United States Patent	12392066
Kind Code	B2
Date of Patent	August 19, 2025
Inventor(s)	Kansteiner; Udo et al.

Arrangement comprising a visible seam and a lighting apparatus, use thereof, and method for producing the arrangement

Abstract

The invention relates to an arrangement comprising a visible seam, which is arranged in a sheet material part. The arrangement also includes a lighting apparatus, which is arranged beneath an underside of the sheet material part. The visible seam has an upper thread and a lower thread. The lower thread extends along the underside of the sheet material part in a direction. The upper thread has first thread portions along the upper side of the sheet material part and is guided, at stitch holes formed during the sewing process, through said stitch holes via second thread portions. By means of the lighting apparatus, emitted light passes into the second thread portions, into the stitch holes, and from there into the first thread portions. Some of the light propagates along the first thread portions, starting from an adjacent second thread portion, whereas another portion of the light exits from the first thread portion. In this way, the upper thread of the visible seam is illuminated.

Inventors: **Kansteiner; Udo (Witten, DE), Blockhaus; Frank (Velbert, DE), Schmidt; Julia (Esslingen, DE), Wagner; Holger (Duisburg, DE), Riethmueller; Christoph (Leonberg, DE), Pohl; Benjamin (Stuttgart, DE)**

Applicant: **Inteva Products Europe GmbH** (Solingen, DE)

Family ID: **1000008763387**

Assignee: **INTEVA PRODUCTS EUROPE GMBH (Solingen, DE)**

Appl. No.: **17/898072**

Filed: **August 29, 2022**

Prior Publication Data

Document Identifier	Publication Date
US 20220411981 A1	Dec. 29, 2022

Foreign Application Priority Data

Related U.S. Application Data

continuation parent-doc US 15673817 20170810 US 11427945 child-doc US 17898072

Publication Classification

Int. Cl.: **D05B79/00** (20060101); **B60Q3/54** (20170101); **D01H7/00** (20060101); **D02G3/26** (20060101); **D02G3/44** (20060101); **D05B15/00** (20060101); **D05B85/00** (20060101); **D05B93/00** (20060101); B60Q3/78 (20170101)

U.S. Cl.:

CPC **D05B79/00** (20130101); **B60Q3/54** (20170201); **D01H7/00** (20130101); **D02G3/26** (20130101); **D02G3/446** (20130101); **D05B15/00** (20130101); **D05B85/00** (20130101); **D05B93/00** (20130101); B60Q3/78 (20170201)

Field of Classification Search

CPC: D05B (79/00); D05B (15/00); D05B (85/00); D05B (93/00); D01H (7/00); D02G (3/26); D02G (3/446); B60Q (3/54); B60Q (3/78)

References Cited

U.S. PATENT DOCUMENTS

Patent No.	Issued Date	Patentee Name	U.S. Cl.	CPC
1647014	12/1926	Pattison	N/A	N/A
2214447	12/1939	Bave	N/A	N/A
2561756	12/1950	Shook	N/A	N/A
3641332	12/1971	Reick et al.	N/A	N/A
3641333	12/1971	Gendron	N/A	N/A
4210255	12/1979	Pan	N/A	N/A
4234907	12/1979	Daniel	N/A	N/A
4422719	12/1982	Orcutt	N/A	N/A
4523258	12/1984	Morse et al.	N/A	N/A
4652981	12/1986	Glynn	N/A	N/A
4724327	12/1987	Mitchell	N/A	N/A
4727603	12/1987	Howard	N/A	N/A
4839777	12/1988	Janko et al.	N/A	N/A
4947293	12/1989	Johnson et al.	N/A	N/A
5067831	12/1990	Robbins et al.	N/A	N/A
5070436	12/1990	Alexander et al.	N/A	N/A
5113325	12/1991	Eisenbraun	N/A	N/A
5134281	12/1991	Bryenton et al.	N/A	N/A
5206562	12/1992	Matsuno et al.	N/A	N/A
5366780	12/1993	Rapisarda	N/A	N/A
5375044	12/1993	Guritz	N/A	N/A

5430621	12/1994	Raskas	N/A	N/A
5477424	12/1994	Mocha	N/A	N/A
5502903	12/1995	Barker	N/A	N/A
5560677	12/1995	Cykana et al.	N/A	N/A
5611089	12/1996	Cretors	N/A	N/A
5647658	12/1996	Ziadi	N/A	N/A
5649755	12/1996	Rapisarda	N/A	N/A
5680496	12/1996	Burkitt, III et al.	N/A	N/A
5709448	12/1997	Jennings et al.	N/A	N/A
5813148	12/1997	Guerra	N/A	N/A
5857273	12/1998	Rapisarda	N/A	N/A
5879076	12/1998	Cross	N/A	N/A
5956818	12/1998	Tsubata	24/397	A44B 19/12
6059414	12/1999	Tsai	N/A	N/A
6116175	12/1999	Ito	N/A	N/A
6126233	12/1999	Gaetano et al.	N/A	N/A
6146006	12/1999	Cross	N/A	N/A
6238075	12/2000	Dealey, Jr. et al.	N/A	N/A
6352355	12/2001	Law	N/A	N/A
D458732	12/2001	Chain	N/A	N/A
6450678	12/2001	Bayersdorfer	N/A	N/A
6536928	12/2002	Hein et al.	N/A	N/A
6561684	12/2002	Reitze et al.	N/A	N/A
6655824	12/2002	Tufte	N/A	N/A
6736442	12/2003	Gebreselassie et al.	N/A	N/A
6773129	12/2003	Anderson, Jr. et al.	N/A	N/A
6851844	12/2004	Guy	N/A	N/A
6854869	12/2004	Fernandez	N/A	N/A
7020369	12/2005	Lodge, Jr. et al.	N/A	N/A
7134773	12/2005	Tufte	N/A	N/A
7221264	12/2006	Woo et al.	N/A	N/A
7234853	12/2006	Givoletti	N/A	N/A
7364315	12/2007	Chien	N/A	N/A
7397993	12/2007	Nave et al.	N/A	N/A
7431484	12/2007	Fong	N/A	N/A
7690318	12/2009	Dooley et al.	N/A	N/A
7735152	12/2009	Golle	N/A	N/A
7753542	12/2009	Bruce et al.	N/A	N/A
7766501	12/2009	Rapisarda	N/A	N/A
7987030	12/2010	Flores et al.	N/A	N/A
8215810	12/2011	Welch, Sr. et al.	N/A	N/A
8256945	12/2011	Choquet	N/A	N/A
8317247	12/2011	Beau et al.	N/A	N/A
8376564	12/2012	Finn	N/A	N/A
8376596	12/2012	Beau et al.	N/A	N/A
8482430	12/2012	Szczerba	N/A	N/A
8536075	12/2012	Leonard	N/A	N/A
9067530	12/2014	Bayersdorfer et al.	N/A	N/A

