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(54) IRONING BOARD COVER WITH SOUND REDUCTION

BÜGELBRETTABDECKUNG MIT GERÄUSCHREDUZIERUNG

COUVERCLE DE PLANCHE À REPASSER AVEC RÉDUCTION DU SON

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EP 3 645 783 B1

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Description

FIELD OF THE INVENTION

[0001] The invention relates to the field of garment care, and in particular relates to an ironing board cover for covering the top of an ironing board used for ironing garments.

BACKGROUND OF THE INVENTION

[0002] Steaming ironing devices which are commercialized nowadays, such as steam irons and pressurized steam generators, sometimes produce very loud steam bursts. When the sound is too loud, this may cause annoyance to user because user cannot listen to e.g. other people, TV or radio during the ironing of garments.

[0003] WO 2013/038317 A1 discloses an ironing board cover with at least three layers that are arranged on top of each other.

[0004] DE 10 2004 008 586 A1 discloses an ironing board cover comprising an upper-side layer of a textile material and an underlying further layer of an air- and/or vapor-permeable material.

[0005] US 2004/121095 A1 discloses a portable ironing pad having a flexible laminate structure.

OBJECT AND SUMMARY OF THE INVENTION

[0006] It is an object of the invention to reduce the sound level of steam during steam ironing of garments.

[0007] The invention is defined by the independent claims. The dependent claims define advantageous embodiments.

[0008] To this end, an ironing board cover for covering an ironing board top of an ironing board is proposed. The ironing board cover comprises:

- a first layer at least partially formed by a felt,
- a second layer at least partially formed by a further felt,
- a third layer at least partially formed by a porous material which is at least one of a porous fabric and a foam, the third layer being arranged in between the first layer and the second layer, and
- a layer arranged above the first layer, the layer being heat resistant and permeable to steam. The layer defines an upper external ironing surface of the ironing board cover.

[0009] By having the third layer made of porous material in between the first and second layers made of felt, a remarkable reduction of the steam sound level during steam ironing is achieved. When this ironing board cover is used to cover an ironing board, the steam sound generated by a steaming ironing device during ironing on the ironing board is greatly attenuated by the ironing board cover itself. As a result, the sound level of steam around

the ironing board is attenuated, improving the user experience.

[0010] If we compare a situation of steam ironing with and without using the ironing board cover, a substantive sound reduction is achieved, from user perspectives.

[0011] Detailed explanations and other aspects of the invention will be given below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] Particular aspects of the invention will now be explained with reference to the embodiments described hereinafter and considered in connection with the accompanying drawings, in which identical parts or sub-steps are designated in the same manner:

Fig. 1 schematically depicts an ironing board cover according to the invention,

Fig. 2 schematically depicts an ironing board cover according to the invention along with an ironing board during ironing of garments.

[0013] The reference signs used in the figures are listed as follows:

- | | |
|----|---|
| 1 | ironing board cover |
| 2 | ironing board top |
| 3 | ironing board |
| 4 | lower external surface of the ironing board cover |
| 5 | upper external surface of the ironing board cover |
| 6 | steaming ironing device |
| 21 | first layer of the ironing board cover |
| 22 | second layer of the ironing board cover |
| 23 | third layer of the ironing board cover |
| 24 | fourth layer (defining the lower external surface 4) of the ironing board cover |
| 25 | fifth layer (defining the upper external surface 5) |

DETAILED DESCRIPTION OF THE INVENTION

[0014] Fig. 1 schematically depicts an ironing board cover 1 according to the invention, while Fig. 2 schematically depicts the ironing board cover 1 along with an ironing board 3 during ironing of garments with a steaming ironing device 6.

[0015] The ironing board 1 cover comprises:

- a first layer 21 at least partially formed by a felt,
- a second layer 22 at least partially formed by a felt,
- a third layer 23 at least partially formed by a porous material, the third layer 23 being arranged in between the first layer 21 and the second layer 22.

[0016] The remarkable sound reduction by the ironing board cover 1 is explained as follows. Felt is a particularly good sound absorption material. The interposed third layer 23, whose porous material does not have to be a good sound absorption material, provides a longer travel of

steam and sound from the felt of the first layer 21 to the felt of the second layer 22. This longer travel provides more time for the acoustic energy to be absorbed, thus providing a synergistic gain in sound reduction. It is further noted that the steam and sound, which are applied through the first layer 21, will also travel in the horizontal plane in-between the two absorbing first and second layers, thereby effectively increasing the sound absorbing surface area and contact times. The sound waves are thus "trapped" in-between the two absorbing layers 21-22. The longer the steam and/or sound wave can travel inside the ironing board cover 1, the more sound can be absorbed.

