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Cheong

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[54] **CUSHION WITH HEAT CONDUCTIVE BUTTONS**

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[51] **Int. Cl.²** **A47C 23/00**

[58] **Field of Search** ..... 297/453; 5/347, 284, 355, 5/361, 361 B

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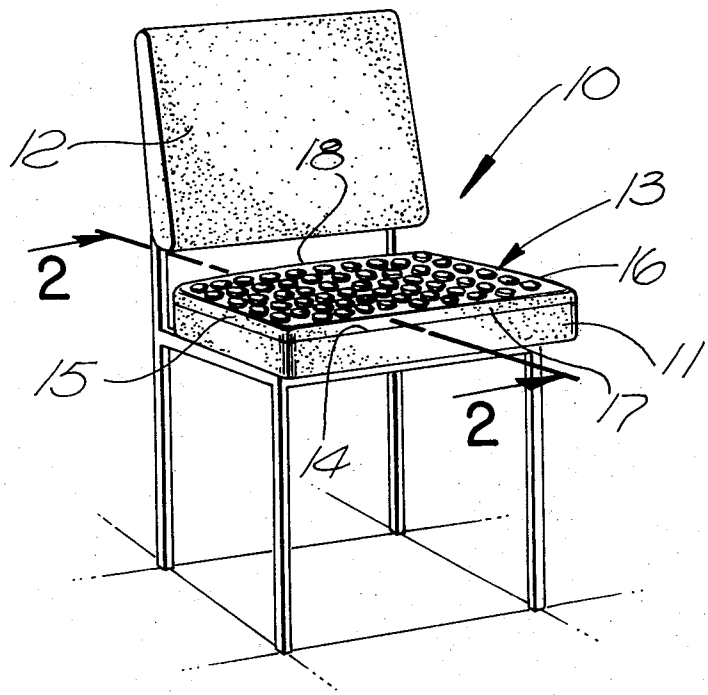
[57] **ABSTRACT**

A cushion having an outer covering formed of a flexible sheet, with cushioning material therebehind, and with a large number of buttons projecting outwardly from the covering material for contact with a user or his clothing. The buttons are formed of a material having greater thermal conductivity than the flexible covering material, preferably being formed of a ceramic or marble, so that heat is dissipated by conduction from a user through the buttons to air circulation spaces laterally between the buttons.

13 Claims, 5 Drawing Figures



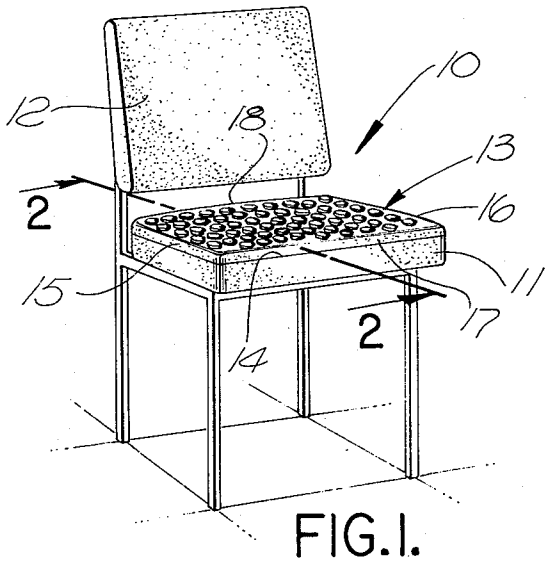
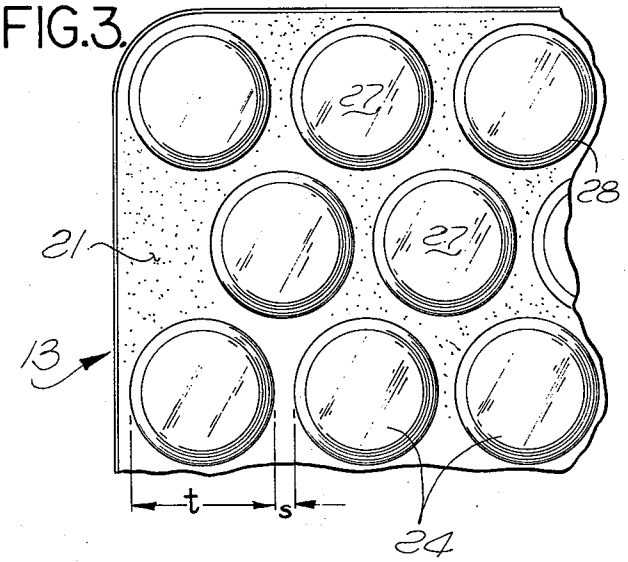


FIG. 1.