9335457	12/2015	Zimmermann	N/A	F21V 13/08
9440582	12/2015	Bayersdorfer et al.	N/A	N/A
9582973	12/2016	Leonard	N/A	G08B 5/004
9703029	12/2016	Wenzel et al.	N/A	N/A
9817169	12/2016	Wenzel et al.	N/A	N/A
9821196	12/2016	Lin	N/A	N/A
9905197	12/2017	Yamada	N/A	N/A
10053026	12/2017	Sato	N/A	N/A
10562446	12/2019	Cannon	N/A	N/A
10618465	12/2019	Laluet et al.	N/A	N/A
11124112	12/2020	Wimmer et al.	N/A	N/A
11427945	12/2021	Kansteiner	N/A	D02G 3/446
2008/0219017	12/2007	Cruickshank et al.	N/A	N/A
2009/0316401	12/2008	Choquet	N/A	N/A
2010/0195337	12/2009	Heite et al.	N/A	N/A
2010/0296302	12/2009	Welchm, Sr. et al.	N/A	N/A
2011/0000061	12/2010	Dooley et al.	N/A	N/A
2011/0032715	12/2010	Beau et al.	N/A	N/A
2011/0063872	12/2010	Irie	N/A	N/A
2011/0084852	12/2010	Szczerba	N/A	N/A
2011/0164406	12/2010	Chen et al.	N/A	N/A
2013/0026504	12/2012	Marx et al.	N/A	N/A
2013/0027955	12/2012	Grote, III et al.	N/A	N/A
2013/0027976	12/2012	Robbins et al.	N/A	N/A
2013/0077338	12/2012	Wenzel et al.	N/A	N/A
2015/0085519	12/2014	Ammar et al.	N/A	N/A
2015/0283941	12/2014	Wenzel et al.	N/A	N/A
2018/0044831	12/2017	Kansteiner et al.	N/A	N/A
2020/0123684	12/2019	Nishimura	N/A	N/A
2020/0324693	12/2019	Begalli et al.	N/A	N/A
2022/0104328	12/2021	Kim	N/A	N/A
2022/0153189	12/2021	Nascimento et al.	N/A	N/A

FOREIGN PATENT DOCUMENTS

Patent No.	Application Date	Country	CPC
20122840245	12/2012	CA	N/A
102066156	12/2010	CN	N/A
201890187	12/2010	CN	N/A
112356770	12/2020	CN	N/A
19724486	12/1997	DE	N/A
102012215164	12/2013	DE	N/A
102012216334	12/2013	DE	N/A
202014000342	12/2013	DE	N/A
102013202222	12/2013	DE	N/A
102014201730	12/2013	DE	N/A
102013015907	12/2014	DE	N/A

202015103947	12/2014	DE	N/A
102015113654	12/2015	DE	N/A
102014116758	12/2015	DE	N/A
102015103850	12/2015	DE	N/A
202017107616	12/2017	DE	N/A
102016114962	12/2017	DE	N/A
202020104604	12/2020	DE	N/A
3650752	12/2019	EP	N/A
2844868	12/2003	FR	N/A
2890152	12/2006	FR	N/A
2927859	12/2008	FR	N/A
2979412	12/2012	FR	N/A
2566258	12/2018	GB	N/A
2003201606	12/2002	JP	A41D 13/01
2009279999	12/2008	JP	N/A
3178627	12/2011	JP	N/A
2012228921	12/2011	JP	N/A
2015074328	12/2014	JP	N/A
2017065355	12/2016	JP	N/A
200459132	12/2011	KR	N/A
101776487	12/2016	KR	N/A
101956390	12/2018	KR	N/A
102057222	12/2018	KR	N/A
2248023	12/2004	RU	N/A
2287737	12/2005	RU	N/A
87027	12/2008	RU	N/A
9718105	12/1996	WO	N/A
9002906	12/2000	WO	N/A
2001019643	12/2000	WO	N/A
2004078518	12/2003	WO	N/A
2006117127	12/2005	WO	N/A
2013060834	12/2012	WO	N/A
2013090371	12/2012	WO	N/A
2014036629	12/2013	WO	N/A
2018225146	12/2017	WO	N/A
2019231723	12/2018	WO	N/A

OTHER PUBLICATIONS

US 10,822,731 B2, 11/2020, Kansteiner et al. (withdrawn) cited by applicant
English Abstract 2248023. cited by applicant
English Abstract 2287737. cited by applicant
English Abstract 87027. cited by applicant
EP SR, Issued May 18, 2015. cited by applicant
International Search Report for International Application No. PCT/US2012/057901; Date of Mailing Jan. 31, 2013. cited by applicant
Non-Final Office Action, Issued Mar. 21, 2017. cited by applicant
NonFinal Office Action, Issued Aug. 27, 2015. cited by applicant
Office Action dated Nov. 8, 2013 for U.S. Appl. No. 13/630,383; 21 pgs. cited by applicant
Written Opinion for International Application No. PCT/US2012/057901; Date of Mailing Jan. 31,

2013. cited by applicant
Notice of Allowance Mailed on Apr. 21, 2022; U.S. Appl. No. 15/673,817, filed Aug. 10, 2017; 13 pages. cited by applicant
International Preliminary Report on Patentability for International Application No. PCT/US2021/059861; Dated Jun. 1, 2023; 7 pages. cited by applicant
CN Office Action for Application No. 201710676053.9; Date Issued: May 8, 2021 (8 pages). cited by applicant
German Office Action for Application No. 10 2016 114 843.1; Date Issued: Jun. 8, 2017 (7 pages) (No English Translation). cited by applicant
International Search Report for International Application No. PCT/US2021/059861; Date of Completion: Mar. 21, 2022; Date of Mailing: Mar. 21, 2022; (3 Pages). cited by applicant
Notice of Allowance issued for U.S. Appl. No. 15/673,817 Dated: Jun. 12, 2020. cited by applicant
Notice of Allowance issued for U.S. Appl. No. 15/673,817 Dated: Jul. 15, 2021. cited by applicant
Notice of Allowance issued for U.S. Appl. No. 15/673,817 Dated: Jan. 5, 2022. cited by applicant
Non-Final Office Action issued for U.S. Appl. No. 15/673,817 Dated: Dec. 4, 2019. cited by applicant
Notice of Allowance issued for U.S. Appl. No. 15/673,817 Dated: Feb. 18, 2021. cited by applicant
Notice of Allowance issued for U.S. Appl. No. 15/673,817 Dated: Jun. 7, 2019. cited by applicant
Search Report for Application No. GB1712809.1 (3 pages). cited by applicant
Written Opinion for International Application No. PCT/US2021/059861; Date of Completion: Mar. 21, 2022; Date of Mailing: Mar. 21, 2022; (5 Pages). cited by applicant

---

Primary Examiner: Izaguirre; Ismael

Attorney, Agent or Firm: CANTOR COLBURN LLP

Background/Summary

CROSS REFERENCE TO RELATED APPLICATIONS (1) This application is a continuation of U.S. patent application Ser. No. 15/673,817 filed on Aug. 10, 2017, which claims priority under 35 U.S.C. § 119 to following German Patent application no. 10 2016 114 843.1, filed Aug. 10, 2016, the contents each of which are incorporated herein by reference thereto.

