Nov. 17, 1953

O. A. BERMAN

2,659,418

CUSHION OR THE LIKE

Filed Feb. 9, 1952

2 Sheets-Sheet 1

FIG. 1.

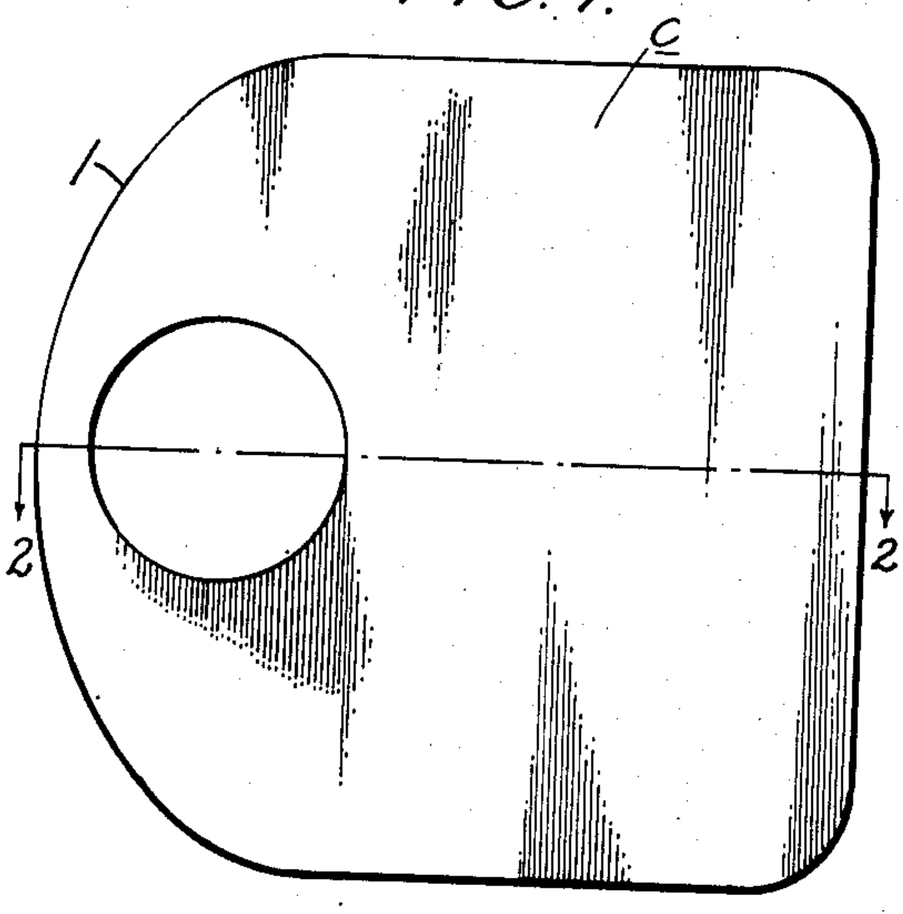


FIG. 3.

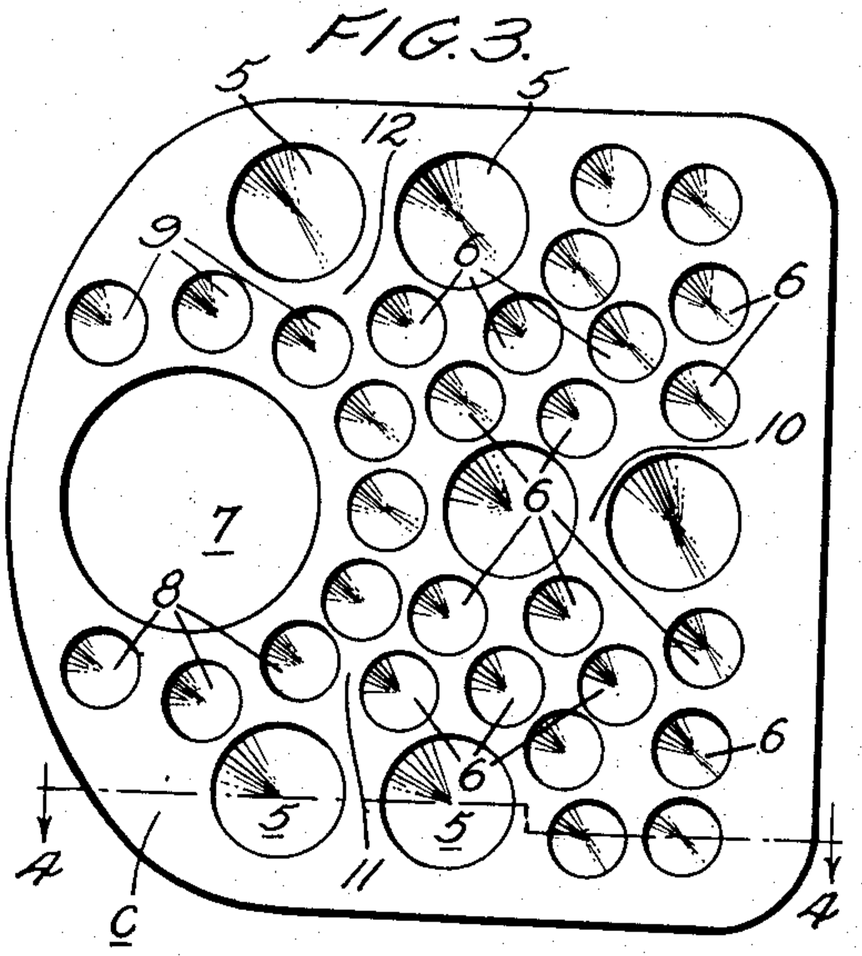


FIG. 2.