FIG. 3.



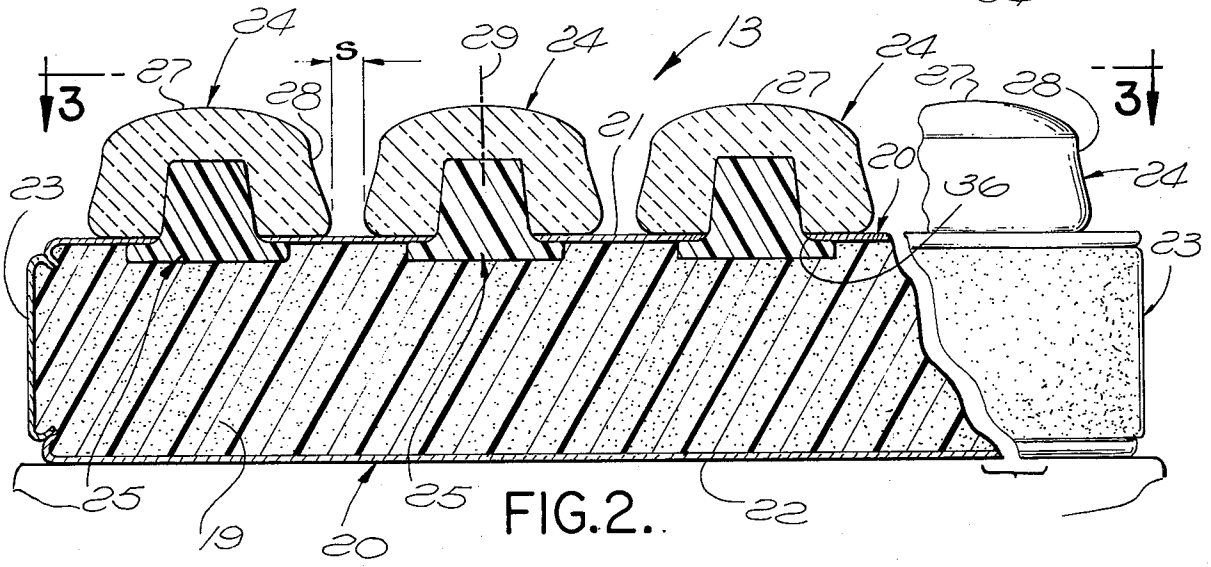


FIG. 2.

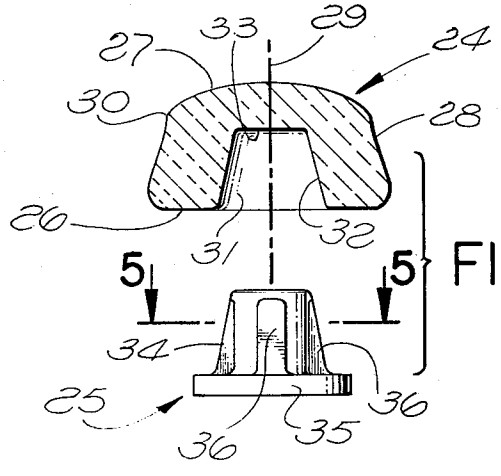


FIG. 4.

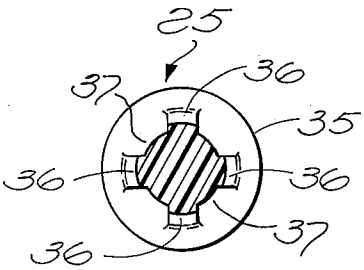


FIG. 5.

CUSHION WITH HEAT CONDUCTIVE BUTTONS

BACKGROUND OF THE INVENTION

This invention relates to improved cushions, for a user to sit on or rest against, and which cushions may either be portable for placement on, or against the back of, a chair or the like, or be permanently built into a chair or other piece of furniture as a portion thereof.

Most cushions which contain any appreciable amount of cushioning material, such as foam rubber, padding, or the like, are inherently incapable of dissipating heat from a user's body, and therefore may be extremely uncomfortable and unpleasant to sit on or lean against under warm weather conditions. Various types of ventilated seats or backrests have been devised to allow for heat dissipation under such conditions, but these ventilated arrangements have not been so constructed that they could contain a cushioning material, and have therefore not been capable of affording the softly resilient supporting comfort attainable only in an upholstered type cushion.