[0017] For the first and second layers 21, 22 many various natural or synthetic felts are possible, or blends thereof.

[0018] By "felt", it is for example referred to a textile material made by rolling and pressing wool or another suitable textile accompanied by the application of moisture and/or heat, which causes the constituent fibers to mat together to create a smooth surface.

[0019] In a preferable embodiment of the invention, the felt of the first layer 21 and/or of the second layer 22 has an absorption coefficient, typically denoted by symbol " α ", which is larger than 0.35, more preferably larger than 0.55, and yet more preferably larger than 0.85.

[0020] For sake of clarity, the absorption coefficient is defined as the ratio of the sound power entering the surface of the test object (without return) to the incident sound power for a plane wave at normal incidence.

[0021] The value of the sound absorption coefficient can be supplied by the supplier/manufacturer itself of the material.

[0022] The value of the sound absorption coefficient can also be measured according to International standards. Basically 2 techniques exist, described in any of the following standards:

- **ISO 354:2003** → Measurement of sound absorption in a reverberation room

- **ISO 10534** → Determination of sound absorption coefficient and impedance in impedance tubes

- **ISO 10534-1:1996** → Part 1: Method using standing wave ratio. In an acoustic laboratory, we typically can use the method using an apparatus also known as 'Kundt's tube'. It specifies a method for the determination of the sound absorption coefficient, reflection factor, surface impedance or admittance of materials and objects. The values are determined by evaluation of the standing wave pattern of a plane wave in a tube, which is generated by the superposition of an incident sinusoidal plane wave with the plane wave reflected from the test object.

- **ISO 10534-2:1998** → Part 2: Transfer-function method

[0023] The third layer 23 is porous, meaning it contains pores (voids), which makes the layer permeable to steam, heat and sound. The third layer 23 may be made and comprise many various materials, such as an open cell foam made out of polyurethane or polyester.

[0024] For example, the third layer 23 may at least (i.e. entirely or partially) be formed by a porous fabric.

[0025] Alternatively, the third layer 23 may at least (i.e. entirely or partially) be formed by a three-dimensional spacer fabric. Such an open structure allows for a good transfer of steam and sound waves.

[0026] Alternatively, the third layer 23 may at least (i.e. entirely or partially) be formed by an open cell foam.

[0027] Preferably, any one of the first layer 21, second layer 22 and the third layer 23 has a thickness in the range 2 to 7 mm. For example the first layer 21 could have a thickness of 3 mm, while the second layer 22 could have a thickness of 4 mm, while the third layer 23 could have a thickness of 5 mm.

[0028] The first layer 21, second layer 22 and the third layer 23 have each an air void space ratio. The air void corresponds to the ratio of the volume of void-space to the volume of solids.

[0029] Preferably, the ratio of the air void space ratio of the first layer 21 or second layer 22 relative to the air void space ratio of the third layer 23 is less than 0.60, and preferably less than 0.10.

[0030] In other words, it is preferred that the air void space ratio of the third (porous) layer 23 be higher than the air void space ratio of the first or second (felt) layers 21-22. This eases the transport of steam and sound in the third (porous) layer 23, i.e. the transport of steam and sound in-between the first and second (felt) layers 21-22.

[0031] Preferably, the ironing board cover 1 further comprises a fourth layer 24 arranged adjacent (i.e. below) to the second layer 22. The fourth layer 24 has a sound reflection factor larger than 0.50, preferably larger than 0.75, and more preferably larger than 0.90.

[0032] According to Standard ISO 10534, the reflection factor, typically denoted by symbol " r ", is defined as the complex ratio of the pressure amplitude of the reflected wave to the incident wave in the reference plane for a plane wave at normal incidence. The sound reflection factor (r), having a magnitude $|r|$ and phase ϕ , is not often mentioned when characterizing the acoustic properties of a material. However, its value can be derived from its relation with the absorption coefficient (α), as indicated for example in paragraph 5.3 of ISO standard 10534-1:1996. For sake of clarity, the value for the reflection factor shown here is derived from its absorption coefficient (α) as follows:

$$r = \sqrt{1 - \alpha}$$

[0033] The sound-reflective fourth layer 24 below the second (felt) layer provides an additional synergistic reduction of the steam sound level during steam ironing.

