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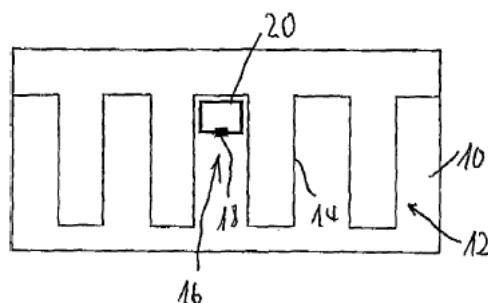
An petition for examination under Section 44 of the Patent Act has been submitted

The following information was obtained from the documents submitted by the applicants

[54] Title: **Textile information carrier**

[57] Abstract: Described is a textile information carrier, consisting of a textile label, a textile article, or a tag connected with the article with an electrical antenna and a detection plate connected with the textile label, the textile article, or the tags, comprising an electronic chip module.

A coupling element is arranged on the detection plate, connected with the electronic chip module, and which is inductively and/or capacitively coupled with the electrical antenna of the textile label, the textile article and the tag.



Description

[0001] The invention relates to a textile information carrier according to the preamble of Claim 1.

[0002] Textile articles are typically provided by manufacturers, garment makers, distributors, or designers with textile labels containing optically readable information about the composition of the product, instructions for care and cleaning, as well as information about the size, origin, and trademark or trade name of the article, as well as the identity of the designer.

[0003] Especially for high quality textile articles, designer labels, also called Jacquard labels, or labels imprinted with the manufacturer's logo or trade name, also known as satin labels, produced by elaborate processes, are used for labelling in order to make imitation more difficult.

[0004] In order to make it easier to identify replicas and mislabeling, or to identify textile articles during manufacturing, processing, transportation, warehousing, distribution, care, and cleaning processes, electronic data carriers are increasingly being used, which contain redundant or additional information for the optically readable textile label, and which can only be read by means of a special reader. The advantage of information stored on electronic data carriers is that these are substantially tamper-proof and resistant to dirt and cleaning agents, and that they can be read even without being optically visible.

[0005] Due to the miniaturized designs of electronic chip modules for the HF, UHF and SHF range, the connection of a textile antenna with terminals of the electronic chip module requires a high degree of precision and is very difficult to realize in practice. Due to the textile nature of the antenna, the connections are also subject to high mechanical stresses. In addition, thermal and chemical influences may occur, when wearing the textiles on the body, as well as during cleaning. This reduces the reliability of the connection between the textile antennas and the connectors of the electronic chip module.

[0006] The object of the invention is to create a textile information carrier that enables contactless coupling between the antenna and the electronic chip module.

[0007] This object is achieved by a textile information carrier according to the preamble of claim 1 with the features of this claim.

[0008] Further developments and advantageous embodiments follow from the subordinate claims.

[0009] In the textile information carrier according to the invention, the chip module is inductively and/or capacitively coupled to the antenna by means of a coupling element. For these purposes, the chip module is arranged along with the coupling element on a detection plate. The chip module and the coupling element form an integral unit, i.e., the detection plate. The antenna itself is designed as an electrical antenna and does not require any galvanic connection to the chip module and the coupling element.

[0010] The combination of the appropriately tuned coupling element and the antenna furthermore results in an increase in the bandwidth of the overall system, making the textile information carrier suited for operation on different, but adjacent frequencies due to different national regulations, without the need for design changes and adjustments.

[0011] The electrical antenna is preferably designed as a dipole, a half-wave antenna, a full-wave antenna, or a ground plane, and the coupling element is arranged at a location of the electrical antenna, at which a minimum standing wave ratio occurs.

[0012] Designing the electrical antenna as a dipole, a half-wave emitter, a full-wave emitter, or a ground plane allows for resonant tuning to the operating frequency and antenna gain via an isotropic emitter. Placing the coupling loop at a location on the electrical antenna where a minimum standing wave ratio occurs results in optimum matching and range.

[0013] The electrical antenna may be shortened mechanically and have a meandering extension inductance.

[0014] This allows for matching to the operating frequency, even for textile labels, textile articles, or tags whose dimensions are below an integer multiple of the quarter wavelength of the operating frequency. The meandering extension inductance allows for a representation within one plane and without an overlap of the conductors. Industrial production using standard textile processes, such as weaving or embroidery, is possible.