TECHNICAL FIELD
(1) The invention relates to an arrangement comprising a visible seam and a lighting apparatus for illuminating the visible seam. The invention additionally relates to the use of this arrangement and a method for production thereof.
BACKGROUND
(2) Visible seams are used today in a wide range of ways in the processing of sheet material parts, such as textile material parts, leather material parts, imitation leather material parts, plastic material parts, etc.
(3) The object of the invention is to improve the appearance of such visible seams and to extend the possibilities for use thereof.
SUMMARY
(4) An arrangement including a visible seam and a lighting apparatus, wherein the visible seam comprises an upper thread and a lower thread, wherein the upper thread comprises first thread portions extending along an upper side of a sheet material part and second thread portions, which run through stitch holes through the sheet material part and which are each interlaced with the lower thread at an underside of the sheet material part beneath each stitch hole, wherein the lighting

apparatus comprises one or more light sources and is adapted to emit light at a plurality of light emission locations beneath the underside of the sheet material part, wherein the lighting apparatus is adapted to couple the light emitted at the plurality of light emission locations into the second thread portions of the upper thread beneath the stitch holes, the light emitted at the plurality of light emission locations propagates along the second thread portions of the upper thread and, starting from the second thread portions propagates partially along adjacent first thread portions of the upper thread and is diffusely emitted in part by the first thread portions, wherein the upper thread comprises a plurality of multi-filament yarns wherein each one of the plurality of multi-filament yarns include filaments twisted together.

(5) An arrangement comprising a visible seam and a lighting apparatus, wherein the visible seam includes an upper thread and a lower thread, wherein the upper thread comprises first thread portions extending along an upper side of a sheet material part and second thread portions, which run through stitch holes through the sheet material part and which are each interlaced with the lower thread at an underside of the sheet material part beneath each stitch hole, wherein the lighting apparatus comprises one or more light sources and is adapted to emit light at a plurality of light emission locations beneath the underside of the sheet material part, wherein the lighting apparatus is adapted to couple the light emitted at the plurality of light emission locations into the second thread portions of the upper thread beneath the stitch holes, the light emitted at the plurality of light emission locations propagates along the second thread portions of the upper thread and, starting from the second thread portions propagates partially along adjacent first thread portions of the upper thread and is diffusely emitted in part by the first thread portions, wherein the upper thread and the lower thread each comprise a plurality of multi-filament yarns wherein each one of the plurality of multi-filament yarns include filaments twisted together.

(6) An arrangement comprising a visible seam and a lighting apparatus, wherein the visible seam includes an upper thread and a lower thread, wherein the upper thread comprises first thread portions extending along an upper side of a sheet material part and second thread portions, which run through stitch holes through the sheet material part and which are each interlaced with the lower thread at an underside of the sheet material part beneath each stitch hole, wherein the lighting apparatus comprises one or more light sources and is adapted to emit light at a plurality of light emission locations beneath the underside of the sheet material part, wherein the lighting apparatus is adapted to couple the light emitted at the plurality of light emission locations into the second thread portions of the upper thread beneath the stitch holes, the light emitted at the plurality of light emission locations propagates along the second thread portions of the upper thread and, starting from the second thread portions propagates partially along adjacent first thread portions of the upper thread and is diffusely emitted in part by the first thread portions, wherein the upper thread has a smaller cross-section than the lower thread.

(7) A method for producing an arrangement including a visible seam and a lighting apparatus, wherein the visible seam comprises an upper thread and a lower thread, wherein the upper thread comprises first thread portions extending along an upper side of a sheet material part and second thread portions, which run through stitch holes through the sheet material part and which are each interlaced with the lower thread at an underside of the sheet material part beneath each stitch hole, wherein the lighting apparatus comprises one or more light sources and is adapted to emit light at a plurality of light emission locations beneath the underside of the sheet material part, wherein the lighting apparatus is adapted to couple the light emitted at the plurality of light emission locations into the second thread portions of the upper thread beneath the stitch holes, the light emitted at the plurality of light emission locations propagates along the second thread portions of the upper thread and, starting from the second thread portions propagates partially along adjacent first thread portions of the upper thread and is diffusely emitted in part by the first thread portions, wherein the upper thread comprises a plurality of multi-filament yarns wherein each one of the plurality of multi-filament yarns include filaments twisted together, including the following steps: producing

the visible seam, wherein the upper thread is pulled from the upper side of the sheet material part through the stitch holes formed by using a sewing needle, and wherein a cross-sectional area of the sewing needle is smaller than twice a cross-sectional area of the upper thread, providing the lighting apparatus having the plurality of light emission locations beneath the underside of the sheet material part.

(8) A visible seam in the present application is understood to mean a seam that is at least partially visible on the end product. The visible seam can be just a stitching, or a combination of a stitching and a functional or connecting seam. The visible seam can thus be used not only as a stitching element, but also to connect a plurality of sheet material parts.

(9) The arrangement according to the invention comprises a visible seam and a lighting apparatus. The visible seam is introduced into a sheet material and has an upper thread on the upper side of the sheet material part and a lower thread on the underside of the sheet material part. Any two-dimensional or three-dimensionally-shaped sheet material that can be handled or processed by sewing can be used as sheet material part. Such sheet materials can be, by way of example, a covering of a panel in a vehicle interior (door, fittings, roof lining, etc.) or a seat covering of a vehicle seat. The sheet material part can be, for example, a textile material (for example a fabric), leather, imitation leather, or a plastic film, etc.

(10) The upper thread has first thread portions running along the upper side of the sheet material part. The first thread portions are adjoined by second thread portions of the upper thread, which run through stitch holes in the sheet material part from the upper side to the underside, or vice versa. Two second thread portions of the upper thread extend through each stitch hole. Beneath the stitch hole, the two second thread portions are connected to or interwoven with the lower thread of the visible seam.

(11) The directly adjacent stitch holes of the visible seam are arranged at a distance from one another preferably ranging from 2 to 10 mm and in particular ranging from 4 to 6 mm. The length of the first thread portion of the upper thread corresponds to the distance between directly adjacent stitch holes.

(12) The arrangement additionally comprises a lighting apparatus which has one or more light sources. The lighting apparatus is adapted to emit light at a plurality of light emission locations beneath the underside of the sheet material part. The light emission locations are arranged in at least one row on the underside in the direction of the visible seam. The light emission locations do not have to be arranged in a plane running at right angles to the sheet material part along the visible seam. The light emission locations can also be arranged offset to this plane in one or more rows beneath the underside of the sheet material. In a preferred exemplary embodiment, each light emission location is formed by a separate light source of the lighting apparatus, for example a semiconductor light source, such as a light-emitting diode.

(13) The light emitted at the light emission locations is directed directly—or indirectly after one or more reflections—towards the second thread portions beneath each stitch hole and is coupled there into the second thread portions of the upper thread. The light propagates along the fibers or filaments of the second thread portions through the stitch hole to the upper side of the sheet material. At the upper side, the light is emitted partially from the subsequent first thread portion of the upper thread and is conducted along the first thread portion partially by reflections at the fibers or filaments of the upper thread. Some of the light exits at each location along the first thread portions. The amount of light propagating along a first thread portion thus decreases with increasing distance from a stitch hole. Since each first thread portion connects two stitch holes, a substantially constant brightness of the emitted light is nevertheless achieved along a first thread portion. This is because some of the light that is directed along the upper thread by the second thread portions of adjacent stitch holes is still present in the middle between two stitch holes. An emission of light that is relatively constant to an observer can thus be achieved along the first thread portions.

