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(54) **A NEW BLACKOUT CURTAIN THAT PROVIDES COMPLETE BLACKOUT**

(57) The invention relates to a new blackout curtain that does not transmit light to the interior environment, which can be used in any environment where it is desired to prevent light from entering such as home, office, hotel, photo studios, motion picture theaters. The invention

particularly relates to a curtain structure that provides 100% blackout by minimizing the light transmittance rate, which protects the privacy of private life and protects against the disturbing effect of light and UV rays.

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Description

Technical Field

[0001] The invention relates to a new blackout curtain that does not transmit light to the interior environment, which can be used in any environment where it is desired to prevent light from entering such as home, office, hotel, photo studios, movie theaters.

[0002] The invention particularly relates to a curtain structure that provides 100% blackout by minimizing the light transmittance rate, which protects the privacy of private life and protects against the disturbing effect of light and UV rays.

State of the art

[0003] Blackout fabrics provide dark environments by blocking light by means of their functional properties. Blackout curtains are essentially light-proof fabrics and are used in various areas to protect against the disturbing effects of light and UV rays and to protect privacy. Blackout curtains are used as classic curtains or roller blinds, especially for hotels, show halls, hospitals, educational institutions or homes, and in addition to this function, they are also used to form qualified living environments by helping to provide sound and heat insulation.

[0004] In the present technique, the production of blackout fabrics is carried out by three different methods. The first of these is to form the structures created on the weaving machine by combining them with the knitting connection points during weaving. However, these structures do not completely prevent the light transmission in the fabric. For this reason, it is generally tried to increase the blackening rate of the product by using dark color. A blackening rate of around 90% can be achieved by means of dark colors, but this results in a limited product range. Namely, the user cannot have the blackout feature with a curtain of the desired color.

[0005] When the curtain fabric structures with blackout feature obtained by weaving technique are examined, it is seen that they have high warp density, black chip yarns are generally used in the weft yarns, and double-faced satin knits are used in terms of knitting. In order to make the fabrics to have less light transmittance, collection is generally provided by dyeing directly in the jet without pre-fixing in dyeing processes. For this reason, untreated yarns are used in the constructions formed to collect the fabric in the weft and warp directions during dyeing.

[0006] However, even if all of these methods are used correctly, it is not possible to ensure that the fabrics formed are completely light-proof (blackout) fabrics. For this reason, all formed fabrics are classified as dim-out.

[0007] The second method used in the technique to ensure light-proof properties in blackout curtain fabric structures is coating. The coating process is a process applied to the fabric for special effects that cannot be

achieved through normal finishing processes. According to the desired effect, chemicals in liquid, dough or powder form are transferred to the fabric in powder, paste or foam form, forming a film layer on the fabric. Blackout curtain fabric structures are generally produced with a 3-layered foam coating technique. Even if the light-proof feature is provided with this process, there are problems in terms of the difficulty of the process applied and it has a very high-cost production technique. In addition, the obtained fabric structures have an artificial feel, similar to the feeling of plastic rather than the touch feeling arising from the nature of the textile material. Additionally, if it is wanted to clean these coating curtains, there is a possibility that the coating chemical may separate from the surface and/or be damaged. In addition, in case of possible washing, cracks and/or surface deformations that may occur on the coating surface cannot be removed by the ironing process, and this situation negatively affects the appearance of the curtain.

[0008] The third method used in the technique to ensure light-proof properties in blackout curtain fabric structures is the fabrics obtained by lamination technology. Laminated fabric is defined as a material formed by the combination of two or more layers, at least one of which is a textile fabric, and linked together by an added adhesive or by the adhesive effect of one or two component layers. The lamination process is based on the process of combining layers of fabric or fabric and material to form a composite material. Polymer materials that cannot be shaped into coating dough are first turned into films and then laminated to the fabric. In lamination, as in coating, chemicals can be transferred to the fabric in the form of foam as a solution or aqueous dispersion. At the end of the lamination process, a structure consisting of two or more layers, including the ground fabric, is obtained. However, even if this method provides the light-proof feature, there are problems in terms of the difficulty of the applied process and it has a high-cost production technique.

[0009] As a result of a search carried out in the literature about the subject, application numbered TR 2020/01260 was found. The application relates to a fabric coating emulsion that gives the fabric the ability to maintain its flexibility even at low temperatures, flame retardant and blackening properties. It is stated that said fabric coating emulsion comprises pigments or filling materials such as kaolin type clay, calcium carbonate, talc, titanium dioxide, carbon black to prevent sunlight from passing through and provide blackening properties. However, in the mentioned document, there is no mention of a structure that provides 100% blackout feature with its fabric structure without any coating.