[0015] Preferably, the coupling element is arranged as a coupling loop within a meander consisting of two parallel conductors and one conductor perpendicular thereto.

[0016] In this case, enclosure of the coupling loop up to three-fourths of its circumference is possible, resulting in tight coupling between the coupling loop and the electrical antenna.

[0017] The electrical antenna may be formed of a continuous electrical conductor that is resonantly tuned by unraveling.

[0018] The manufacture of the antenna is simplified by processing a continuous textile thread. By unraveling the electrical conductor, the antenna is formed at the desired location and at the same time individually tuned in resonance with the operating frequency of the detection plate used.

[0019] The detection plate may be connected with the textile label, the textile article, or a tag identifying the fabric by means of a reversibly detachable or irreversibly undetachable fastener.

[0020] In the case of reversibly detachable detection plates, the detection plate may be removed, e.g., after a manufacturing, transportation, or sales process, if, subsequently, the information is no longer needed or is not to be used by unauthorized individuals. It is also possible to equip inferior articles with a low-cost "disposable" electrical antenna and to secure it by temporarily installing a reusable detection plate at least until being sold.

[0021] In the case of irreversibly non-detachably connected detection plates, the information should remain permanently linked to the textile label, the textile article, or the tag. This makes tampering more difficult and even impossible without destroying the bond between the textile label, the textile article, or the tag, as well as the detection plate.

[0022] The fastener may be formed as at least one mandrel attached to the detection plate and penetrating the textile label, the textile article, or the tag, and a button receiving one end of the mandrel, and arranged on the detection plate on the opposite side of the textile label, the textile article, or the tag.

[0023] This embodiment of the fastener provides an interlocking connection and is therefore particularly secure. In the case of a reversibly detachable design, removal may also only be possible by mean of a special tool, in order to avoid unauthorized removal.

[0024] The fastener may also be formed as welding or probing or laminating or gluing or crimping or adhesive

sheeting, or by means of a patch joint produced under heat and pressure.

[0025] In this regard, the fastener may be designed as a thermal or reaction adhesive.

[0026] The detection plate is bonded directly to the textile label, the textile article, or the tag by fusing fibers or filaments, or indirectly by an adhesive material. The textile properties of the bonded layers of the detection plate and the textile label, the textile article, or the tag are thus maintained.

[0027] Furthermore, the fastener may be formed from discrete connecting points or a very fine, perforated adhesive foil.

[0028] By limiting the fastener to discrete connection points or a very fine, i.e., thin and flexible perforated adhesive foil, stiffening of the bonded layers from the detection plate and the textile label, textile article, or tag is avoided.

[0029] The fastener may also be formed of woven yarns that are placed over the detection plate in the area of the detection plate and interwoven outside the detection plate with the fabric of the textile label, the textile article, or the tag.

[0030] This provides integral attachment of the detection plate within a fabric of the textile label, the textile article, or the tag. This attachment may be done as part of an industrial weaving process.

[0031] The fastener may also be designed as a hook and loop fastener.

[0032] This allows for swift attachment and detachment of the detection plate.

[0033] The detection plate may be sealed with a coating.

[0034] This coating may effectively protect the detection plate against mechanical and chemical influences.

[0035] The detection plate may have a coupling loop comprising shortenable coupler structures and adaptable to the width of the textile label, the textile article, or the tag by way of cutting, while maintaining a closed coupling loop.

[0036] This embodiment makes possible a uniform design and thus cost-effective production of the detection plate

for different widths of textile labels, textile articles, or tags. Since a closed coupling loop remains, even when the detection plate is cut to a smaller width, a close coupling of the coupling loop to an antenna is always ensured.

[0037] The detection plate and/or the textile label, the textile article, or the tag may comprise a multi-part antenna and/or a coupling loop resulting in frequency and impedance matching only when operated jointly and in a mutually complementing way.

[0038] This embodiment makes tampering by counterfeiting or simple replacement of textile labels more difficult, since the overall system requires multiple components that need to be matched with one another.

[0039] In one practical embodiment, the components of the multi-part antenna and/or coupling loop are mounted on different carriers, which are uniquely assigned to one another in terms of location in order to ensure functionality.