(14) It is preferred if the distance between two directly adjacent light emission locations in the direction of the visible seam is different from the distance between directly adjacent stitch holes of the visible seam. It is thus possible to use a smaller number of lighting means or light-emitting diodes or light emission locations to achieve a constant illumination of the visible seam.
(15) The second thread portions bear tightly against the sheet material within the stitch holes. A direct, straight emission of light through gaps between the two second thread portions and the peripheral wall of the sheet material part delimiting a stitch hole is substantially completely avoided. This results in the effect that merely the upper thread illuminates the visible seam. Light does not run past the upper thread upwardly through the stitch holes.
(16) The direct emission of light through the stitch holes is also reduced or avoided by the lower thread, which extends beneath the stitch holes. In a preferred exemplary embodiment the cross-section or the thickness of the lower thread is greater than that of the upper thread. The lower thread can therefore cover the stitch hole, at least for the most part, at the underside of the sheet material.
(17) The lower thread is constructed in such a way that the fibers or filaments of the lower thread primarily extend at right angles to the orientation of the stitch holes. The main direction of orientation of the fibers or filaments is therefore in the direction of extension of the lower thread and not transversely thereto. Light that contacts the lower thread from the light emission locations is reflected there. A greater light emission intensity in the region of the stitch holes at the upper side of the sheet material is thus also avoided.
(18) In a preferred embodiment, the upper thread and/or the lower thread are/is embodied as a multi-filament yarn. Here, the twist of the upper thread embodied as a multi-filament yarn can be less than the twist of the lower thread embodied as a multi-filament yarn.
(19) In order to achieve a light perception that is as constant as possible, it is advantageous if the twist of the upper thread embodied as a multi-filament yarn is as small as possible. For a suitable sewing behavior and a uniform seam pattern, a minimum twist is required so that the filaments are sufficiently connected to one another. In one exemplary embodiment, the twist of the upper thread can lie in a range of 20-400 twists per meter.
(20) For the lower thread, the same principles apply as for the upper thread. However, in the case of the lower thread, greater attention can be placed on the sewing behavior, since the lower thread must not conduct any light along its extent. The twist of the lower thread embodied as a multi-filament yarn can preferably range from 20-400 twists per meter and can also be up to 1000 twists per meter.
(21) The upper thread and/or the lower thread can be embodied as twine. The twine can contain a plurality of twisted multi-filament yarns. The number of steps in which in each case a plurality of filaments or twisted multi-filament yarns are twisted with one another can be selected here suitably. At the least, two such steps are provided in order to form the twine. In one exemplary embodiment, a plurality of filaments are twisted in the first step to form in each case a multi-filament yarn. In a second step, these multi-filament yarns are in turn twisted with one another. The twisting in the first step by way of example can be embodied as an S-twist, and the twisting in the second step can be embodied as a Z-twist, or vice versa. It is also possible to select the direction of twisting in both twisting steps to be in the same direction.
(22) In the case of twine, a twisting of 20-400 twists per meter can be selected in each step. It is advantageous if, with twisting in the same direction in both steps, the sum of the twists in the two steps is at least 20 twists per meter and for the upper thread does not exceed 400 twists per meter and for the lower thread does not exceed 400 or up to 1000 twists per meter. With twisting directions in opposite directions in the first step and in the second step, it is preferred if the difference from the twist of the first step minus the twist of the second step ranges from 20-400 twists per meter for the upper thread and ranges from 20-400 twists per meter and at most up to 1000 twists per meter for the lower thread.

(23) An auxiliary, such as wax, oil, etc., can be added to the upper thread and/or the lower thread in order to improve the sewing behavior. It is also possible to add this auxiliary just to one or more yarns of a twine.
(24) The twist of the upper thread and/or lower thread embodied as a multi-filament yarn is less than that which would be used for a conventional sewing yarn in order to attain a good thread cohesion and a good sewability. The smaller twist can improve the desired propagation of part of the coupled-in light along the upper thread.
(25) It is advantageous if the upper thread and/or lower thread is colored. In a preferred exemplary embodiment, the upper thread or the lower thread is white or appears to be white, since substantially all light wavelengths of visible light will be reflected. Other colors, such as blue, red, etc., can also be used. The upper thread and/or lower thread can be colored by addition of pigments.
(26) The upper thread preferably has a smaller mass per meter (tex) than the lower thread.
(27) In a preferred embodiment, the first thread portions of the upper thread form a first thread layer. A second thread layer can be applied to this first thread layer by means of at least one additional thread, preferably by stitching. The orientation of the thread portions of the at least one additional thread in the second thread layer can be at right angles and/or obliquely and/or parallel to the first thread portions of the upper thread. The thread portions of the at least one additional thread are preferably arranged parallel to one another in the second thread layer. The threads of the second thread layer by way of example can form a letter, a number, a symbol, a logo or any other symbol to be illuminated. Backlit elements can thus be created in the sheet material part.
(28) In a preferred embodiment, the sheet material part is sewn to a further sheet material part by means of a connecting seam, adjacently to the visible seam. Here, both sheet material parts can have a visible seam adjacently to the connecting seam. The sheet material parts are held together by the connecting seam. The at least one visible seam does not have a fixing function for holding together the two sheet material parts.
(29) It is advantageous if at least one shielding means is provided at or adjacently to the connecting seam. By means of the at least one shielding means, the passage of light through the connecting seam or through the contact region between the two sheet material parts from the underside to the upper side can be at least reduced and in the ideal case completely prevented. Here, the at least one shielding means is at least partially impermeable for the emitted light wavelength. The shielding means can be formed by a non-transparent sheet, by a non-transparent close-meshed textile or lattice structure, or the like.
(30) In one exemplary embodiment, the shielding means is formed by a seam tape or comprises a seam tape. The connecting seam by way of example can comprise two seam tapes, one on each of the two sheet material parts.
(31) In a further preferred exemplary embodiment at least one supporting body is provided. In one exemplary embodiment, a supporting body is provided in the region of each visible seam. The supporting body is designed in each case to support an associated sheet material part at the underside. The supporting body by way of example can be formed from a resilient material. The supporting body is preferably produced from a material that is transparent for the emitted light wavelength.
(32) It is advantageous if the shielding means is arranged or formed on the supporting body. By way of example, no or only a few structures or areas permeable to light can be provided or formed on the supporting body adjacently to the connecting seam. Corresponding microstructures or reflection areas can be provided in the supporting body, at which microstructures or reflection areas the impinging light is reflected and directed away from the connecting seam.
(33) The lighting apparatus can comprise at least one delimiting face for the arrangement of the light emission locations. By way of example, it is advantageous if three delimiting faces adjoining one another form a channel delimited on three sides, for example a U-shaped or groove-shaped