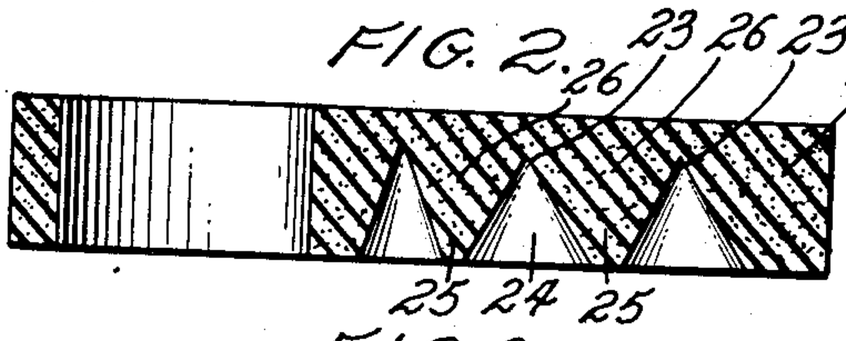


FIG. 4.

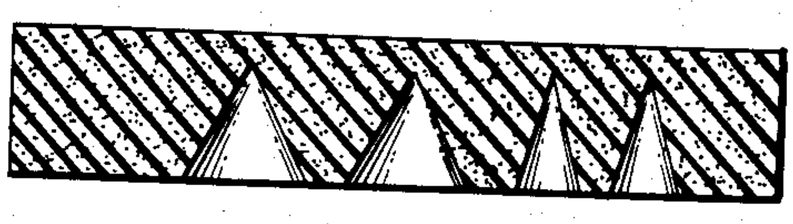


FIG. 6.

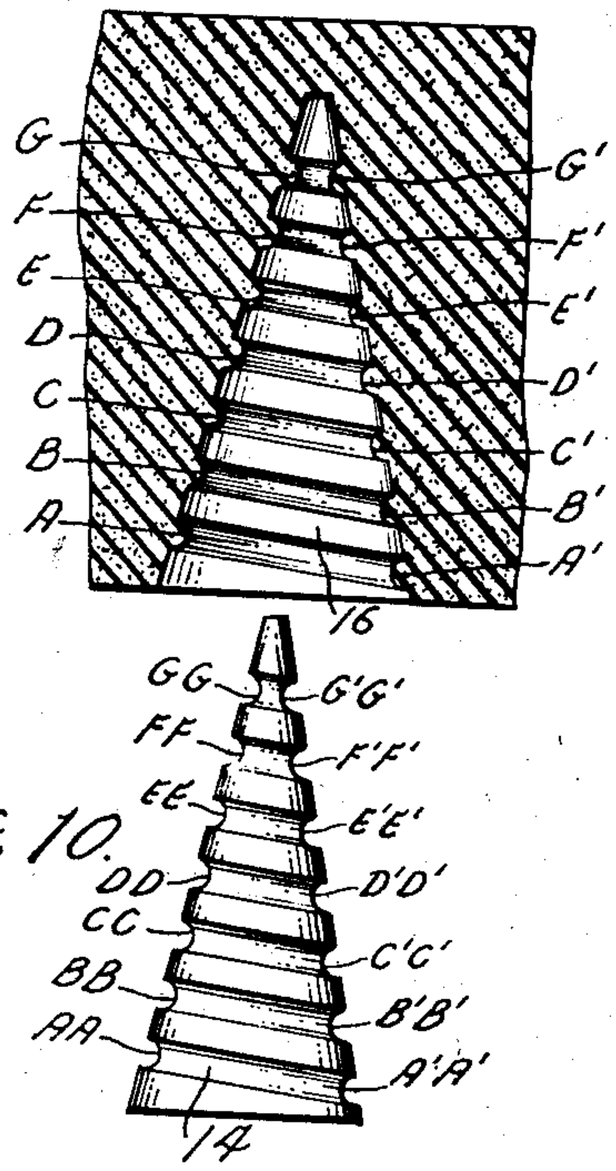


FIG. 10.

FIG. 5.

