by other means.

[0024] By the use of an adhesive stripe 18 that extends around the perimeter of the outer foam layers 12, or inner foam layer 10, the interior surface 16 of the outer foam layer 12 and the corresponding interior facing surface of the inner foam layer 10 are free from any adhesive and, therefore, there is movement that is allowed between the inner and outer foam layers 10, 12 inwardly of the adhesive stripe 20. As such, the interior portions 21 of the foam layers have no adhesive, thereby allowing the foam layers to react to the weight load of the infant being exerted thereon without being bound by any other mechanical means except for surface contact friction.

[0025] The use of an adhesive stripe is to mechanically retain the outer foam layers 12 to the inner foam layer 10 however other means may be used to mechanically retain the foam layers together such as stitching, Velcro fastening system or other mechanical means. In a further embodiment, there may be no mechanical retaining means between the outer layers and the inner layer.

[0026] Turning briefly to Fig. 3, there is shown a side view of the completed assembly of the composite foam structure comprising the three foam layers made up of the inner foam layer 10 and the two outer foam layers 12 sandwiching the inner foam layer 10 therebetween.

[0027] Turning now to Fig. 4, there is shown a perspective view of the present infant mattress illustrating the outer cover 22 that encloses the three foam layers shown in Fig. 3. As explained, the outer cover 22 is intended to enclose the composite foam structure made up of the three foam layers of Fig. 3 in forming the eventual mattress. One suitable material for the outer cover 22 is Darterex P091 Polyamide fabric (polyurethane transfer coating on a weft knitted fabric) and is chosen for its properties of being washable, dry cleanable, and is capable of being HF welded. Other comparable material can, of course, be used for the outer cover 22. The material for the outer cover 22 should also be non-toxic and anti-microbial so as to be safe for the contact with an infant and therefore be skin friendly or irritation free and can be coated with an anti-fungal and antibacterial coating.

[0028] In the application surrounding the foam layers 10, 12, i.e. the composite foam structure, it is also preferred that the outer cover 22 be a loose fit surrounding those foam layers, that is, the outer cover 22 should be fabricated and dimensioned so that the outer cover 22 is not tight around the inner and outer foam layers 10, 12 enclosed therein. As such, the dimensions of the outer cover 22 are such that there is a sufficient space surrounding the outer perimeter of the foam layers 10, 12 such that the outer cover 22 is not taut on the surface and act like a hammock when the infant is placed on the mattress. The looseness of the outer cover 22 allows the foam layers 10, 12 to perform the function of weight distribution and elimination of pressure points without the outer cover 22 causing any considerable effect on the intended performance.

[0029] As one way of assuring such looseness, the outer cover 22 should be sufficiently loosely fitted over the foam layers 10, 12 such that when the infant is placed on the mattress, the normal expansion of the perimeter dimensions of the foam layers 10, 12 due to the depression created by the weight of the infant will not be constrained by the outer cover 22 such normal perimeter expansion of the foam layers 10, 12 can readily take place.

[0030] The outer cover 22 can be closed about the foam layers 10,12 by means such as stitches that surround the mattress as shown in Fig. 4 or there may be an opening 24 in the outer cover 22 to enable the foam layers 10, 12 to be readily inserted into and removed from the outer over 22. The opening 24 may be secured by means such as a zipper, a Velcro closure system or other similar means.

[0031] Accordingly, as now constructed, the present mattress is comprised of an inner foam layer 10 comprised of a open or closed cell foam material and a pair of outer foam layers 12 comprised of a visco-elastic foam

material having less stiffness than the inner foam layer 10 and the composite foam layers 10, 12 are encased in a outer cover 22 of a particular material to achieve the advantages of the present invention.

[0032] While the present invention has been set forth in terms of a specific embodiment or embodiments, it will be understood that the present infant mattress and method of making the same herein disclosed may be modified or altered by those skilled in the art to other configurations. Accordingly, the invention is to be broadly construed and limited only by the scope and spirit of the claims appended hereto.