[0040] Here, the local arrangement of the components of the multi-part antenna and/or coupling loop requires special expertise to ensure interaction of all components. Tampering is thus made more difficult.

[0041] At least one sub-component of the multi-part antenna and/or the coupling elements may be hidden inside the detection plate and/or in the textile label, the textile article, or the tag.

[0042] Due to the structure of the antenna or the coupling elements, which is not evident from the outside, reconstruction after the removal of individual components is only possible for persons with the required skills, and thus tampering is further avoided.

[0043] According to a further development, at least two jointly queryable detection plates may be provided.

[0044] This further development also or additionally allows for improved protection against manipulation, since the functionality of the overall system is only ensured if information can be queried from at least two detection plates.

[0045] The detection plates may comprise complementary information, and may be assessed as valid or invalid by means of a joint query. Examples include matching clothes items, such as socks or gloves which contain individual detection tokens with information, such as right or left,

color, or size, but are packaged as a single unit in pairs and have a shared antenna acting as an amplifier.

[0046] This ensures that a query is assessed as valid only when a pairing is valid, and that tampering or mismatching is detectable. The amplifier antenna may also be arranged in a joint packaging.

[0047] Furthermore, the detection plates may use a reader to exchange complementary information with each other, and may be assessable as valid or invalid by way of an individual or joint query.

[0048] This allows for relocating an intelligence of the authentication to the detection plates and for simplifying the information to be transmitted via a valid or invalid query and for making it more secure.

[0049] The invention will be explained below with reference to embodiments shown in the drawing.

[0050] In the drawings:

[0051] [Fig. 1](#) shows a textile label with an electrical antenna as a mechanically shortened dipole and a detection plate,

[0052] [Fig. 2](#) shows a textile label with an electrical antenna, formed from a continuous electrical conductor, brought into resonance by unraveling, and a detection plate,

[0053] [Fig. 3a](#) shows a top view of a button-like detection plate attached to a textile label,

[0054] [Fig. 3b](#) shows a cross section of a button-like detection plate attached to a textile label, a mandrel penetrating the textile label and a counter button,

[0055] [Fig. 4a](#) shows a detection plate with fasteners in the form of adhesives, and a globtop coating,

[0056] [Fig. 4b](#) shows a detection plate that can be pressed head-down straight into the adhesive,

[0057] [Fig. 5](#) shows the detection plate according to [Fig. 4b](#) attached to a textile label,

[0058] [Fig. 6](#) shows the detection plate according to [Fig. 4a](#) attached to a textile tape,

[0059] [Fig. 7](#) shows a fabric for receiving a detection plate,

[0060] [Fig. 8a](#) shows a detection plate integrated into a fabric tape having a width, which is shorter than the fabric tape,

[0061] [Fig. 8b](#) shows a detection plate integrated into a fabric tape having a width identical to that of the fabric tape,

[0062] [Fig. 9](#) shows a detection plate having a coupling loop with a shortenable coupler structure,

[0063] [Fig. 10](#) shows a detection plate attached to a textile label by means of a patch,

[0064] [Fig. 11](#) shows a diagram of the bandwidth of an electrical antenna of and the overall system, and

[0065] [Fig. 12](#) shows a packaging unit for matching textile articles.

[0066] [Fig. 1](#) shows a textile label **10** with an electrical antenna **12**. The antenna is designed as a mechanically shortened dipole with a meandering extension inductor **14**. Within a meander **14** at the center of the antenna **12**, a detection plate **16** is arranged, having an electronic chip module **18** and a coupling loop **20** connected to the electronic chip module **18**. The coupling loop **20** is situated at a location of low impedance of the electrical antenna **12**. The arrangement within a meander **14** by way of two parallel conductors and one conductor perpendicular thereto provides for inductive coupling with simultaneous impedance matching between the coupling loop **20** and the electrical antenna **12**.

[0067] [Fig. 2](#) shows another textile label **10** with an electrical antenna **12**. The antenna **12** is formed from an originally continuous electrical conductor **22**, which is unraveled at two locations **24**, **26** to form a dipole. The unraveling of the conductor **22** is done at locations situated one half of a wavelength of the operating frequency apart. Thus, the formed dipole antenna is simultaneously adjusted to resonate with the working frequency. Adjacent to the antenna **12**, a detection plate **16** is arranged, having an electronic chip module **18** and a coupling loop **20** connected to the electronic chip module **18**. The coupling loop **20** is situated at a location of low impedance of the electrical antenna **12**, preferably slightly center offset. This also provides for inductive coupling with simultaneous impedance matching between the coupling loop **20** and the electrical antenna **12**.