[0010] As a result, due to the above-mentioned drawbacks and the inadequacy of the existing solutions, it has become necessary to make a development in the relevant technical field.

Object of the Invention

[0011] The invention aims to solve the above-mentioned drawbacks, inspired by current situations.

[0012] The main object of the invention is to provide a curtain structure with 100% blackout feature that does not transmit any light into the interior environment.

[0013] An object of the invention is to minimize the light transmission rate by using layered weaving technique and different knitting structures.

[0014] Another object of the invention is to prevent light transmittance by having a high filament of the weft yarns used in the middle layer of the three-layered structure.

[0015] Another object of the invention is to produce a 100% blackout curtain fabric that can be easily washed and/or ironed in case of contamination, staining or dust.

[0016] Another object of the invention is to eliminate the problems such as melting and/or deforming of existing fabric structures with blackout feature due to sunlight over time, and to ensure that they have a much longer lasting structure.

[0017] In order to achieve the objects described above, the invention is a new blackout curtain with a completely (100%) light-proof feature, comprising; an upper layer fabric (1) and a lower layer fabric (3), which are woven with knits from warp and weft yarns and form the visible sides of the curtain, a middle layer fabric (2), which provides light proofing and comprise an upper part (2.1) and a lower part (2.2), woven as a single layer with knits by using warp yarns and two different groups of weft yarns of high filament and black color, connection points (4) connecting the upper layer fabric (1) and the upper part (2.1) of the middle layer fabric (2) to each other and connecting the lower fabric (3) and the lower part (2.2) of the middle fabric (2) to each other and an upper layer floating fabric structure (1.1) and a lower layer floating fabric structure (3.1) located opposite the connection points (4) to prevent light leaks.

[0018] In order to achieve the objects described above, the invention is a production method to obtain a completely (100%) light-proof blackout curtain and comprises the following process steps;

- i. Weaving the upper layer fabric (1) that forms the visible sides of the curtain by using knits of warp yarns and weft yarns,
- ii. Weaving the middle layer fabric (2) comprising the upper part (2.1) and lower part (2.2) with knits by using warp yarns and two different groups of weft yarns of high filament and black color,
- iii. Weaving the lower layer fabric (3) that forms the visible sides of the curtain by using knits of warp yarns and weft yarns,
- iv. Connecting the upper part (2.1) of the middle layer fabric (2) with the upper layer fabric (1) with connection points (4) in a single weft and

tion points (4) in a single weft and

v. Connecting the lower part (2.2) of the middle layer fabric (2) with the lower layer fabric (3) with connection points (4) in a single weft, diagonally with the connection mentioned in the previous step.

[0019] The structural and characteristic features and all the advantages of the invention will be more clearly understood by means of the drawing given below and the detailed description written with reference to this drawing, and therefore the evaluation needs to be made by taking this drawing and detailed description into consideration.

Drawing Assisting Understanding of the Invention

[0020] **Figure 1:** The view of blackout curtain fabric structure, which is the subject of the invention.

Description of Piece References

[0021]

1. Upper layer fabric
 - 1.1 Upper layer floating fabric structure
2. Middle layer fabric
 - 2.1 Upper part
 - 2.2. Lower part
3. Lower layer fabric
 - 3.1 Lower layer floating fabric
4. Connection points

Detailed Description of the Invention

[0022] In this detailed description, the blackout curtain and its production method, which are the subject of the invention, are described only for a better understanding of the subject.

[0023] The invention relates to a new blackout curtain that is completely (100%) light-proof and its production method. The said blackout curtain comprises an upper layer fabric (1) and a lower layer fabric (3), which are woven from warp and weft yarns, form the visible sides of the curtain; a middle layer fabric (2) comprise an upper part (2.1) and a lower part (2.2), woven as a single layer with knits by using warp yarns and weft yarns of high filament and black color; and connection points (4) connecting the upper layer fabric (1) and the upper part (2.1) of the middle layer fabric (2) to each other and connecting the lower layer fabric (3) and the lower part (2.2) of the middle layer fabric (2) to each other; and an upper layer floating fabric structure (1.1) and a lower layer floating fabric structure (3.1) located opposite the connection points (4) to prevent light leaks.