channel, which for example can be arranged beneath the associated visible seam. The cross-sectional shape of the channel can be selected arbitrarily and can also vary along the extent of the channel. The at least one delimiting face is preferably diffusely reflective and by way of example can be formed from a face with appropriate roughness, preferably a white face.
(34) Since the lighting apparatus is disposed beneath the underside of the sheet material part, it is covered by the sheet material part in the use position or installed position and is not visible to the observer.
(35) As explained, the above-described arrangement can be used advantageously in an interior of a vehicle, in particular a motor vehicle, aircraft, rail vehicle or watercraft. The sheet material part can therefore be used for example to provide a covering on the roof lining, in a door, or on the dashboard. The sheet material part can also be part of a seat covering.
(36) When producing the arrangement, a visible seam is produced in the sheet material part with the aid of a sewing needle. The upper thread is drawn through a stitch hole by means of the sewing needle. The stitch hole is formed in the sheet material by the sewing needle. The needle cross-section is selected in such a way that a close fit of the two second thread portions within the stitch hole with the sheet material part, substantially without gaps, is produced by the resilient properties of the upper thread and the sheet material. The needle cross-section is in particular selected to be as small as possible. The lighting apparatus with the light emission locations is arranged beneath the underside of the sheet material. The light emission locations are preferably arranged at a distance from one another along the visible seam.
(37) The distance between the light emission locations or the light sources and the lower thread is between 0 mm and 50 mm. With use of light-emitting diodes which are arranged at the light emission locations, the spacing is preferably 5-15 mm.
(38) The cross-section of the sewing needle in the case of the method can be selected to be all the smaller, the lower is the resilience of the sheet material part.
(39) Advantageous embodiments of the invention will become clear from the dependent claims, the description, and the drawings.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
(1) Preferred embodiments of the invention will be explained in greater detail hereinafter on the basis of the accompanying drawings, in which:
(2) FIG. **1** shows a schematic, block diagram-like illustration of an exemplary embodiment of an arrangement comprising a visible seam in a sheet material part and a lighting apparatus,
(3) FIG. **2** shows a schematic basic diagram of the propagation of the light through part of an upper thread of the visible seam from FIG. **1**,
(4) FIG. **3** shows a highly schematic basic illustration of an exemplary embodiment of the arrangement in the direction of the visible seam,
(5) FIGS. **4**-**6** each show a basic illustration of an exemplary embodiment of an arrangement with two sheet material parts connected to one another at a connection location by means of a connecting seam,
(6) FIG. **7** shows a schematic basic illustration of a further exemplary embodiment of an arrangement with two thread layers arranged one above the other on the upper side of the sheet material part,
(7) FIG. **8** shows an exemplary schematic illustration of a symbol formed by a second, upper thread layer,
(8) FIG. **9** shows a basic illustration of an exemplary embodiment of an arrangement with two sheet material parts connected to one another at a connection location by means of a connecting

seam, and
(9) FIG. **10** shows a schematic illustration for producing a twine for an upper thread and/or lower thread in two steps.

DETAILED DESCRIPTION

(10) FIG. **1** schematically shows an exemplary embodiment of an arrangement **10** comprising a sheet material part **11** with a visible seam **12** and a lighting apparatus **13**. The sheet material part can be a flexible two-dimensional fabric which is provided with a visible seam **12** by sewing and which can be connected to other sheet material parts **11**, in particular by sewing. The sheet material part by way of example can be a textile material part or can consist of leather, imitation leather, or plastic. The sheet material part **11** can also have a three-dimensionally shaped form. For example, it can be formed by a film which is brought into a desired three-dimensional form by means of a contour tool and is cured in this form. A three-dimensionally shaped sheet material of this type can be referred to as a molded skin. The molded skin can also have one or more visible seams. A molded skin of this type can be produced alternatively also by means of a process of spraying with PU materials or in a rotational sintering process ("slushing"). Such three-dimensionally shaped sheet material parts can be provided with the visible seam in a state in which the three-dimensional form has already been produced.
(11) The sheet material part **11** has an upper side **11***a* and an underside **11***b*. In use, the upper side **11***a* faces towards a user or observer. The underside **11***b* is not visible in the use state. A sheet material part **11** with a visible seam **12** is used by way of example in vehicle interiors of vehicles, for example in motor vehicles. For example, internal door trims, fittings or seats can be equipped with an arrangement **10**, in which the sheet material part forms the visible top layer so to speak.
(12) The visible seam **12** has an upper thread **17** and a lower thread **18**. The lower thread **18** extends in a manner adjacent to the underside **11***b* of the sheet material part **11**. The upper thread **17** is stabbed or pulled through the sheet material part **11** with the aid of a sewing needle. During this process, the sewing needle forms a stitch hole **19** in the sheet material part **11**. The upper thread **12** is pulled from the upper side **11***a* through the stitch hole **19** to the underside **11***b* and, there, is connected to or interwoven with the lower thread **18**. In so doing, the upper thread **17** forms a loop, through which the lower thread **18** passes.
(13) The upper thread **17** has first thread portions **17***a*, which each extend along the upper side **11***a* of the sheet material part **11** between two directly adjacent stitch holes **19**. At each stitch hole **19**, the upper thread **17** forms two second thread portions **17***b*, wherein the two second thread portions **17***b* pass through the stitch hole **19** and are interwoven with the lower thread **18** at the underside **11***b*. At the upper side **11***a*, the second thread portions **17***b* each transition into a first thread portion **17***a*.
(14) The visible seam **12** extends in a direction R along the sheet material part **11**. Here, the direction R of the visible seam **12** is considered to be, at any point, the direction in which the first thread portions **17***a* extend between two stitch holes **19** or the direction in which the lower thread **18** extends. The direction R—in contrast to the schematic illustration in the drawings—can have an arbitrary course as considered over a multiplicity of stitch holes **19** and on the whole can form straight portions and/or curved portions.
(15) The cross-section of the sewing needle for the upper thread **17** is selected such that this is smaller than, or at most the same size as the overall cross-section of the two second thread portions **17***b* guided through the stitch hole **19**. Due to the resilience of the sheet material part **11** and the upper thread **17**, the two second thread portions **17***b* can lie closely against one another once the sewing needle has been pulled out from the stitch hole **19**, and it is possible that they do not leave a linear light gap passing through the stitch hole.
(16) In accordance with the example, the cross-sectional area of the upper thread **17** is smaller than the cross-sectional area of the lower thread **18**. The upper thread **17** has a greater fineness. In other words, the weight per meter of the upper thread **17** is smaller than the weight per meter of the lower

thread **18**. in FIG. **2** this has been illustrated by way of example in that the cross-sectional contours, assumed by way of example to be circular, are of different sizes and the diameter d**1** of the upper thread **17** is smaller than the diameter d**2** of the lower thread **18**.