Claims

1. An infant mattress for underlying an infant, said infant mattress comprising an inner foam layer, a pair of outer foam layers that are located on each side of the inner foam layer sandwiching the inner foam layer therebetween, said outer foam layers comprised of a visco-elastic foam material and an outer cover loosely enclosing the three layers within the outer cover.

2. The infant mattress as defined in claim 1 wherein the inner foam layer is less resilient than the outer foam layers.

3. The infant mattress as defined in claim 1 wherein the density of the outer, visco-elastic foam layers is between about 1.0 and 5.0 pounds per cubic foot (16 to 80 kg per cubic metre).

4. The infant mattress as defined in claim 1 wherein the density of the inner foam layer is between about 1.0 and 3.0 pounds per cubic foot (16 to 48 kg per cubic metre).

5. The infant mattress as defined in claim 1 wherein the outer foam layers are affixed to the inner layer by means of an adhesive in a pattern.

6. The infant mattress as defined in claim 5 wherein the adhesive pattern is a stripe of adhesive at least substantially along the perimeter of the outer and inner foam layers.

7. A method of constructing an infant mattress comprising the steps of:

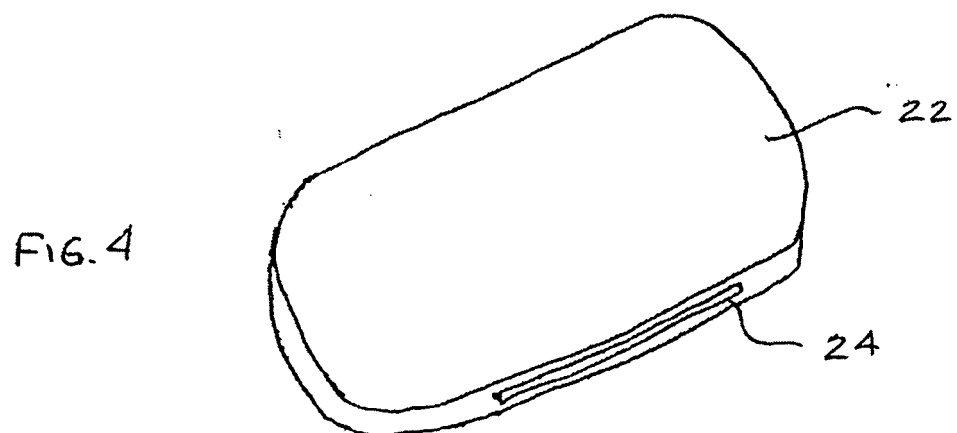
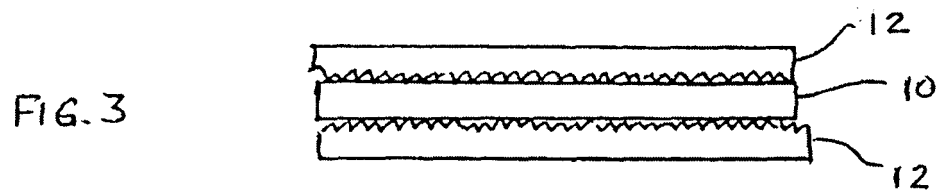
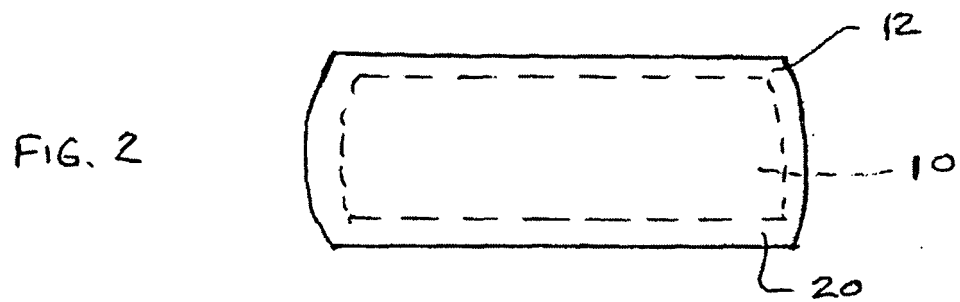
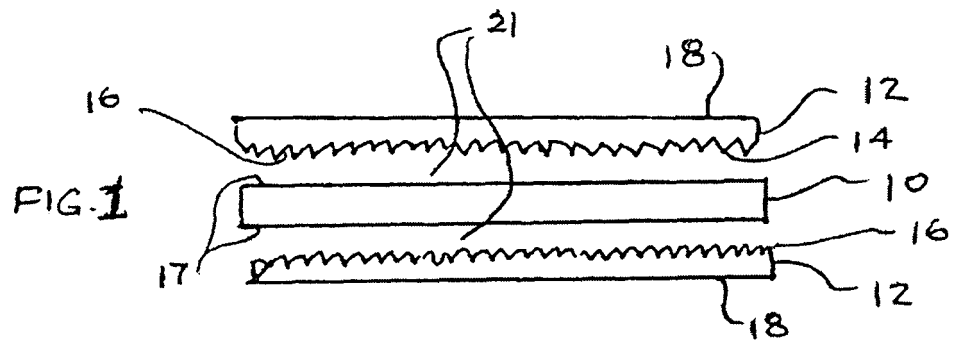
providing an inner foam layer comprised of a open or closed cell foam material;
providing a pair of outer foam layers comprised of a visco-elastic foam material;
mechanically affixing the outer foam layers to the inner foam layer to sandwich the inner foam layer between the pair of outer foam layers;