[0024] In the product, which is subject of the invention,

the upper layer floating fabric structure (1.1) is located opposite the connection point (4) that connecting the lower layer fabric (3) and the lower part (2.2) of the middle layer fabric (2) to each other.

[0025] In the product, which is subject of the invention, the lower layer floating fabric structure (3.1) is located opposite the connection point (4) that connecting the upper layer fabric (1) and the upper part (2.1) of the middle layer fabric (2) to each other.

[0026] In an embodiment of the invention, the middle layer fabric (2) is woven by using high filament, black colored weft yarns, preferably 150 denier 288 filament black micro yarns.

[0027] In a preferred embodiment of the blackout curtain, which is subject of the invention, all of the warp yarns used in weaving the upper layer fabric (1), the middle layer fabric (2) and the lower layer fabric (3) are the same warp yarn. Herein, warp yarns are grouped in order to facilitate the weaving process and form layers. Preferably, 50 denier / 24 filament raw semi-dull warp yarn is used in the weaving process.

[0028] In a preferred embodiment of the blackout curtain, which is subject of the invention, high filament yarns are used as weft yarns in the weaving of the upper layer fabric (1) and the lower layer fabric (3) to minimize light leakage. Preferably, 300 denier / 288 filament weft yarn is used in the weaving process.

[0029] A production method to obtain a completely (100%) light-proof blackout curtain, which is subject of the invention comprises the following process steps;

i. Weaving the upper layer fabric (1) that forms the visible sides of the curtain by using knits with warp yarns and weft yarns,

ii. Middle layer fabric (2) comprising the upper part (2.1) and the lower part (2.2), woven as a single layer with double-faced satin knits by using warp yarns and two different groups of weft yarns of high filament and black color,

iii. Weaving the lower layer fabric (3) that forms the visible sides of the curtain by using knits with warp yarns and weft yarns,

iv. Connecting the upper part (2.1) of the middle layer fabric (2) with the upper layer fabric (1) with connection points (4) in a single weft and

v. Connecting the lower part (2.2) of the middle layer fabric (2) with the lower layer fabric (3) with connection points (4) in a single weft, diagonally with the connection mentioned in the previous step.

[0030] In the process step i) of the method of the invention, including but not limited to, the upper layer fabric (1) of the warp yarns and weft yarns, which forms the visible sides of the curtain, is woven by using mostly

normal or reinforced satin, twill and similar knits, which do not have a multi-hole structure.

[0031] In a preferred example of the method, which is subject of the invention, in the process step ii) the middle layer fabric (2) comprising the upper part (2.1) and the lower part (2.2) is woven by using warp yarns and two different high filament and black colored weft yarns in double-faced satin knits. Herein, preferably 50 denier 24 filament yarns are used as warp yarns and preferably 150 denier 288 filament black micro yarns are used as weft yarns.

[0032] In the process step iii) of the method of the invention, including but not limited to, the lower layer fabric (3) of the warp yarns and weft yarns, which forms the visible sides of the curtain, is woven by using mostly normal or reinforced satin, twill and similar knits, which do not have a multi-hole structure.

[0033] In the method of the invention, with the diagonally connection mentioned in iv) and v) process steps, the lower layer floating fabric structure (3.1) is formed opposite to the connection point (4) connecting the upper layer fabric (1) and the upper part (2.1) of the middle layer fabric (2) to each other and the upper layer floating fabric structure (1.1) is formed opposite to the connection point (4) connecting the lower layer fabric (3) and the lower part (2.2) of the middle layer fabric (2) to each other.

[0034] In order to obtain a preferred example of the invention, the following processes are followed:

(i) Weaving of the upper layer fabric (1): The upper layer warp yarns and the upper layer weft yarns are woven by using certain knits. Thus, the upper layer fabric (1) structure occurs. When the weaving process of this layer is completed, the visible side of the curtain is formed.

(ii) Weaving of the middle layer fabric (2): Warp yarns and two types of middle layer weft yarns, which different from those used in the upper and lower layer fabric structure, are woven by using specific knits. The weft yarns used here have both high filament and black color. Double-faced satin knits are preferably used herein. However, other knits can also be used by adjusting the weft and warp density.

(iii) Weaving of the lower layer fabric (3): The lower layer warp yarns and the lower layer weft yarns are woven by using certain knits. Thus, the lower layer fabric (3) structure occurs. When the weaving process of this layer is completed, the other visible side of the curtain is formed.