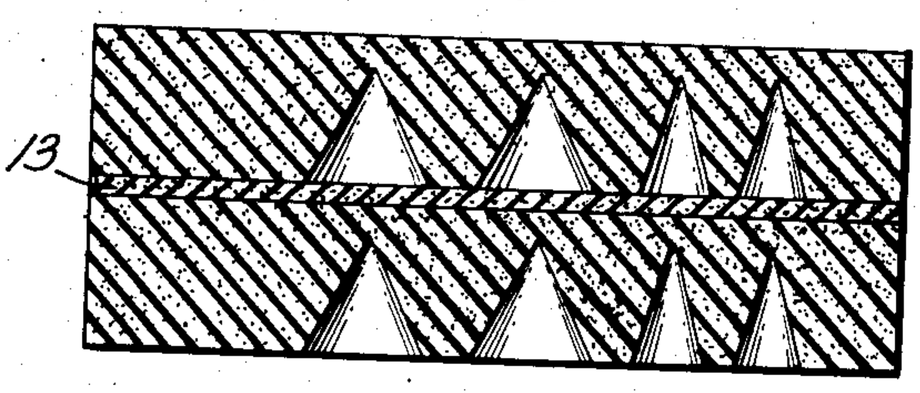
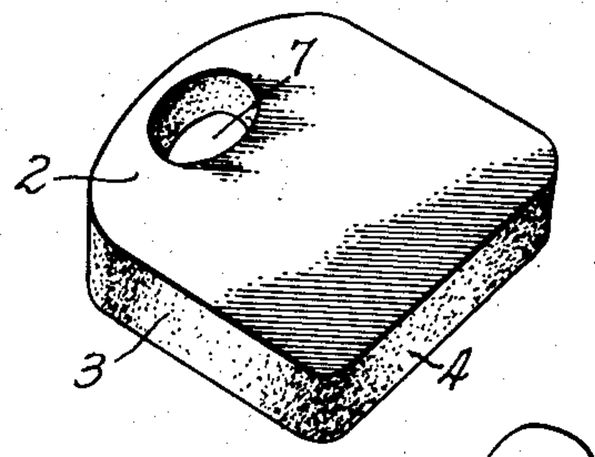
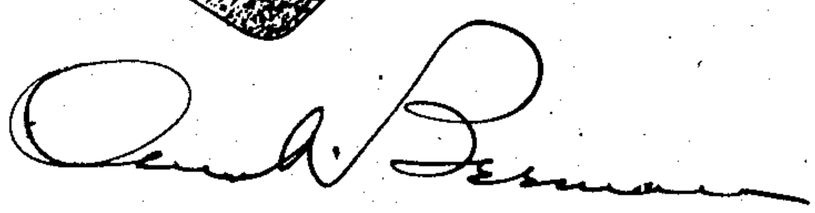


FIG. 17.



INVENTOR



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CUSHION OR THE LIKE

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FIG. 7.

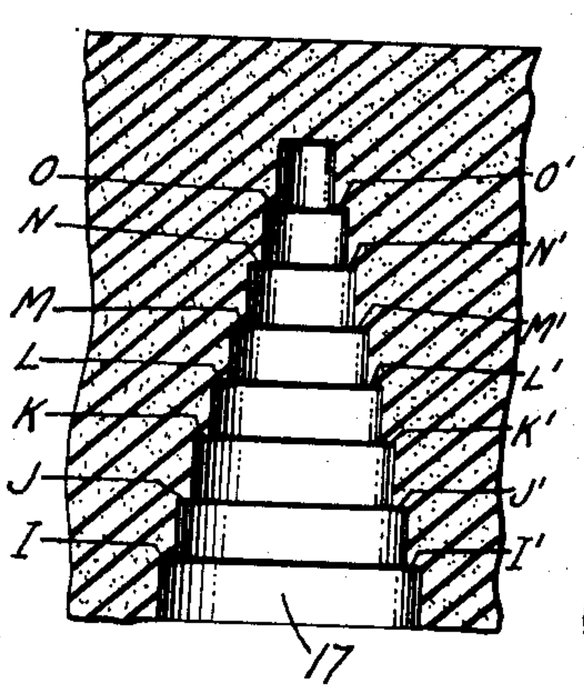


FIG. 8.

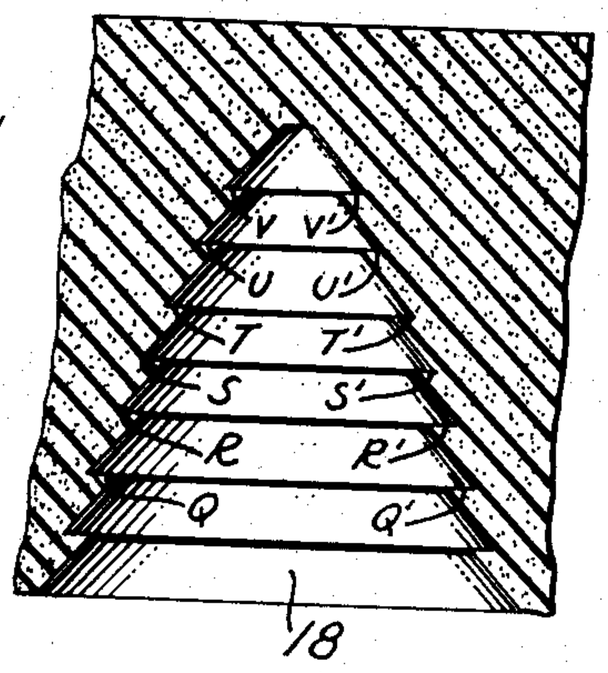


FIG. 9.

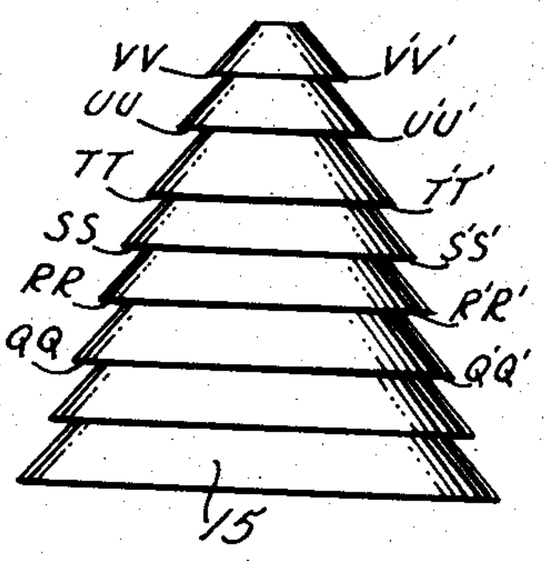


FIG. 11.