The reason is that the sound-reflective fourth layer 24 reflects part of the sound, allowing the sound waves to pass multiple times through the sound absorption configuration formed by the stacking of the three layers 21-22-23, before exiting the ironing board cover.

[0034] Preferably, the fourth layer 24 is impermeable to liquid and/or steam.

[0035] For example, it may comprise a plastic sheet, e.g. polyurethane or polypropylene foil, or a metal sheet, such as an aluminum foil. These foils can (partially) reflect incoming sound pressure waves, next to other properties typically useful for ironing board covers, like blockage of liquid and improved mechanical stability. It is noted that the fourth layer 24 may for example be applied to the bottom of the felt layer by means of lamination, or applied as a coating.

[0036] Preferably, the ironing board cover 1 comprises a fifth layer 25 arranged adjacent to (i.e. above) the first layer 21. The fifth layer 25 is heat resistant and permeable to steam.

[0037] The fifth layer 25 may for example be made of a fabric material, preferably cotton, linen, or a blend of cotton and polyester. Typically a very thin open-cell foam layer may be arranged directly beneath the fifth layer 25 to make it softer and more smooth, which may improve ironing performance, and which has little or no impact on the acoustics.

[0038] While the invention has been described and illustrated in detail in the foregoing description and in the drawing, such description and illustration are to be considered exemplary and/or illustrative and not restrictive; the invention is not limited to the disclosed embodiments.

[0039] For example, the ironing board cover may comprise one or more additional layers, such as one or more additional layers between the fifth layer and the first layer, one or more additional layers between the first layer and the third layer, one or more additional layers between the third layer and the second layer, one or more additional layers between the second layer and the fourth layer, or one or more additional layers below the fourth layer. Such one or more additional layers may for example comprise layers similar to the first and second layers (i.e. being entirely or partially formed by a felt) and layers similar to the third layer (i.e. being entirely or partially formed by a porous material). So for example it is possible to create "felt - porous - felt - porous - felt" layer configurations instead of the "felt - porous - felt" layer configuration of Fig. 1.

[0040] Other variations to the disclosed embodiments can be understood and effected by those skilled in the art in practicing the claimed invention, from a study of the drawings, the disclosure, and the appended claims.

[0041] In the claims, the word "comprising" does not exclude other elements or steps, and the indefinite article "a" or "an" does not exclude a plurality. A single processor or other unit may fulfill the functions of several items recited in the claims. For the purpose of clarity and a concise description, features are disclosed herein as part of

the same or separate embodiments. However, it will be appreciated that the scope of the invention may include embodiments having combinations of all or some of the features disclosed. The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage. Any reference signs in the claims should not be construed as limiting the scope.

Claims

1. An ironing board cover (1) for covering an ironing board top (2) of an ironing board (3), the ironing board cover comprising:
 - a first layer (21) at least partially formed by a felt,
 - a second layer (22) at least partially formed by a further felt,
 - a third layer (23) at least partially formed by a porous material which is at least one of a porous fabric and a foam, the third layer (23) being arranged in between the first layer (21) and the second layer (22), **characterized in that** the ironing board cover also comprises:
 - a layer (25) arranged above the first layer (21), the layer (25) being heat resistant and permeable to steam, the layer (25) defining an upper external ironing surface (5) of the ironing board cover (1).
2. An ironing board cover (1) according to claim 1, wherein the first layer (21) and/or of the second layer (22) has an absorption coefficient (α) larger than 0.35, the absorption coefficient being defined as the ratio of the sound power entering a surface of a test object to the incident power for a plane wave at normal incidence.
3. An ironing board cover (1) according to claim 2, wherein the absorption coefficient (α) is larger than 0.55.
4. An ironing board cover (1) according to claim 3, wherein the absorption coefficient (α) is larger than 0.85.
5. An ironing board cover (1) according to any one of the preceding claims, wherein the third layer (23) is at least formed by the porous fabric.
6. An ironing board cover (1) according to any one of the preceding claims, wherein the porous fabric is a three-dimensional spacer fabric.
7. An ironing board cover (1) according to any one of claims 1-4, wherein the third layer (23) is at least

formed by the foam.