[0068] [Fig. 3a](#) shows a top view of button-like detection plate **16** attached to a textile label, and can be used for the embodiments according to [Fig. 1](#) and [Fig. 2](#).

[0069] [Fig. 3b](#) shows a cross section of the button-like detection plate **16** with a spindle **28** penetrating the textile label **10** and with a counter button **30**. Since this detection plate **16** has an interlocking connection with the textile label **10**, it can be made very small. Consequently, it is inconspicuous and hardly affects wearing comfort. In addition, it offers little contact surface during cleaning, and is therefore particularly durable. The connection can be made by pressing the button components **16**; **30** together. Depending on the structure of the connection, it may be designed to allow for detachment without causing damage, if necessary with a special tool, or in the case of a snap-in connection, only detachable while simultaneously causing damage.

[0070] [Fig. 4a](#) shows a detection plate **16** with a fastener formed as an adhesive **32**, and with a coating **34**. The detection plate **16** includes a soft, flexible foil **36** that flexibly conforms to a textile label, a textile article, or a tag. The adhesive **32** may be a thermal or a reactive adhesive that bonds to the threads of the textile label, the textile article, or the tag. A coating **34** with globtop material provides protection against mechanical, thermal, and chemical influences. An additional coating may likewise form an adhesive surface if the detection plate with the chip module is bonded to the textile label, textile product or tag, while facing in its direction.

[0071] Alternatively, according to [Fig. 4b](#), an adhesive **38** may also be applied to the textile label **10** itself, after which the detection plate **16** may be pressed head-down into the adhesive **38**.

[0072] [Fig. 5](#) shows the detection plate **16** according to [Fig. 4b](#) as attached to a textile label **10**. Here, the detection plate **16** is adhered to the rear side of the textile label **10**, which is not visible here.

[0073] [Fig. 6](#) shows the detection plate **16** of [Fig. 4a](#) being attached to a textile tape **40** at equal intervals in an assembly process. The textile tape **40** runs from a supply roll **42** to a finished roll **44**. In a first station **46**, a detection plate **16** moistened with a reaction adhesive **32** is placed on the textile tape **38**; in a second station **48**, a coating **50** made of silicone is applied, and in a third station **52**, the reaction adhesive **32** is activated by UV light. When using a setup as in [Fig. 4b](#), the detection plate **16** may be pressed head-down directly into a drop of adhesive.

[0074] [Fig. 7](#) shows a fabric **54** for receiving a detection plate **16**. The fabric **54** is manufactured on a weaving machine that includes an additional compartment for independently controlling a portion of the warp threads **56**. This allows for alternate interweaving of all the warp threads in one instance and interweaving only a portion of the warp threads in another instance, while continuing to guide the other warp threads **56** to the fabric **54**. This creates a receptacle for detection plates, bounded on one flat side by a woven surface of warp and weft threads, and on the other flat side by unwoven warp threads **56**. Laterally, the retainer is then likewise bounded by the fully interwoven warp and weft threads. At the same time, an electrically conductive weft thread may be meander-shaped and form an extension inductor.

[0075] [Figs. 8a](#) and [8b](#) illustrate fabric tapes **54** manufactured according to [Fig. 7](#), having an electrically conductive weft **58** guided in a meandering manner and chambers **60** for receiving a detection plate **16**. In [Fig. 8a](#), the detection plate **16** extends over only a portion of the width of the textile tape **54**. While the coupling loop **20** arranged on the detecting plate **16** allows for tight coupling with a meander of the antenna **58** regardless of the width of the textile tape **54**, this variant would result in skewing of the wrap when the textile tape **54** is wound onto a roll.

[0076] In [Fig. 8b](#), the detection plate **16** extends across the entire width of the textile tape **54**, thus avoiding the skewing of the winding when the textile tape is wound onto a roll.

[0077] In order to be able to use uniformly manufactured detection plates **16** for textile tape **54** of different widths, [Fig. 9](#) shows a variant with a coupling loop **20** comprising a shortenable coupler structure **62**. If the textile tape **54** is narrower than the original detection plate **16**, the detection plate **16** can be adjusted to the width of the textile tape **54** by way of cutting, while at the same time maintaining a closed coupling loop **20**.