(17) As has been illustrated schematically in FIG. **2**, both the upper thread **17** and the lower thread **18** are each embodied in accordance with the example as a multi-filament yarn. The individual filaments are twisted with one another in this case. The number of twists per meter in the case of the upper thread **17** can be lower than in the case of the lower thread **18**. As is also illustrated schematically in FIG. **2**, the twisted filaments of the lower thread **18** run primarily in a direction R in which the visible seam **12** extends.

(18) FIG. **10** by way of example shows an exemplary embodiment for producing an upper thread **17** and/or a lower thread **18**. Here, the thread **17**, **18** is embodied as a twine **20**. In accordance with the example, a plurality of multi-filament yarns with a first number of twists per meter are produced in a first step S**1**. In a second step S**2**, the multi-filament yarns produced in the first step are then connected to one another by twisting to form the twine **20**. Here, the number of twists per meter in the first step S**1** can be different from the number of twists in the second step S**2**. In addition, the direction of twisting in the two steps S**1**, S**2** can be the same or different. In the first step S**1**, the multi-filament yarns can each have the same or also different directions of twist (S-twist and/or Z-twist). In accordance with the example, the multi-filament yarns are formed in the first step S**1** by an S-twist and the produced multi-filament yarns are connected by a Z-twist in the second step S**2** to form the twine. The number of twists per meter can lie for example in the range of 20-400 twists per meter in each step S**1**, S**2**. With twisting in the same direction in both steps S**1**, S**2**, the sum of the twists per meter for the upper thread preferably lies in the range of 20-400 twists per meter and for the lower thread **18** is preferably also up to 1000 twists per meter. With twisting in different directions in the two steps S**1**, S**2**, the difference of the twists in the first step minus the twists in the second step for the upper thread is in the range of 20-400 twists per meter and for the lower thread is 20-400 or up to 1000 twists per meter.

(19) The lighting apparatus **13** has at least one light source, and in the exemplary embodiment a plurality of light sources **23**. The electrical connection of the light sources **23** to a control unit for controlling or stipulating the light output is not illustrated in the drawings. Here, commercially available control means can be used. The at least one light source **23** is preferably a semiconductor light source, and in the exemplary embodiment is a light-emitting diode.

(20) In the direction R of the visible seam **12**, the lighting apparatus **13** forms a plurality of light emission locations **24** distanced from one another. Light is emitted at each light emission location **24** in the direction of the underside **11***b* of the sheet material part **11**. In the preferred exemplary embodiment described here, a separate light source **23**, and in accordance with the example a light-emitting diode, is arranged at each light emission location **24**. The distance in the direction R between two directly adjacent light emission locations **24** is different in the exemplary embodiment from the distance between two directly adjacent stitch holes **19**. Here, the distance between the light emission locations **24** can be larger than that between the stitch holes **19** as considered in the direction R.

(21) The light sources **23** are also arranged at a distance from the underside **11***b* of the sheet material part **11**. The distance between the light sources **23** in the direction R is dependent here on the light emission angle of the individual light sources **23** and on the distance from the underside **11***b*. It is preferably selected such that, in particular at each stitch hole **19**, substantially the same radiation intensity is present at the underside **11***b* along the visible seam **12**.

(22) In contrast to the illustrated exemplary embodiments, it is also possible to select the distance between the light sources **23** and the stitch holes **19** in the direction R to be of equal size. Here, the light sources **23** are preferably not arranged directly in the extension of a stitch hole **19**, but instead are arranged offset between two stitch holes **19**, and in accordance with the example centrally therebetween. This measure can also result in the avoidance of a direct linear emission of light

through a gap in a stitch hole **19** from the underside **11***b* to the upper side **11***a*.
(23) By means of the lighting apparatus **13**, the upper thread **17** is illuminated so to speak. The first thread portions **17***a* in the ideal case emit light over their entire course with the same radiation intensity. The arrows indicated in FIG. **2** schematically illustrate the light emitted by a light source **23**. The light emitted at a light emission location **24** can contact a second thread portion **17***b* either directly or—as illustrated schematically in FIG. **1**—can be reflected once or more before it contacts a second thread portion **17***b* and is coupled in there. The light coupled into the second thread portions **17***b* beneath a stitch hole **19** is reflected at the filaments of the upper thread **17**. Due to the filaments running primarily in the direction of extension of the upper thread **17** or the corresponding thread portion **17***a*, **17***b*, some of the light propagates in the direction in which the upper thread **17** runs. Another portion of the light exits from the upper thread **17** at the upper side **11***b* into the first thread portions **17***a*. The upper thread **17** emits light and lights up. Starting from a stitch hole **19**, the light propagating along a first thread portion **17***a* of the upper thread **17** decreases. Since light is coupled into a first thread portion **17***a* by two adjacent stitch holes **19** and the second thread portions **17***b* provided there, the light is added in a central region of the first thread portion **17***a* between two stitch holes **19**. An overall uniform radiation intensity of the emitted light from a first thread portion **17***a* can thus be achieved. In the exemplary embodiment, the distance between two adjacent stitch holes **19** is selected in accordance with the example to be less than 10 mm and preferably less than 6 mm. the distance in the direction R between two stitch holes **19** is preferably at least 2 mm and preferably at least 4 or 5 mm.
(24) The lower thread **18** is disposed beneath each stitch hole **19**. Due to a larger diameter or cross-section than that of the upper thread **17**, the lower thread **18** covers the stitch hole **19** completely or for the most part. As a result of this measure, light is also prevented from passing directly straight through a gap in the stitch hole **19**. If light were to pass through a light gap of a stitch hole **19** to the upper side, the stitch hole **19** itself would then appear to be illuminated, and not only the upper thread **17**. A visual impression of this type should be avoided.
(25) Due to the filaments of the lower thread **18**, this is additionally diffusely reflective. The orientation of the filaments of the lower thread **18** also reduces or blocks the direct emission of light through a stitch hole **19**.
(26) It should be noted at this juncture that, in contrast to the present preferred exemplary embodiment, the upper thread **17** and/or lower thread **18** can additionally also comprise fibers or can comprise fibers instead of filaments.
(27) FIGS. **3** and **4** schematically show an embodiment in which the light emission locations **24** or the light sources **23** are arranged in a groove-like channel **25**. The channel **25** is open towards the underside **11***b* of the sheet material part **11**. It has three delimiting faces **26**. The bottom face **27** opposite the underside **11***b* constitutes a delimiting face **26**, which at the same time is designed as a mounting face for the light sources **23**. The bottom face **27** is adjoined on opposite sides in each case by a side face **28**, which side faces each form a further delimiting face **26**. The two side faces **28** face towards one another and are arranged in a transverse direction Q, at right angles to the direction R, at a distance from one another on opposite sides of the visible seam **12** or the lower thread **18**.
(28) The design of the channel **25** is in principle freely selectable and can deviate from the illustration. The channel **25** can have an arbitrary cross-section which is open towards the underside **11***b* of the sheet material part **11** and which can also vary along the channel **25**.
(29) At least one of the provided delimiting faces **26** is diffusely reflective. It can have a corresponding roughness. The at least one delimiting face **26** is preferably light, for example white or metallic grey.
(30) In the exemplary embodiments illustrated in FIGS. **4-6**, two sheet metal parts **11** are connected to one another at a connection location **32**. For this purpose, an edge-side portion of each sheet material part **11** is folded down away from the upper side **11***a*, and the two sheet material parts **11**

are placed against one another by means of these edge-side portions and are connected there. In the exemplary embodiment a connecting seam **33** is provided in these edge-side portions. Additionally or alternatively, the two sheet material parts **11** could also be glued or otherwise connected to one another at the connection location **32**. In accordance with the example, a connection by means of a connecting seam **33** is provided exclusively.