8. An ironing board cover (1) according to any one of the preceding claims, wherein any one of the first layer (21), second layer (22) and the third layer (23) has a thickness in the range 2 to 7 mm. 5
9. An ironing board cover (1) according to any one of the preceding claims, wherein the first layer (21), second layer (22) and the third layer (23) have each an air void space ratio, the air void space ratio being the ratio of the volume of void-space to the volume of solids, and wherein the ratio of the air void space ratio of the first layer (21) or the second layer (22) relative to the air void space ratio of the third layer (23) is less than 0.60. 10 15
10. An ironing board cover (1) according to claim 9, wherein the ratio of the air void space ratio of the first layer (21) or the second layer (22) relative to the air void space ratio of the third layer (23) is less than 0.10. 20
11. An ironing board cover (1) according to any one of the preceding claims, further comprising a fourth layer (24) arranged adjacent to and below the second layer (22), the fourth layer (24) having a sound reflection factor (r) larger than 0.50. 25
12. An ironing board cover (1) according to claim 11, wherein the sound reflection factor (r) is larger than 0.75. 30
13. An ironing board cover (1) according to claim 12, wherein the sound reflection factor (r) is larger than 0.90. 35
14. An ironing board cover (1) according to any one of the claims 11 to 13, wherein the fourth layer (24) is impermeable to liquid and/or steam. 40

Patentansprüche

1. Bügelbrettabdeckung (1) zum Abdecken einer Bügelbrettoberseite (2) eines Bügelbretts (3), wobei die Bügelbrettabdeckung umfasst: 45
 - eine erste Schicht (21), die zumindest teilweise von einem Filz gebildet wird, 50
 - eine zweite Schicht (22), die zumindest teilweise von einem weiteren Filz gebildet wird,
 - eine dritte Schicht (23), die zumindest teilweise aus einem porösen Material besteht, das mindestens aus einem porösen Gewebe und einem Schaum besteht, wobei die dritte Schicht (23) zwischen der ersten Schicht (21) und der zweiten Schicht (22) angeordnet ist, **dadurch ge-** 55

kennzeichnet, dass die Bügelbrettabdeckung auch umfasst:

- eine Schicht (25), die über der ersten Schicht (21) angeordnet ist, wobei die Schicht (25) hitzebeständig und dampfdurchlässig ist, wobei die Schicht (25) eine obere äußere Bügelfläche (5) der Bügelbrettabdeckung (1) definiert.

2. Bügelbrettabdeckung (1) nach Anspruch 1, wobei die erste Schicht (21) und/oder die zweite Schicht (22) einen Absorptionskoeffizienten (α) größer als 0,35 aufweist, wobei der Absorptionskoeffizient als das Verhältnis der Schalleistung, die in eine Oberfläche eines Testobjekts eintritt, zur einfallenden Leistung für eine normale einfallende ebene Welle definiert ist.
3. Bügelbrettabdeckung (1) nach Anspruch 2, wobei der Absorptionskoeffizient (α) größer als 0,55 ist.
4. Bügelbrettabdeckung (1) nach Anspruch 3, wobei der Absorptionskoeffizient (α) größer als 0,85 ist.
5. Bügelbrettabdeckung (1) nach einem der vorhergehenden Ansprüche, wobei die dritte Schicht (23) zumindest durch das poröse Gewebe gebildet wird.
6. Bügelbrettabdeckung (1) nach einem der vorhergehenden Ansprüche, wobei das poröse Gewebe ein dreidimensionales Abstandsgewebe ist.
7. Bügelbrettabdeckung (1) nach einem der Ansprüche 1 bis 4, wobei die dritte Schicht (23) zumindest durch den Schaum gebildet wird.
8. Bügelbrettabdeckung (1) nach einem der vorhergehenden Ansprüche, wobei eine beliebige der ersten Schicht (21), der zweiten Schicht (22) und der dritten Schicht (23) eine Dicke im Bereich von 2 bis 7 mm aufweist.
9. Bügelbrettabdeckung (1) nach einem der vorhergehenden Ansprüche, wobei die erste Schicht (21), die zweite Schicht (22) und die dritte Schicht (23) jeweils ein Luftleerraumverhältnis aufweisen, wobei das Luftleerraumverhältnis das Verhältnis des Volumens des Leerraums zum Volumen der Feststoffe ist, und wobei das Verhältnis des Luftleerraumverhältnisses der ersten Schicht (21) oder der zweiten Schicht (22) zum Luftleerraumverhältnis der dritten Schicht (23) weniger als 0,60 beträgt.
10. Bügelbrettabdeckung (1) nach Anspruch 9, wobei das Verhältnis des Luftleerraumverhältnisses der ersten Schicht (21) oder der zweiten Schicht (22) zu dem Luftleerraumverhältnis der dritten Schicht (23) weniger als 0,10 beträgt.