(iv and v). Connecting the upper layer fabric (1) and lower layer fabric (3) to the middle layer fabric (2): The connections between the upper layer fabric (1) and the upper part (2.1) of the middle layer (2) to each other are provided by the connection point (4). The connections between the lower layer fabric (3) and

the lower part (2.2) of the middle layer (2) to each other are provided by the connection point (4). At this connection point, an additional weft yarn (different from the main weft yarns) is used to connect both layers to each other. Herein, the connection process is performed by using a different knitting structure than the main fabric knitting. The connection points (4) connect the upper layer fabric (1) and lower layer fabric (3) to the middle layer fabric (2), ensuring that the curtain fabric stands in one piece. These connection points prevent light leaks by connecting the (4) layers of fabric diagonally. In other words, opposite the connection point (4) in the upper layer fabric (1) structure, there is the floating fabric structure (3.1) of the lower layer fabric (3). Opposite the connection point (4) in the lower layer fabric (3) structure, there is the floating fabric structure (1.1) of the upper layer fabric (1).

[0035] The woven fabric blackout curtain, which is the subject of the invention, is formed by combining three different fabric structures (upper layer, middle layer, lower layer) using different knitting techniques and connection points (4) during weaving. As shown in Figure 1, the middle layer fabric (2) structure comprises the upper part (2.1) and the lower part (2.2) and is woven as a single layer by using the knitting technique. The warp yarns entering the weaving loom are grouped and adjusted to form the upper layer, middle layer and lower layer. In addition, the weft yarns are grouped to separate each layer. Herein, four weft groups are used: one weft group to form the upper layer fabric (1), two weft groups to form the middle layer fabric (2), and one weft group to form the lower layer fabric (3).

[0036] In order to form the middle layer fabric (2) structure, the middle layer warp yarns, the middle layer upper weft yarns and the middle layer lower weft yarns are used. The weft yarns used herein are different from the weft yarns used in the upper layer fabric (1) and lower layer fabric (3) structure. The weft yarns used in the middle layer fabric (2) have both high filament and black color. Preferably, 150 denier 288 filament black micro yarns are used to form this layer, but other yarns with a high number of filaments can also be used here. High filament and black yarns are preferred to minimize light transmission. The middle layer warp yarns and the middle layer weft yarns are woven by using certain knits. Double-faced satin knits are preferably used here. However, other yarns can also be used by adjusting the weft and warp density. The upper part (2.1) and lower part (2.2) of this middle layer fabric (2) consist of high filament weft yarns.

[0037] The most important part of the curtain, which is the subject of the invention is that 3 layers of fabric are woven independently of each other, as shown in Figure 1 and formed by connecting the middle layer fabric (2) diagonally at certain intervals to the upper layer fabric (1) and the lower layer fabric (3) in a single weft. The

reason for this is that when the middle layer fabric (2), the lower layer fabric (3) or the upper layer fabric (1) connect, the other layer fabric prevents the light filtering caused by this connection and provides 100% blackout feature. In the opposite case, the other layer prevents this light filtering from passing to the surface.

[0038] In the product, which is subject of the invention, the connection points (4) are formed with a special mesh structure in order to prevent light leaks. While the upper layer fabric (1) and the lower layer fabric (3) are woven, the middle layer is woven (floating) independently of the fabric (2) and is woven independently again by connecting to the second and third layers only at certain points. These connection points prevent light leaks by connecting the (4) layers of fabric diagonally to each other. In other words, opposite the connection point (4) in the upper layer fabric (1) structure, there is the lower layer floating fabric structure (3.1) of the lower layer fabric (3) structure. Opposite the connection point (4) in the lower layer fabric (3) structure, there is the upper layer floating fabric structure (1.1) of the upper layer fabric (1) structure.

[0039] In order to obtain a preferred example of the invention, the woven fabric is subjected to quality control processes and then, the fabric is collected in the warp and weft directions by passing it through the stenter machine at appropriate temperature, speed and feeding values, and as a result, light transmittance is completely prevented. In fabrics produced as dyed fabric, the dyeing process is applied to color the product. When thermosetting yarn, called melting yarn, is preferred as warp and weft yarn in fabrics that are transferred at appropriate temperatures, it hardens after heat treatment and can also be used for blind purposes.