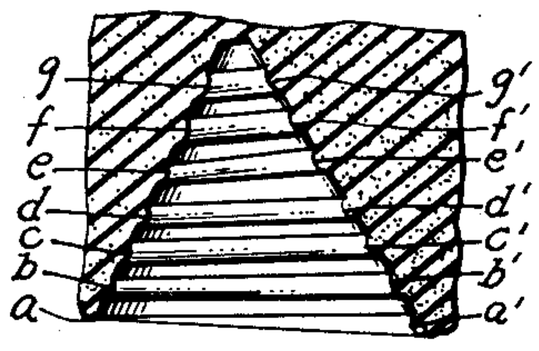


FIG. 12.

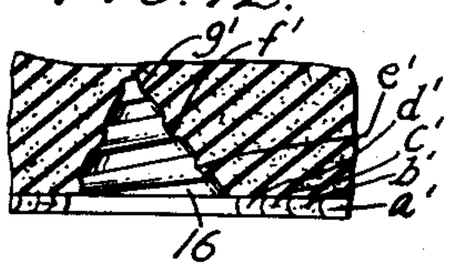
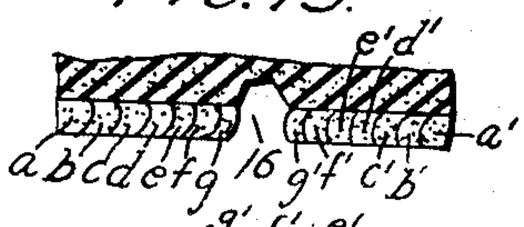


FIG. 13.



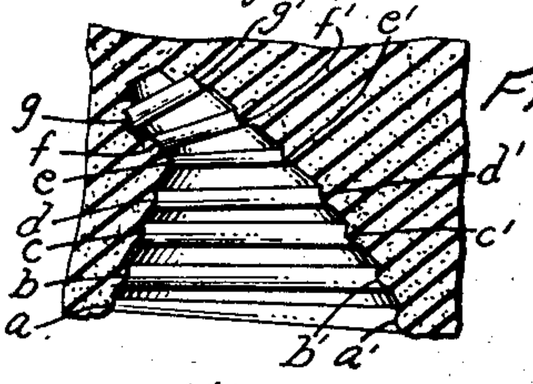


FIG. 14.

FIG. 15.

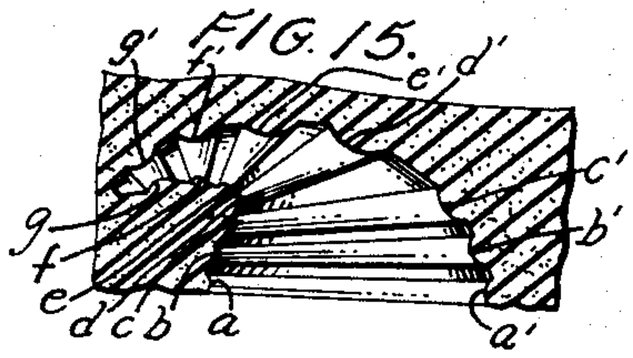


FIG. 16.

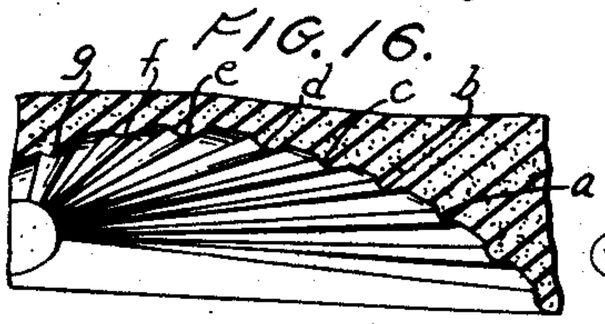


FIG. 19.