(31) A sheet material part **11** can also have a visible seam applied outside a connection location **32** as decoration, for example in a three-dimensionally formed molded skin.

(32) In the illustrated exemplary embodiments, a visible seam **12** is provided in each sheet material part **11** adjacently to the connecting seam **33** in the transverse direction Q. The connecting seam **33** or the connection location **32** and the visible seams **12** extend in each case substantially parallel to one another in the direction R.

(33) In the exemplary embodiments according to FIGS. **4** and **5**, both visible seams **12** are assigned a joint lighting apparatus **13**. Here, a single row of light emission locations **24** or light sources **23** can be provided in the direction R. The light thereof irradiates in the direction of both visible seams **12**. Alternatively, it is also possible to assign each visible seam **12** a separate lighting apparatus **23**, said apparatuses having their own light emission locations **24** or light sources **23**. Such an embodiment is illustrated by way of example in FIG. **6**.

(34) In order to avoid a passage of light at the connection location **32** and in accordance with the example at the connecting seam **33**, at least one shielding means **34** can be provided there. This shielding means **34** serves to prevent or at least reduce the passage of light at the connecting seam **33** or the contact face of the two sheet material parts **11** at the connection location **32**. The at least one shielding means **34** is illustrated merely in a highly schematized and dashed manner in FIG. **4**. By means of the at least one shielding means **34**, the entry of light into the stitch holes of the connecting seam **33** can be reduced or blocked. In addition, the entry of light into the region of the contact face between the two sheet material parts **11** at the connection location **32** can be blocked or reduced.

(35) A shielding means **34** can be formed by way of example by a seam tape **35** or may comprise a seam tape **35** of this type. In the case of the exemplary embodiment illustrated schematically in FIG. **5**, a seam tape **35** is provided along the connecting seam **33** on both sheet material parts **11** and reduces or blocks the entry of light into the stitch holes of the connecting seam.

(36) In the case of a further embodiment of the arrangement **10**, as illustrated in FIG. **5**, at least one supporting body **40** is provided. In the exemplary embodiment illustrated in FIG. **5**, the supporting body **40** is produced from a material that is permeable for the light emitted by the lighting apparatus **13**. The at least one supporting body **40** supports the assigned sheet material part **11** on the underside **11***b* thereof. In the region of the connection location **32**, the two sheet material parts **11** can be assigned a common supporting body **40** or alternatively can each be assigned their own supporting body **40**.

(37) A shielding means **34** is provided in the gap between the connection location **32** or the connecting seam **33** and the light emission locations **24** or the light sources **23**, and in accordance with the example is arranged on the supporting body **40** or is formed on the supporting body **40**. By way of example, the region of the supporting body **40** beneath the connection location **32** or the connecting seam **33** can be formed by a microstructure and/or by a coloring and/or by application of a material hindering or preventing the passage of light, as shielding means **34**. An embodiment of this type is illustrated in FIG. **5** in a highly schematized manner by the dashed region of the supporting body **40**. This region is dimensioned and positioned such that light emitted by the light emission locations **24** does not impinge on the connection location **32** between the sheet textile parts **11**, but the emission of light is enabled, unhindered, in the direction of the visible seams **12**.

(38) The channel **25** for arranging the light emission locations **24** or the light sources **23** can also be formed in the supporting body **40**. Such an embodiment is illustrated by way of example in FIG. **6**. There, a channel **25** is provided beneath each visible seam **12**. It is also possible to form the

channel **25** in the supporting body **40** if both visible seams **12** are assigned a common lighting apparatus **13**, as is illustrated by way of example in the exemplary embodiments according to FIGS. **4** and **5**. The channel is then preferably positioned between the two visible seams **12** in the transverse direction Q.

(39) In the exemplary embodiment illustrated in FIG. **6**, the supporting body **40** can be produced from any material. The material does not necessarily have to be transparent for the emitted light wavelength. The delimiting faces **26** delimiting the channels **25** on three sides, these delimiting faces being formed by the supporting body **40** itself in accordance with the example, are preferably diffusely reflective, as has been explained on the basis of the channel **25** according to FIGS. **3** and **4**. Here, the light can leave the channel **25** merely at the underside **11***b* of the corresponding sheet material part **11** and consequently in the direction of the visible seam **12**. Additional shielding means in the region of the connection location **32** therefore are not necessary. Seam tapes **35** can still be provided for reasons relating to the sewing process.

(40) A further exemplary embodiment of the arrangement **10** is illustrated in FIG. **9**. A plurality of light emission locations **24** or light sources **23** are arranged beneath each of the two visible seams **12**. The supporting body **40** is arranged within the channel **25** between these two arrangements of light emission locations **24** or light sources **23** and divides the channel **25** into two channel portions, which are separated at a distance from one another in the transverse direction Q by the supporting body **40**. The supporting body **40** is fastened to, or on the bottom face **27**. The fastening can be implemented for example in a frictionally engaged and/or positively engaged and/or integrally bonded manner. In the case of the exemplary embodiment, the supporting body **40** has a plurality of pins **36**, which are arranged at a distance from one another in the direction of the channel **25** and which each protrude through an assigned hole in the bottom of the body forming the channel **25**. On the outside, the pin **36** can be shaped to have a widened head, whereby a positively engaged and optionally additionally integrally bonded connection can be created between the supporting body **40** and the channel bottom.

(41) On the side opposite the bottom or the bottom face **27**, which side faces the underside **11***b* of the sheet material parts **11**, the supporting body **40** has a supporting face **37**. A region of the sheet material part **11** rests on the supporting face **37**. A gap remains between each side face **28** and the supporting body **40**, said gap having a sufficiently small dimension in the transverse direction Q so that, when the sheet material part **11** is loaded, a sufficiently good supporting effect is provided and the sheet material part **11** is not pushed into the channel **25** through the gap or is only slightly pushed in this way.

(42) In order to receive the two end portions of the sheet material parts **11** in the region of the connection location **32**, a receiving recess **38** is provided, which extends at right angles to the transverse direction Q along the extent of the channel **25** through the supporting body **40**. There, the end portions are received with the connecting seam **33**. The receiving recess **38** can have any cross-section adapted thereto. The receiving recess **38** divides the supporting face **37** into two face regions. Between each side face **28** and the supporting body **40**, there is provided the corresponding visible seam **12** in the sheet material parts **11** in the region of the remaining gap.

(43) Depending on the course of the connection location **32** or the visible seams **12**, a plurality of separate supporting bodies **40** can be arranged adjacently. The supporting bodies **40** can extend along the channel **25** in a straight line and/or in a curved fashion and consequently in a manner adapted to the course of the connection location **32** and the visible seams **12**.