SUMMARY OF THE INVENTION

The present invention provides a unique type of cushion which can effectively dissipate heat in use, and yet is so constructed as to contain any desired amount of cushioning material, giving to the device whatever resilience may be desired. This result is achieved by provision of a large number of unique thermally conductive buttons on the outer surface of the cushion, to be contacted by a user or his clothing, for conducting heat from the user's body through the buttons to a number of air circulation spaces formed laterally between the buttons. The buttons are carried at the outer side of a sheet of covering material, such as leather, plastic, cloth, or the like, behind which a mass of cushioning material may be provided. To attain an optimum rate of heat dissipation, the buttons are formed of a nonmetallic, inorganic material, having a thermal conductivity greater than that of the flexible sheet from which they project. More particularly, it is desirable that the material of the buttons be selected from the group of materials consisting of the ceramics and marble, with porcelain being the preferred material for low cost cushions, and marble being the preferred material for high cost cushions.

The buttons have outer surfaces against which the user rests, and have side surfaces spaced apart to define air circulation passages between the buttons to which heat is conducted. The buttons are desirably secured to the sheet of flexible covering material of the cushion by a number of retaining elements, desirably one such element associated with each of the buttons. For maximum simplicity of assembly, these elements may have shanks projecting through openings in the flexible sheet and connected into recesses in the back sides of the buttons, with enlarged heads of the retaining elements being received at the inner side of the flexible sheet to prevent detachment therefrom. The retaining elements may be formed of deformable resinous plastic material, and may taper in a direction toward the buttons, to be connectible frictionally to the buttons by pressing the two parts axially together.

BRIEF DESCRIPTION OF THE DRAWING

The above and other features and objects of the invention will be better understood from the following

detailed description of the typical embodiment illustrated in the accompanying drawing in which:

FIG. 1 is a perspective view of a chair having a portable cushion embodying the present invention positioned on the seat of the chair;

FIG. 2 is an enlarged fragmentary vertical section through the cushion taken in line 2—2 of FIG. 1;

FIG. 3 is a fragmentary plan view taken on line 3—3 of FIG. 2;

FIG. 4 is a view showing one of the buttons and the associated retaining element in separated condition; and

FIG. 5 is an enlarged transverse section through the retaining element taken on line 5—5 of FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring first to FIG. 1, I have represented at 10 a chair having a seat portion 11 and a backrest portion 12. A portable cushion 13 embodying the invention is positioned on and supported by the upper essentially horizontal top surface 14 of the seat portion 11 of the chair. The cushion is typically illustrated as of rectangular outline configuration, being defined by two parallel opposite side edges 15 and 16 and two parallel front and rear edges 17 and 18.

As best seen in FIG. 2, the cushion 13 contains a mass or body of soft cushioning material 19 enclosed within an outer flexible covering 20. The cushioning material 19 may typically be a rectangular piece of foam rubber, or an elastomeric body of resinous plastic foam material, such as polyethylene foam, or may be a fibrous cushioning material, or any other conventional or convenient cushioning substance useable in pillows, upholstered furniture, or the like. It is also contemplated that, if desired, springs may be contained within and enhance the elastic deformability of the cushioning material.

In the particular arrangement illustrated in the figures, the outer covering 20 of the cushion includes two parallel upper and lower sheets 21 and 22 of flexible material, secured together about their peripheries by a relatively narrow vertical edge strip or series of edge strips 23. This covering may be formed of any convenient flexible material, such as leather, plastic sheet material, an appropriate flexible fabric, or the like.

For dissipating heat at a level above or outwardly of the flat top sheet 21 of the cover, there are attached to this top sheet a large number of thermally conductive preferably identical upwardly projecting buttons 24, secured to sheet 21 by a number of retaining elements 25. The buttons 24 are formed of a nonmetallic, inorganic substance, which is preferably rigid, and which has a thermal conductivity greater than that of the top sheet 21, and desirably also greater than the thermal conductivity of the remainder of cover 20 and cushioning material 19. For best results, the thermal conductivity coefficient λ (given in g.-cal./(sec.) (sq cm.)(°C./cm.). or (btu./(sec.)(sq. in.)-(°F./inch) of the buttons is at least several times as great as the thermal conductivity coefficient of the covering material 20 and cushioning material 19.

With regard to particular materials, it is desirable that buttons 24 be formed of a material selected from the group consisting of the ceramics and marble. For relatively inexpensive cushions, a ceramic may be employed, while for more expensive cushions marble but-

tons may be utilized. The optimum material is currently felt to be porcelain, which has a thermal conductivity co-efficient λ of 0.00248 g.-cal./(sec.)(sq.cm)(°C./cm.).