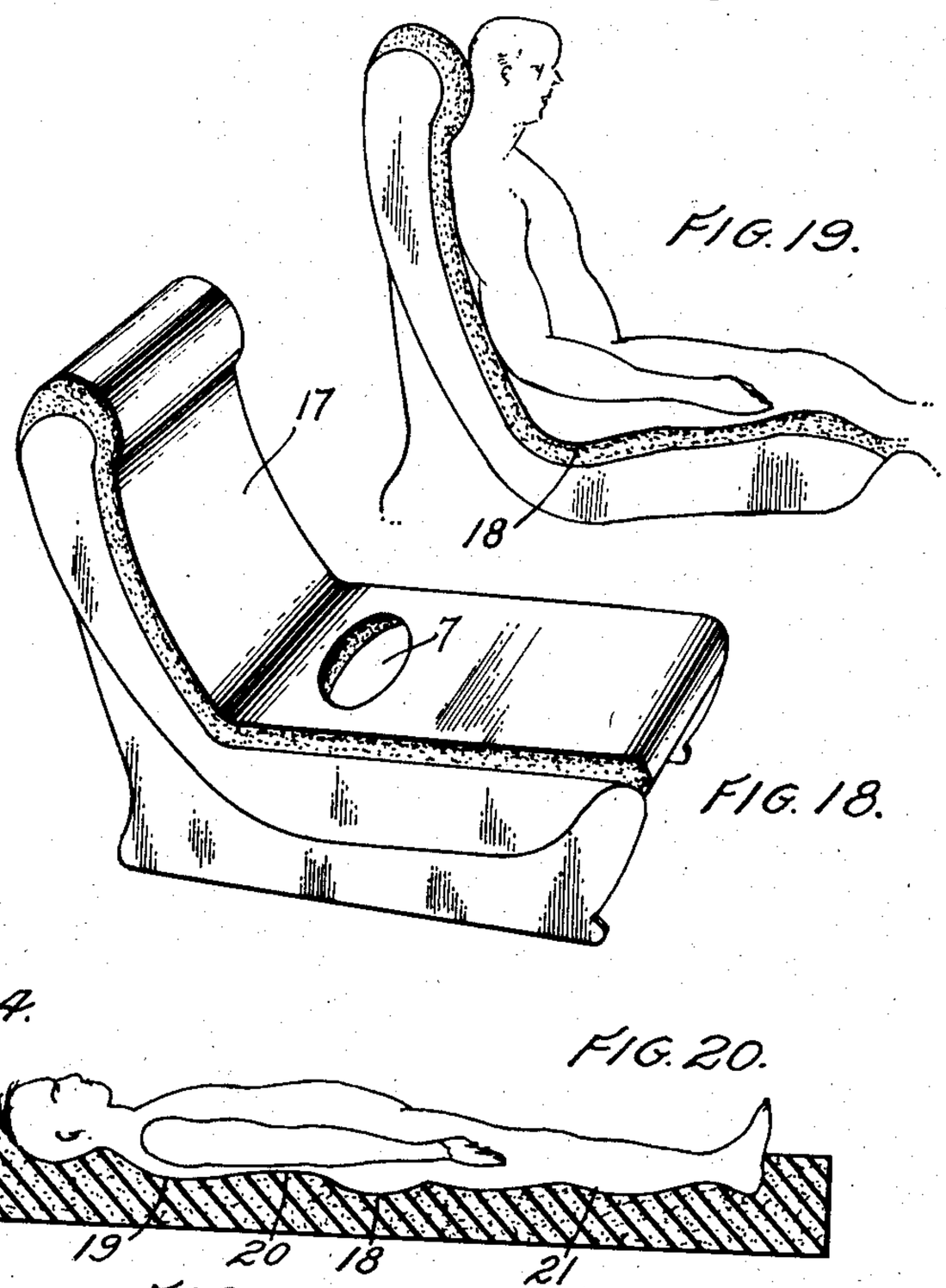


FIG. 18.

FIG. 20.

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Patented Nov. 17, 1953

UNITED STATES PATENT OFFICE

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CUSHION OR THE LIKE

Oscar A. Berman, New York, N. Y.

Application February 9, 1952, Serial No. 270,799

7 Claims. (Cl. 155—179)

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This invention relates to cushions, and particularly to health cushions or the like, adapted to provide maximum relaxation.

Heretofore the maximum amount of softness, elasticity and resiliency in such objects has been achieved through the use of cylindrical cavities or horizontal channels in a cellular web body, these cavities or channels reducing the resiliency of the web and adding to the lightness of the object. But neither cylindrical cavities or horizontal channels or a combination or variation of them have afforded the greatest degree of comfort.

In the case of cylindrical cavities, compression increases the density of the cellular web until it forms hard rings around soft centers so that one sitting or lying thereon feels like he is sitting or lying on a plurality of hard annular formations. In the case of horizontal channel, there is a similar result except that the hard formations are elongated.

This presents the problem of finding a way to retain all the advantages of cylindrical cavities or horizontal channels, and at the same time avoid the undesirable hard formation that is not conducive to comfort.

The present invention solves that problem by means of non-cylindrical cavities that under compression avoid the formation of rings or ridges.

It is therefore, a primary object of this invention to provide a cushion that will remain uniformly soft under varying degrees of pressure without a semblance of hard formations such as are incident to cylindrical cavities or horizontal channels.

Another object of the present invention is to combine with the comfort provided by the aforementioned means, in a single integral device, the additional comfort that results from avoiding even the slightest pressure on the "tail-bone" of a person sitting on a cushion made with the aforementioned non-cylindrical cavities.

Some resilient cushions tend to lose their resiliency and supporting power in the degree that pressure is applied. If the cushion is made harder and more resilient to provide greater resistance to pressure, it is less comfortable and hence less desirable. On the other hand, a soft cushion, not being possessed of extreme resiliency, does not provide as satisfactory a support as does the harder cushion. The central portion of the body of the cushion is, of course, subject to greater pressure as the cushion is used.

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By means of this invention, it is possible to provide the resiliency of a hard cushion while at the same time retaining the comfort of a soft cushion, and it is an object of the invention to provide an increase in resiliency automatically with the increase in pressure due to application of weight on the top of the cushion, without reducing the softness or comfort thereof.

It is a further object of my invention to provide a cushion which is characterized by the provision of a relatively thick layer of a material known as foamed latex sponge, for cushioning purposes. The material itself may be of the class of materials represented by the disclosures of the patent to Chapman et al., No. 1,852,447, and the patent to Shidrowitz, No. 1,156,184, and comprising, generally speaking, a body of cushioning material interposed between the outer top covering of the cushion and the base of the non-cylindrical cavities, and of such nature as to resiliently yield to variations in pressure due to the weight of a person thereon.

The material is specially characterized by being formed from rubber latex, and is honeycombed with miniature cells disposed throughout its mass, said cells normally containing air, and the cells being constrictedly interconnected through breaks in their walls, whereby air is expelled from such of the cells in proportions of the body where increase in pressure occurs, and whereby, due to the resilient nature of the materials, other cells in other portions of the body where, at the moment pressure is being or has been reduced, air is drawn into such cells. In other words, during use, different portions of the cushioning body are caused to pump air into and out of the cushioning material, as pressure is exerted by the weight of a person during various movements of the body.