11. Bügelbrettabdeckung (1) nach einem der vorhergehenden Ansprüche, ferner umfassend eine vierte Schicht (24), die neben und unter der zweiten Schicht (22) angeordnet ist, wobei die vierte Schicht (24) einen Schallreflexionsfaktor (r) aufweist, der größer als 0,50 ist. 5
12. Bügelbrettabdeckung (1) nach Anspruch 11, wobei der Schallreflexionsfaktor (r) größer als 0,75 ist. 10
13. Bügelbrettabdeckung (1) nach Anspruch 12, wobei der Schallreflexionsfaktor (r) größer als 0,90 ist.
14. Bügelbrettabdeckung (1) nach einem der Ansprüche 11 bis 13, wobei die vierte Schicht (24) für Flüssigkeit und/oder Dampf undurchlässig ist. 15

Revendications

1. Couvercle de planche à repasser (1) pour recouvrir un dessus de planche à repasser (2) d'une planche à repasser (3), le couvercle de planche à repasser comprenant:
- une première couche (21) formée au moins partiellement par un feutre,
 - une deuxième couche (22) formée au moins partiellement par un autre feutre,
 - une troisième couche (23) formée au moins partiellement par un matériau poreux qui est au moins l'un entre un tissu poreux et une mousse, la troisième couche (23) étant agencée entre la première couche (21) et la deuxième couche (22), **caractérisé en ce que** le couvercle de planche à repasser comprend également:
 - une couche (25) agencée au-dessus de la première couche (21), la couche (25) étant résistante à la chaleur et perméable à la vapeur, la couche (25) définissant une surface de repassage externe supérieure (5) du couvercle de planche à repasser (1).
2. Couvercle de planche à repasser (1) selon la revendication 1, dans lequel la première couche (21) et/ou la deuxième couche (22) a un coefficient d'absorption (α) supérieur à 0,35, le coefficient d'absorption étant défini comme le rapport entre la puissance sonore entrant dans une surface d'un objet de test et la puissance incidente pour une onde plane à incidence normale. 45
3. Couvercle de planche à repasser (1) selon la revendication 2, dans lequel le coefficient d'absorption (α) est supérieur à 0,55. 50
4. Couvercle de planche à repasser (1) selon la revendication 3, dans lequel le coefficient d'absorption (α) 55

est supérieur à 0,85.

5. Couvercle de planche à repasser (1) selon l'une quelconque des revendications précédentes, dans lequel la troisième couche (23) est au moins formée par le tissu poreux.
6. Couvercle de planche à repasser (1) selon l'une quelconque des revendications précédentes, dans lequel le tissu poreux est un tissu d'espacement tridimensionnel.
7. Couvercle de planche à repasser (1) selon l'une quelconque des revendications 1 à 4, dans lequel la troisième couche (23) est au moins formée par la mousse.
8. Couvercle de planche à repasser (1) selon l'une quelconque des revendications précédentes, dans lequel l'une quelconque parmi la première couche (21), la deuxième couche (22) et la troisième couche (23) a une épaisseur dans la plage allant de 2 à 7 mm. 20
9. Couvercle de planche à repasser (1) selon l'une quelconque des revendications précédentes, dans lequel la première couche (21), la deuxième couche (22) et la troisième couche (23) ont chacune un rapport d'espace vide d'air, le rapport de l'espace vide d'air étant le rapport entre le volume de l'espace vide et le volume des solides, et dans lequel le rapport du rapport de l'espace vide d'air de la première couche (21) ou de la deuxième couche (22) relativement au rapport de l'espace vide d'air de la troisième couche (23) est inférieur à 0,60. 25
10. Couvercle de planche à repasser (1) selon la revendication 9, dans lequel le rapport du rapport de l'espace vide d'air de la première couche (21) ou de la deuxième couche (22) relativement au rapport de l'espace vide d'air de la troisième couche (23) est inférieure à 0,10. 30
11. Couvercle de planche à repasser (1) selon l'une quelconque des revendications précédentes, comprenant en outre une quatrième couche (24) agencée adjacente à et au-dessous de la deuxième couche (22), la quatrième couche (24) ayant un facteur de réflexion du son (r) supérieur à 0,50. 35
12. Couvercle de planche à repasser (1) selon la revendication 11, dans lequel le facteur de réflexion acoustique (r) est supérieur à 0,75. 40
13. Couvercle de planche à repasser (1) selon la revendication 12, dans lequel le facteur de réflexion acoustique (r) est supérieur à 0,90. 45
14. Couvercle de planche à repasser (1) selon l'une 50

quelconque des revendications 11 à 13, dans lequel la quatrième couche (24) est imperméable aux liquides et/ou à la vapeur.