providing an outer cover, and
enclosing the inner foam layer and the outer foam layers affixed thereto within the outer cover.

8. The method of claim 8 wherein the step of mechanically affixing the outer foam layer to the inner foam layer comprises applying a stripe of adhesive at least substantially around the outer perimeter of the outer foam layers or the inner foam layer.

9. A composite foam structure comprising an inner foam layer of an open or closed cell foam material having a predetermined resilience, a pair of outer foam layers that are located on each side of the inner layer sandwiching the inner foam layer therebetween, said outer foam layers comprised of a visco-elastic foam material.

10. The composite foam structure as defined in claim 9 wherein the outer foam layers are affixed to the inner layer by means of a stripe of an adhesive material provided at least substantially along the outer perimeter of the outer foam layers or the inner foam layer.





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EUROPEAN SEARCH REPORT

Application Number
EP 06 25 0127

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	GB 2 244 000 A (* S.TEASDALE; * S TEASDALE) 20 November 1991 (1991-11-20) * abstract * * page 4 - page 6 * * figures 1,2 *	1-5,7-10	INV. A47C27/14
X	----- US 6 541 094 B1 (LANDVIK DAG ET AL) 1 April 2003 (2003-04-01) * abstract * * column 2, line 40 - column 3, line 5 * * figures 5-7 *	1,7,9	
X	----- US 3 939 508 A (HALL ET AL) 24 February 1976 (1976-02-24) * abstract * * column 1, line 53 - column 2, line 34 * * figures 1-3 *	1,7,9	
Y		2	
Y	----- US 3 047 888 A (SHECTER GEORGE O ET AL) 7 August 1962 (1962-08-07) * column 2, line 35 - column 2, line 40 * * column 3, line 16 - column 3, line 32; figures 1-4 *	2	TECHNICAL FIELDS SEARCHED (IPC)
A	----- US 6 601 253 B1 (TARQUINIO PETER) 5 August 2003 (2003-08-05) * column 2, line 34 - column 3, line 12 * * figures *	1-10	A47C
A	----- FR 2 848 817 A (PRAXIS MEDICAL TECHNOLOGIES [FR]) 25 June 2004 (2004-06-25) * abstract; figure 1 *	1-10	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 26 April 2006	Examiner MacCormick, D
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 06 25 0127

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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26-04-2006

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