Another object of my invention is to provide a cushion that will afford a supporting surface to closely conform to the glutaeus maximus and adjacent biceps femoris or biceps flexor cruris, constituting the buttocks and forward contiguous parts of the human body by balanced resiliency.

My invention comprehends a cushion that will not only afford maximum comfort, but also is relatively light in weight, easily covered and will conduct and radiate the heat of the body occupying the cushion.

It is another of my invention to provide an improved bed, chair or similar body resting appliance having a relatively yielding surface with respect to the curvature of selected portions of the posterior aspect of the body of the user includ-

ing the shoulders, spine and legs, in which the said surface is resiliently supported to provide additional comfort to the user.

Now it becomes apparent that if a cushion is soft all over, the weight of the body will cause the ischial tuberosities of the pelvis to sink into the face of the cushion so far that the center of the cushion will be formed upward under the coccyx with the result that part of the weight of the body is supported on the small triangular bone forming the lower extremity of the spinal column, thereby forcing the four ankylosed rudimentary vertebrae to assume an improper position for correct posture.

On the other hand, if a cushion is hard all over, the weight of the upper portion of the body rests directly upon the coccyx, thereby transmitting pressure on the lower part of the spine, forcing the spine to assume an improper position for correct posture.

The problem posed, therefore, is how to overcome the disadvantages of a cushion either soft or hard all over. The present invention solves that problem by providing comparatively hard support for the ischial tuberosities of the pelvis and the contiguous thigh portions with an opening under the coccyx so that no pressure can be transmitted to the so-called "tail-bone."

Another object of my invention is to provide an improved cushion of the character described, which is adapted to be placed upon any type of living room chair to make it more comfortable for sitting than any expensive contour chair particularly built to provide a special degree of relaxation.

Another object of my invention is to provide a novel and highly improved cushion of the character described, which shall be provided in the form of a single unit with graduated resilience to provide the greatest possible comfort.

A further object of my invention is to provide a cushion which shall represent a substantial improvement in the art, that is, a cushion construction which will be simple in structure, economical of manufacture, durable, easily and quickly assembled, and highly efficient for the purpose for which it is intended.

It is also an object of the invention to provide a cushion construction in which lumping and undesirable features resulting therefrom will be avoided.

Another object of the invention is the provision of a cushion which will retain its shape indefinitely and be possessed of a comparatively long life.

Another object of the invention is the provision of a cushion construction which will be comfortably yieldable also to persons of other than average sizes and weights, so that varying degrees of flexibility may be obtained for all types of physiques.

Another object of the invention is the provision of a cushion comprising a plurality of non-cylindrical cavities so constructed and arranged as to provide a maximum amount of movement while at the same time retaining their operative relation.

Another object of the invention is the provision of non-cylindrical cavities which aid in resisting the impact of the weight of the body of a person sitting or lying down thereon and automatically distributing the weight imposed on different portions of the cushion.

Other objects and advantages reside in the details of construction and operation as more fully

hereinafter described and claimed, reference being had to the accompanying drawings forming part hereof, wherein like numerals refer to like parts throughout, and in which:

In Figure 1 is shown the opening in which floats the "tail-bone" of a person sitting on the cushion.

In Figure 2 is shown a cross-sectional view taken along the line 2—2 of Figure 1.

In Figure 3, the bottom plan view shows the opening 7, with relation to cavities 5, 6, 8 and 9.

In Fig. 4 is shown a cross-sectional view taken along the line 4—4 of Fig. 3.

In Figure 5, the fragmentary cross-sectional view shows two single thickness cushions joined by a central layer of foam rubber 13, cemented together to provide a cushion of double thickness.

In Figure 6 is shown a cross-sectional view of a generally conical cavity 16, with spiral protuberances A, B, C, D, E, F, G and A′, B′, C′, D′, E′, F′ and G′.

In Figure 7 is shown a cross-sectional view of a generally conical cavity 17, with parallel protuberances I, J, K, L, M, N, O and I′, J′, K′, L′, M′, N′ and O′.

In Figure 8 is shown a cross-sectional view of a generally conical cavity 18 with ratchet protuberances Q, R, S, T, U, V and Q′, R′, S′, T′, U′ and V′.

In Figure 9 is shown a perspective view of a generally conical plug 14, with a spiral trough AA, BB, CC, DD, EE, FF, GG and A′A′, B′B′, C′C′, D′D′, E′E′, F′F′ and G′G′.

In Figure 10 is shown a perspective view of a generally conical plug 15, with ratchet troughs QQ, RR, SS, TT, UU, VV and Q′Q′, R′R′, S′S′, T′T′, U′U′ and V′V′.

In Figure 11 is shown a view of a non-cylindrical cavity 16 with spiral protuberances *a*, *b*, *c*, *d*, *e*, *f*, *g* and *a′*, *b′*, *c′*, *d′*, *e′*, *f′* and *g′* in the first stages of vertical compression.

In Figure 12 is shown a cross-sectional view of the same cavity 16, in a further stage of vertical compression.

In Figure 13 is shown a cross-sectional view of the same cavity 16, in a still further stage of vertical compression.

In Figure 14 is shown a cross-sectional view of the same cavity 16, in the first stages of combined vertical and lateral compression.

In Figure 15 is shown a cross-sectional view of the same cavity 16, in a further stage of combined vertical and lateral compression.

In Figure 16 is shown a cross-sectional view of the same cavity 16, in a still further stage of combined vertical and lateral compression.

In Figure 17 is shown a perspective view of the opening 7, in which floats the "tail-bone" of a person sitting on said cushion.