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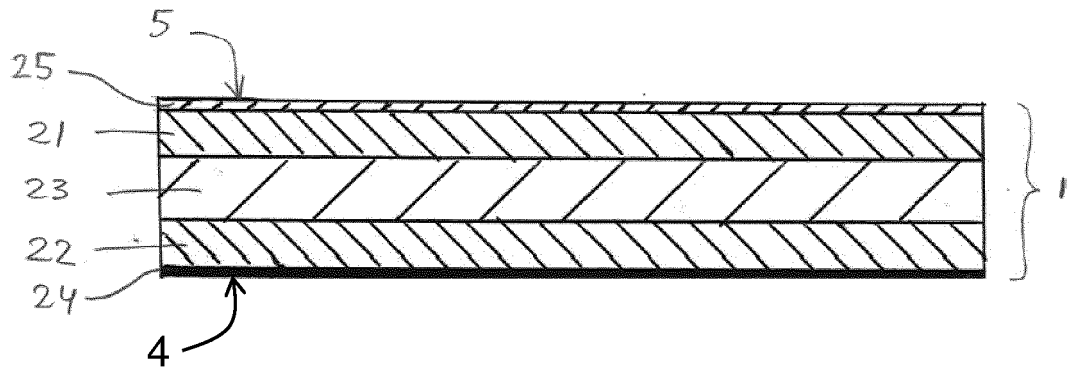


FIG.1

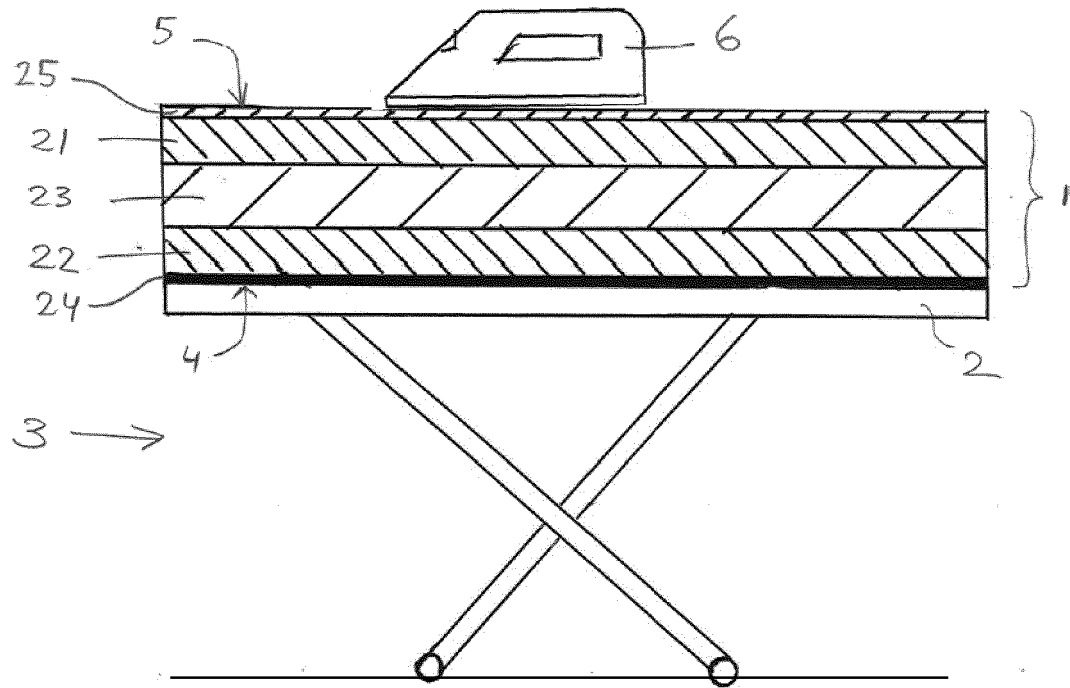


FIG.2

REFERENCES CITED IN THE DESCRIPTION

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