Claims

1. The invention is a new blackout curtain that is completely (100%) light-proof, **characterized by comprising;**

an upper layer fabric (1) and a lower layer fabric (3), which are woven with knits from warp and weft yarns and form the visible sides of the curtain,

a middle layer fabric (2), which provides light proofing and comprise an upper part (2.1) and a lower part (2.2), woven as a single layer with knits by using warp yarns and two different groups of weft yarns of high filament and black color,

connection points (4) connecting the upper layer fabric (1) and the upper part (2.1) of the middle layer fabric (2) to each other and connecting the lower layer fabric (3) and the lower part (2.2) of the middle layer fabric (2) to each other, and an upper layer floating fabric structure (1.1) and

a lower layer floating fabric structure (3.1) located opposite the connection points (4) to prevent light leaks.

2. The curtain according to claim 1, **wherein**; the said high filament, black colored weft yarns are preferably 150 denier, 288 filament black micro yarns. 5
3. The curtain according to claim 1, **wherein**; the said upper layer floating fabric structure (1.1) is located opposite the connection point (4) that connecting the lower layer fabric (3) and the lower part (2.2) of the middle layer fabric (2). 10
4. The curtain according to claim 1, **wherein**; the said lower layer floating fabric structure (3.1) is located opposite the connection point (4) that connecting the upper layer fabric (1) and the upper part (2.1) of the middle layer fabric (2). 15
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5. The invention is a production method to obtain blackout curtains that are completely (100%) light-proof, **characterized by comprising** the following process steps: 25
 - i. Weaving the upper layer fabric (1) that forms the visible sides of the curtain by using knits of warp yarns and weft yarns,
 - ii. Weaving the middle layer fabric (2) that comprise the upper part (2.1) and the lower part (2.2), by using warp yarns and two different groups of weft yarns of high filament and black color, 30
 - iii. Weaving the lower layer fabric (3) that forms the visible sides of the curtain by using knits of warp yarns and weft yarns, 35
 - iv. Connecting the upper part (2.1) of the middle layer fabric (2) with the upper layer fabric (1) with connection points (4) in a single weft and
 - v. Connecting the lower part (2.2) of the middle layer fabric (2) with the lower layer fabric (3) with connection points (4) in a single weft, diagonally with the connection mentioned in the previous step. 40
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6. The method according to claim 5, **wherein**; in the process step ii) the middle layer fabric (2) comprising the upper part (2.1) and the lower part (2.2) is woven by using double-faced satin knits with warp yarns and two different groups of weft yarns of high filament and black color. 50
7. The method according to claim 5, **wherein**; in the process step ii), preferably 150 denier 288 filament black micro yarns are used as weft yarns. 55
8. The method according to claim 5, **wherein**; with diagonally connection mentioned in the process

steps iv) and v), the lower layer floating fabric structure (3.1) is formed opposite to the connection point (4) that connecting the upper layer fabric (1) and the upper part (2.1) of the middle layer fabric (2) to each other and the upper layer floating fabric structure (1.1) is formed opposite to the connection point (4) that connecting the lower layer fabric (3) and the lower part (2.2) of the middle layer fabric (2) to each other.

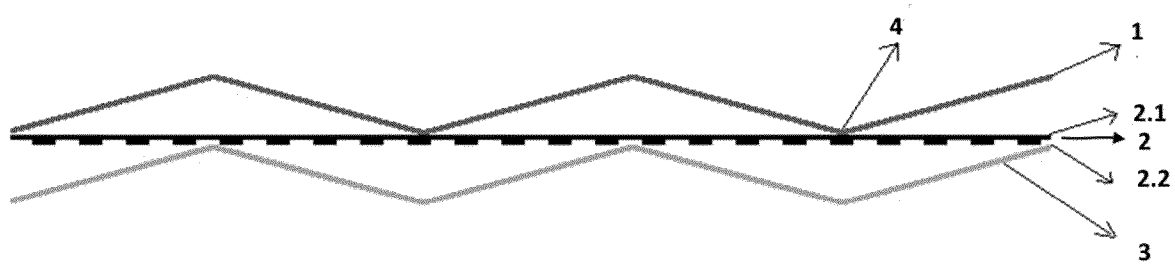


FIGURE 1



EUROPEAN SEARCH REPORT

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EPO FORM 1503 03.82 (P04C01)

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	CN 208 533 022 U (JIANGSU LUYI TEXTILE TECH CO LTD) 22 February 2019 (2019-02-22) * abstract * * claims 1-4 * * figures 1-3 * * paragraph [0002] - paragraph [0013] * * paragraph [0015] - paragraph [0024] * * paragraph [0028] - paragraph [0031] * -----	1-8	INV. D03D11/02 A47H23/14
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 6 February 2025	Examiner Heinzelmann, Eric
CATEGORY OF CITED DOCUMENTS 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 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			

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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