In Figure 18 is shown a perspective view showing the application of my invention to a posture chair 17.

In Figure 19 is shown the configuration of my cushion to the body of a person sitting thereon, whereby the buttocks 18, and contiguous parts rest in balanced resiliency.

In Figure 20 is shown the configuration of my cushion to the body of a person lying thereon, whereby the shoulders 19, spine 20, buttocks 18, and legs 21, are resiliently supported to provide maximum relaxation and comfort.

Referring now to the drawings in detail, wherein for the purpose of illustration I have disclosed a preferred embodiment of the invention, the letter C designates generally the cushion

which is composed of a plurality of non-cylindrical cavities, surrounded by a web, and an opening in the web, including a border row of relatively large cavities 5, a front group of cavities 6, an opening 7, in the center of the rear portion, and a group of non-symmetrical cavities 8 and 9 on either side of the opening 7. These cavities may vary in size and shape to provide varying degrees of resiliency.

A cushion embodying the invention is preferably made of segments of sponge rubber, or of foamed or frothed rubber latex, which is commonly prepared either by whipping a compounded latex containing a foaming agent into a foam or stirring the compounded latex into a separately prepared foam, the mixture or compound then being molded and vulcanized in the desired shape. In the drawing the cushion is shown as of the conventional cushion shape and is composed of either a single unit as shown in Figure 1, or of two identical mating half sections, as shown in Figure 5. The cushion is made of foamed latex, and has an infinite number of tiny intercommunicating cells which permit air circulation throughout the mass for ventilation, also to contribute to the "hysteresis" properties of the cushion. The two half sections are preferably cemented to opposite sides of a latex sheet, and in the embodiment shown, the latex sheet is the vertical medial longitudinal plans of the cushion.

Each half section is molded with corresponding cored out non-cylindrical cavities 6, 7, 8 and 9, arranged in groups with walls 10, 11 and 12, intermediate the non-cylindrical cavities. The cored-out cavities 6, 8 and 9 are of different diameters depending on their positions.

As shown in Figure 5, the non-cylindrical cavities 6, 8 and 9, of each half section are aligned or registered with the corresponding core cavities of the other half section when the flat faces of the two half sections are cemented opposite each other, thus providing the assembled cushion with a multiplicity of double non-cylindrical openings extending throughout the cushion, except for the opening 7, and affording an internal cushion structure of weblike walls of foam latex.

The foam rubber of the cushion body is of intercommunicating open cell texture, compression and expansion of the cushion causes movements of ventilating currents not only through the non-cylindrical cavities 6, 8, and 9, but also through the webs and walls of the foam rubber itself.

In use, the cushion of this invention may be placed on the cushion of any seating device. An individual who then seats himself on the cushion is afforded proper support by virtue of the size and arrangement of the non-cylindrical cavities. The ischial tuberosities of the pelvis will be disposed directly above the groups of smaller cavities 8 and 9, and the under side of the thighs will normally extend above cavities 6. The weight of the body above the pelvis is transmitted by way of the ischial tuberosities to cavities 8 and 9, and the "tail-bone" or end of the spinal column floats in the opening 7. The coccyx therefore, is free and not subjected to pressure. As a result, the various organs within the body are maintained in proper position, and fatigue is minimized. Because cavities 6, 8 and 9 automatically fill in and flatten down in proportion to the weight upon them, resiliency is graduated and there is no line of demarcation between contiguous cavities to cause discomfort.

A cushion constructed in accordance with this

invention may be used in various locales. It may be advantageously used with conventional items of seating equipment, such as automobile seats, easy chairs, overstuffed furniture, and the like, and when so used, give the occupant anatomical support superior to that obtainable by the use of a well-constructed posture chair.

The non-cylindrical cavities 8 and 9 are arranged to support the pelvis of an occupant in such a manner that the spinal column is left free in proper position for attaining correct posture. Most of the weight of body organs associated with the spine is transferred from the spine to the pelvis. The cavities 8 and 9 prevent sagging or tilting of the pelvis and assures proper relationship between the pelvis and the spinal column.

It is thus seen from the above description that I have provided a body supporting device in which the desired concavities and convexities, in conformity with the body of the user, are maintained, and which at the same time permits resilient yielding of the entire body support as a whole. In this manner some of the disadvantages in the types of body resting members heretofore in use, have been overcome, and at the same time support of those portions of the body which it is desirable to support, has been provided.

The cushion is substantially rectangular in plan view. In top plan view as well as in end elevation and side elevation, the cushion has a continuous shell 1. In side elevation the upper and side walls 2, 3 and 4 are preferably flat throughout the major portion of their length. The shell preferably has a thickness of the order of 3/8". Formed as a unit integral with the shell is a web 22, surrounding all the cavities which extends in the direction generally normal to the upper and lower surfaces of the cushion with their vertexes 23, contiguous to the top wall, their bases 24, forming, with the web 22, between them, the bottom of the cushion. The cavities throughout the area of the cushion, generally non-cylindrical, may be conical, pyrimidal, tetragonal, or any other shape so long as the sides of the cavities approach oblique lines which will produce vertices 23, and bases 24. The bases 24, may be circular, square, oval, triangular, pentagonal or any other or combination of shapes. The web portions 25, between the bases 24, of closely contiguous cavities are relatively thin. The web portions 26, between the vertices 23, of contiguous cavities are relatively thick. This web pattern provides a web thickness gradually decreasing from a maximum thickness at the top of the cushion to a minimum thickness at the bottom, to thereby provide the least density at the bottom while retaining sufficient structure to maintain the shape of the cushion.