To define the illustrated preferred shape of the buttons **24**, each button may be symmetrical about a vertical axis **29**, and have a planar horizontal undersurface **26** engageable against the upper surface of normally flat flexible sheet **21**. At its upper side, each button may have an upper surface **27** disposed generally parallel to undersurface **26** and to sheet **21**, but preferably somewhat rounded as shown. The side surface **28** of the button may be generally vertical, and desirably tapers gradually upwardly about axis **29** of the button. At the juncture of top surface **27** and side surface **28**, these two surfaces may be joined by a smoothly curving annular surface **30**.

At its underside, each of the buttons **24** contains a recess **31** extending upwardly into the interior of the button from bottom surface **26**, and centered about axis **29**. This recess **31** may be defined by a side wall **32** centered about and extending approximately parallel to axis **29**, but preferably tapering slightly to a somewhat reduced diameter as wall **32** advances upwardly to the level of a transverse or horizontal top wall **33** defining the end of the recess.

The retaining elements **25**, for securing the various buttons to the remainder of the cushion, may be formed of a slightly resiliently deformable resinous plastic material, such as polyethylene, polypropylene, or the like, adapted to be deformed slightly when pressed upwardly into a corresponding button, to form a tight frictional connection therewith. As illustrated best in FIGS. **4** and **5**, each of these retaining elements **25** has a shank portion **34** which projects upwardly into recess **31**, and a lower annular transverse flange or head portion **35** disposed transversely of axis **29** and projecting outwardly to an increased diameter with respect to shank **34** to engage the underside or inner side of top sheet **21** about a circular opening **36** in sheet **21** through which the shank projects upwardly. The shank tapers to a reduced diameter as it advances upwardly, at an angle preferably equal to the angle of upward taper of side wall **32** of recess **31**, and may have a series of circularly spaced upwardly tapering lands or ribs **36** and intermediate grooves **37** as seen in FIGS. **4** and **5**. When one of the retaining elements **25** is pressed upwardly through one of the openings **36** in top sheet **21** and into a recess **31** of a corresponding one of the buttons **24**, and to the final assembled condition of FIG. **2**, the portion of shank **34** which is received within recess **31** is of an external diameter slightly greater than the internal diameter of the contacted portion of the recess, and is a sufficiently tight frictional fit within the recess to very effectively attach the button to the retaining element. In this condition, the lands **36** are deformed inwardly to a substantial extent, and thereafter continuously exert radially outward force against the side wall **32** of the button recess, by virtue of the inherent resilience of the elastomeric material of which retaining element **25** is formed, to thereby maintain the discussed connection between the button and retaining element.

In manufacturing the cushion **13**, the various buttons **24** may first be attached to upper sheet **21** of the cushion before this upper sheet is secured to the remainder of the covering material **20** and cushioning material **19**. The buttons may be easily and rapidly attached to the sheet by merely pressing the various retaining elements through the corresponding apertures **36** in sheet **21**, and into the recesses **31** in the buttons, until the material of top sheet **21** is tightly clamped between flanges **35** and the undersurfaces **26** of the buttons, about openings **36**. The top sheet and carried buttons may then be attached to the remainder of the covering **20**, with the cushioning material **19** received within the covering, to complete the assembly of the cushion.

In use, the cushion is placed on a seat surface as illustrated in FIG. **1**, or can be placed in a more vertical position against the back **12** of the chair, in either case with the buttons **24** exposed for contact with the user's clothing. The user or his clothing then contact the exposed outer faces **27** of the various buttons, and heat is conducted from those surfaces through the ceramic or other material of the buttons to the side surfaces **28** of the buttons, between which a large number of air circulation passages **38** are defined. Circulation of air through these various passages **38**, to the periphery of the cushion, allows dissipation of the heat to the atmosphere in a manner keeping the user cooler than in a padded cushion arrangement not having the buttons on its surface. At the same time, the resilience of the cushioning material **19** allows the buttons to be pressed downwardly against the resilience of that material, to afford well cushioned support of the user's body and maximize the comfort of the support.

To assure maintenance of the air circulation passages **38** laterally between the various buttons **24**, these buttons are desirably positioned relatively close to one another, so that the user's body is at all times preferably supported only by contact with the outer surfaces **27** of the buttons, and does not move downwardly into contact with the top sheet **21** of the cushion between the buttons. For this purpose, it is desirable that the spacing of the buttons be close enough that the minimum spacing *s* between adjacent buttons is not greater than and preferably substantially less than the maximum width *t* of the individual buttons. For best results, the dimension *t* should be several times as great as spacing *s*, desirably at least about four times as great. Also, it is desirable that, when seen in plan view as in FIG. **3**, the combined horizontal area of all of the buttons, at the level of their widest portions (i.e., at the level of the dimension *s* in FIG. **2**), is at least as great as, and preferably greater than, the combined area of all of the air circulation passages or spaces **38** between the buttons at that same level.