(44) FIGS. **7** and **8** show a further variant or possible use of the arrangement **10**. The first thread portions **17***a* of the upper thread **17** of a visible seam **12** here form a first thread layer **41**, which is directly adjacent to the upper side **11***a* of the sheet material part **11** or rests directly thereon. A second thread layer **42** can be arranged on the first thread layer **41**. The second thread layer **42** consists of portions of one or more additional threads **43**, which for example form the second thread layer **42** by being stitched above the first thread layer **41**. The at least one additional thread

43 is preferably connected to the sheet material part **11** at the edge adjacent to the first thread layer **41**. This provides the possibility to emit the light indirectly via the first thread portions **17***a* and the second thread layer **42**. The first thread layer **41** with the first thread portions **17***a* can be arranged for optimization of a uniform emission of light and for example the length, number, orientation and distribution of the first thread portions **17***a* can be selected accordingly. Due to the additional second thread layer **42**, a second layer **42** conveying a good optical impression—even in the non-illuminated state—can be stitched with additional threads **42**. By way of example, lettering, logos, symbols, numbers, letters or any combination thereof can be formed. An arrow symbol is stitched in FIG. **8** by the additional threads **43**, merely by way of example. The first thread layer **41** is disposed beneath these additional threads **43**. The arrow symbol consequently can be illuminated. The described exemplary embodiments of the arrangement **10** are therefore also suitable for the presentation of illuminated symbols, characters, letters, numbers, logos, etc.

(45) The invention relates to an arrangement **10** having a visible seam **12**, which is arranged in a sheet material part **11**. The arrangement **10** also includes a lighting apparatus **13**, which is arranged beneath an underside **11***b* of the sheet material part **11**. The visible seam **12** has an upper thread **17** and a lower thread **18**. The lower thread **18** extends in a direction R along the underside **11***b* of the sheet material part **11**. The upper thread **17** has first thread portions **17***a* along the upper side **11***a* of the sheet material part **11** and, when sewn, is guided at stitch holes **19**, through said holes via second thread portions **17***b*. By means of the lighting apparatus **13**, emitted light passes into the second thread portions **17***b*, into the stitch holes **19**, and from there into the first thread portions **17***a*. Some of the light propagates along the first thread portions **17***a* starting from an adjacent second thread portion **17***b*, whereas another portion of the light exits from the first thread portion **17***a*. In this way, the upper thread **17** of the visible seam **12** is illuminated.

LIST OF REFERENCE SIGNS

(46) **10** arrangement **11** sheet material part **11***a* upper side of the sheet material part **11***b* underside of the sheet material part **12** visible seam **13** lighting apparatus **17** upper thread **17***a* first thread portion **17***b* second thread portion **18** lower thread **19** stich hole **20** twine **23** light source **24** light emission location **25** channel **26** delimiting face **27** bottom face **28** side face **32** connection location **33** connecting seam **34** shielding means **35** seam tape **36** pin **37** supporting face **38** receiving recess **40** supporting body **41** first thread layer **42** second thread layer **43** additional thread d**1** diameter of the upper thread d**2** diameter of the lower thread R direction of the visible seam S**1** first step S**2** second step Q transverse direction

Claims

1. A portion of a vehicle interior, comprising stitching and a lighting apparatus, wherein the stitching comprises an upper thread and a lower thread, wherein the upper thread comprises first thread portions extending along an upper side of a sheet material part and second thread portions, which run through stitch holes through the sheet material part and which are each interlaced with the lower thread at an underside of the sheet material part beneath each stitch hole, wherein the lighting apparatus comprises one or more light sources and is adapted to emit light at a plurality of light emission locations beneath the underside of the sheet material part, wherein the lighting apparatus is adapted to couple the light emitted at the light emission locations into the second thread portions of the upper thread beneath the stitch holes, which light propagates along the second thread portions of the upper thread and, starting from the second thread portions propagates partially along the adjacent first thread portions of the upper thread and is diffusely emitted in part by the first thread portions, and wherein the first thread portions of the upper thread form a first thread layer, and a second thread layer is provided on the first thread layer.

2. The portion of the vehicle interior according to claim 1, wherein the upper thread and/or the lower thread are/is embodied as a multi-filament yarn or as twine.

3. The portion of the vehicle interior according to claim 2, wherein, in a first step, a plurality of multi-filament yarns are produced by twisting filaments together, and the multi-filament yarns are twisted together in at least one further step to form the twine.
4. The portion of the vehicle interior according to claim 2, wherein a twist of the upper thread embodied as a multi-filament yarn is less than a twist of the lower thread embodied as a multi-filament yarn or as twine.
5. The portion of the vehicle interior according to claim 2, wherein a twist of the upper thread embodied as a multi-filament yarn or as twine lies in a range of 20 to 400 twists per meter.
6. The portion of the vehicle interior according to claim 2, wherein a twist of the lower thread embodied as a multi-filament yarn or as twine lies in a range of 20 to 400 or up to 1000 twists per meter.
7. The portion of the vehicle interior according to claim 1, wherein the upper thread has a smaller cross-section than the lower thread.
8. The portion of the vehicle interior according to claim 1, wherein the sheet material part is sewn to a further sheet material part at a connecting seam, adjacently to the stitching.
9. The portion of the vehicle interior according to claim 8, wherein the sheet material part and the further sheet material part have stitching adjacently to the connecting seam.
10. The portion of the vehicle interior according to claim 8, wherein at least one shielding means is provided at or adjacently to the connecting seam and reduces or prevents the passage of light at the connecting seam of the sheet material part and the further sheet material part.
11. The portion of the vehicle interior according to claim 10, wherein the at least one shielding means comprises a seam tape or is formed by a seam tape.
12. The portion of the vehicle interior according to claim 10, wherein at least one supporting body is provided and supports the sheet material part at the underside or the further sheet material part at an underside.
13. The portion of the vehicle interior according to claim 12, wherein the at least one shielding means comprises a seam tape or is formed by a seam tape and wherein the at least one shielding means is arranged or formed on the at least one supporting body.
14. The portion of the vehicle interior according to claim 1, wherein the plurality of light emission locations are each formed by a separate light source.
15. The portion of the vehicle interior according to claim 1, wherein the lighting apparatus comprises at least one diffusely reflective delimiting face along the arrangement of the plurality of light emission locations.
16. A vehicle interior comprising the portion of claim 1.
17. The portion of the vehicle interior according to claim 3, wherein a twist of the upper thread embodied as a multi-filament yarn is less than a twist of the lower thread embodied as a multi-filament yarn or as twine.
18. A method for producing the portion of the vehicle interior according to claim 1, comprising the following steps: producing a visible seam, wherein the upper thread is pulled from the upper side of the sheet material part through a stitch hole formed by using a sewing needle, and wherein a cross-sectional area of the sewing needle is smaller than twice a cross-sectional area of the upper thread, providing the lighting apparatus having the plurality of light emission locations beneath the underside of the sheet material part.
19. The method according to claim 18, wherein the upper thread has a smaller cross-section than the lower thread.