The superior functioning of the cushion is attributed to the fact that under compression the cavities are automatically filled in from the bottom, as shown in Figures 11, 12 and 13. As soon as a person starts to sit down on the cushion, the first contact causes protuberance b—b' to descend inside abutments a—a'; then protuberances c—c' descend inside abutments b—b'; then abutments d—d' descend inside protuberances c—c', and so on until all protuberances have descended into the same plane as shown in Figure 13. The compression of the conical cavity operates like the compression of a spiral spring, there being enough slope in the walls of the cavity to permit the protuberance in the apex to fit in the larger

protuberance contiguous and below the arc in the apex, the second protuberance fitting within the third, etc., until all the protuberances have been compressed into approximately a horizontal plane. This avoids any line of demarcation as exists between a web and the usual cylindrical cavity or channel 1, which produces a hard ring, uncomfortable to a person seated thereon.

This capacity to avoid any line of demarcation as exists between a web and the usual cylindrical cavity or channel also characterizes these non-cylindrical cavities when pressure is applied laterally as well as vertically when a person sits on the cushion as shown in Figures 14, 15 and 16.

The superior functioning of this cushion is also definitely aided by the use of the fitting plugs as shown in Figures 9 and 10. These plugs, also made of foam rubber of the same density as the web in the portion of the cushion to which they are to be applied, by closing up the cavities, make it possible to increase the resiliency of any part of the cushion. The plug shown in Figure 9 has ratchet side walls QQ, RR, SS, TT, UU, VV and Q'Q', R'R', S'S', T'T', U'U' and V'V', which automatically lock into the ratchet protuberances Q, R, S, T, U, V and Q', R', S', T', U' and V', as shown in Figure 8. The plug shown in Figure 10 has spiral side walls AA, BB, CC, DD, EE, FF, GG and A'A', B'B', C'C', D'D', E'E', F'F' and G'G', which fit on to the protuberances A, B, C, D, E, F, G and A', B', C', D', E', F' and G' of the cavity shown in Figure 6. Various other shaped plugs may be fitted or cemented into corresponding cavities for the same purpose, providing a cushion construction which is very easily and quickly adapted to persons of other than average sizes and weights, by varying the degrees of flexibility in varying portions of the cushion. Varying the number and positions of the plugs, besides aiding in resisting the impact of the bodies of persons of different weight sitting down thereon, also aid in blending the resiliency of contiguous portions of the cushion and provide varying degrees of density or resiliency so as to distribute the weight imposed on different portions of the cushion.

This arrangement also results in a flexible structure utilizing a relatively small amount of material and providing a maximum shape-retaining structure. A cushion made in accordance with this invention may be comparatively hard at the top and substantially as soft as down at the bottom, with semi-pneumatic qualities in the middle, and possessing the advantages of immediately returning to its normal shape when pressure is removed. Likewise, a cushion in accordance with this invention is relatively light, is well ventilated and is readily cleaned by washing like a sponge in soapy water.

In this connection it may be said that recent experiments indicate that my new cushion may be produced faster and cheaper than any manufactured heretofore, for it has been found that by switching from hot water to infrared heat for curing latex foam sponge rubber, it has been able to step up production by 50%, and at the same time improve the quality by the elimination of a large percentage of rejects occurring by use of the water method. In the new method, the latex foam compound is poured into aluminum molds which are immediately conveyed through a zoned infrared oven. The first zone provides rapid heating; the second zone adjusts the mold temperature to 200 degrees F.; the remaining zones maintain this required temperature. Radiant heaters in the oven are said to deliver more of the cured rubber in two shifts than were previously produced in three.

It is to be understood that even though there is herein shown and described a preferred embodiment of the invention, the same is susceptible to many changes fully comprehended by the spirit of the invention, as herein described, and the scope of the appended claims. It is, therefore, to be understood that endless variations and modifications in sizes and shapes of the various elements of my invention may be made to meet various needs, and I herein claim all such variations and modifications insofar as they fall within the reasonable spirit and scope of my claims.

I claim:

1. A cushion having a plurality of non-cylindrical cavities, each containing annular integral protuberances.

2. A cushion having a cellular web interspersed with non-cylindrical cavities, each of said cavities containing a series of annular integral protuberances adapted to fit within each other under compression, the protuberance nearest the base of each cavity descending first into said base, then the next higher protuberance, then the next higher and so on as pressure on the vertex of said cavity increases until, under maximum pressure, all of said annular protuberances in said cavity have descended into the plane of said base, said cushion having in the central rear portion thereof an opening permitting the "tail-bone" of a person sitting thereon to "float" therein without the slightest pressure on said "tail-bone."

3. In a latex foam rubber cushion, a plurality of non-cylindrical cavities having spiral integral protuberances adapted to receive spirally annulated plugs.

4. A molded, foamed latex rubber article having a plurality of shaped openings therein extending from the base thereof transversely of its longitudinal axis and terminating short of the top surface thereof, said openings conforming essentially in configuration to a conical cavity with a gradually increasing cross section from the vertex to the base thereof, the walls of said cavity having protuberances integral therewith projecting into said cavity.

5. A rubber article according to claim 4, wherein said protuberances extend spirally about said walls from apex to base.

6. A rubber article according to claim 4, wherein said portuberances are graduated in inverted steplike formation from vertex to base, the sides of said steplike formations being substantially parallel.

7. In a foam rubber cushion comprising a web and plurality of cavities, said web forming the walls of said cavities, protuberances integral with said walls and projecting into said cavities.

OSCAR A. BERMAN.

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