As a variational form of the invention, it is contemplated that the novelty of the invention may be incorporated in a cushion which is a permanent portion of the seat or back of an upholstered chair, sofa, or other piece of furniture. In that event, the sheet of material **21** of FIG. **2** may take the place of the normal upper or outer layer of covering material of the sofa or chair, with the buttons **24** being secured thereto, and with the conventional padding and/or springs of the upholstered item being located beneath or behind sheet **21**.

While a certain specific embodiment of the present invention has been disclosed as typical, the invention is of course not limited to this particular form, but rather is applicable broadly to all such variations as fall within the scope of the appended claims.

I claim:

1. A cushion comprising:

a sheet of flexible material;

cushioning material at an inner side of said flexible sheet acting to cushion the deformation thereof; and

a large number of buttons carried at the outer side of said sheet of material and projecting outwardly therebeyond and having outer surfaces facing in a direction essentially away from said sheet and exposed for supporting contact with a person resting thereagainst or his clothing;

adjacent ones of said buttons having side surfaces which are spaced laterally apart in a relation defining air circulation passages between said side surfaces of adjacent buttons and inwardly of said outer surfaces of the buttons;

said flexible sheet having portions laterally between adjacent buttons spaced inwardly beyond the level of said outer surfaces and defining inner sides of said air circulation passages;

said buttons being formed of rigid nonmetallic, inorganic material having a thermal conductivity greater than that of said flexible sheet to conduct heat from said outer surfaces to said air circulation passages.

2. A cushion as recited in claim **1**, in which said buttons are formed of a ceramic material.

3. A cushion as recited in claim **1**, in which said buttons are formed of porcelain.

4. A cushion as recited in claim **1**, in which said buttons are formed of marble.

5. A cushion as recited in claim **1**, in which said cushion is portable and has a second sheet of flexible material spaced from said first sheet and secured peripherally thereto, with said cushioning material between the two sheets.

6. A cushion as recited in claim **1**, including a retaining element connected to one of said buttons and having a portion received at the inner side of said flexible sheet and bearing outwardly thereagainst to retain the button against detachment from the sheet.

7. A cushion as recited in claim **1**, including a plurality of retaining elements for securing said buttons to said flexible sheet and each having a shank projecting through an opening in said sheet and connected into a recess in a corresponding button, said retaining elements having enlarged heads at the inner side of said flexible sheet bearing outwardly thereagainst to prevent detachment from the sheet.

8. A cushion as recited in claim **1**, including a plurality of retaining elements formed of deformable resinous plastic material for securing said buttons to said flexible sheet, each of said retaining elements having a shank projecting through an opening in said sheet and tightly frictionally received and retained within a recess in a corresponding one of the buttons, each retaining element having an enlarged head at the inner side of said flexible sheet, with a portion of the sheet about a corresponding one of said openings being confined between said head and a corresponding button.

9. A cushion as recited in claim **8**, in which said recesses in the buttons and said shanks of said retaining elements taper progressively to reduced dimensions as they advance in a direction away from said sheet.

10. A cushion as recited in claim **9**, in which said buttons are formed of porcelain.

11. A cushion as recited in claim **9**, in which said buttons are formed of marble.

12. A cushion as recited in claim **1**, including a second sheet of flexible material spaced from said first sheet and attached peripherally thereto, with said cushioning material received between the two sheets; said buttons being formed of porcelain; said outer surfaces of said buttons being convexly rounded; said side surfaces of said buttons tapering gradually toward said outer surfaces; said cushion including a plurality of retaining elements formed of deformable resinous plastic material for securing said buttons respectively to said first mentioned flexible sheet; said retaining elements having tapering shanks projecting through openings in said first mentioned flexible sheet and tightly frictionally retained within tapering recesses formed in the inner sides of said buttons; said retaining elements having enlarged heads received at the inner side of said first sheet, with portions of said first sheet about said openings being confined between said heads and said buttons to prevent detachment of the buttons from said first sheet.

13. A cushion as recited in claim **1**, in which the combined area of said buttons at the level of their widest portions, and in a plane parallel to said flexible sheet, is greater than the combined area of all of said air circulation spaces between the buttons at said level.

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