[0078] [Fig. 10](#) shows a detection plate **16** attached to a textile label **10** by means of a patch **64**. The patch **64** has a coating with a thermal adhesive. Pressure and heat are used to attach the patch **64** placed over the detection plate **16** to the textile label **10**. In the process, the detection plate **16** is enclosed and simultaneously attached to the textile label **10** and covered.

[0079] [Fig. 11](#) shows a diagram of the bandwidth of an electrical antenna as a curve **66** and of the overall system as a curve **68**. As an example, an antenna is shown here, whose resonance frequency corresponds to a first permitted operating frequency of 886 MHz.

[0080] The diagram shows that at a second permitted operating frequency of 915 MHz, the antenna would already be outside of its optimum range. In conjunction with the coupling element, however, the overall system attains a broadband characteristic, such that no adjustment to different national standards is necessary.

[0081] [Fig. 12](#) shows a packaging unit **70** for matching textile articles, in this case a pair of stockings **72**, **74**. Each stocking has its own detection plate **16a**, **16b**, which carrying complementary information about its size, and whether it is right or left. The two detection plates **16a**, **16b** are coupled with a joint electrical antenna **12** as an amplifier antenna, and assessed by means of joint querying.

Claims

1. A textile information carrier, consisting of a textile label, a textile article, or a tag connected with the article with an electrical antenna and a detection plate connected with the textile label, the textile article, or the tags, comprising an electronic chip module, **characterized in that** a coupling element is arranged on the detection plate, connected with the electronic chip module, which is inductively and/or capacitively coupled with the electrical antenna of the textile label, the textile article and of the tag.

2. The textile information carrier according to claim 1, characterized in that the electrical antenna is designed as a dipole, a half-wave emitter, a full-wave emitter, or a ground plane, and in that the coupling element is arranged at a location of the electrical antenna at which a minimum standing wave ratio or an optimum bandwidth of the overall system or an optimum antenna gain occurs.

3. The textile information carrier according to claim 1 or 2, characterized in that the electrical antenna is mechanically shortened and has a meandering extension inductance.

4. The textile information carrier according to claim 3, characterized in that the coupling element follows the course of the electrical antenna over a certain distance.

5. The textile information carrier according to claim 3 or 4, characterized in that the coupling element is designed as a coupling loop and is arranged within a meander of two parallel conductors and one conductor perpendicular to them.

6. The textile information carrier according to any of claims 1 through 5, characterized in that the electrical

antenna is formed by a continuous electrical conductor, which is brought into resonance by unraveling.

7. The textile information carrier according to any of claims 1 through 6, characterized in that the detection plate is fastened to the textile label, the textile article, or the tag by means of a reversibly detachable or irreversibly undetachable fastener.

8. The textile information carrier according to claim 7, characterized in that the fastener is designed as at least one mandrel attached to the detection plate and penetrating the textile label, the textile article, or the tag, and a button for receiving one end of the mandrel, and arranged on the detection plate on the opposite side of the textile label, the textile article, or the tag.

9. The textile information carrier according to claim 7, characterized in that the fastener is formed as a welding or probing or laminating or gluing or crimping or adhesive sheeting or by means of a patch joint produced under heat and pressure.

10. The textile information carrier according to claim 7 or 9, characterized in that the fastener is designed as a thermal or reaction adhesive.

11. The textile information carrier according to any of claims 7, 9, or 10, characterized in that the fastener is formed from discrete connecting points or very fine, perforated adhesive foil.

12. The textile information carrier according to claim 7, characterized in that the fastener is formed from woven yarns, which are laid over the detection plate in the region of the detection plate and are interwoven with the fabric of the textile label, the textile article, or the tag outside of the detection plate.

13. The textile information carrier according to claim 7, characterized in that the fastener is designed as a hook and loop fastener.

14. The textile information carrier according to any of claims 1 through 13, characterized in that the detection plate is sealed with a coating.

15. The textile information carrier according to claim 14, characterized in that the coating also forms an adhesive surface.

16. The textile information carrier according to any of claims 1 through 15, characterized in that the detection

plate features a coupling loop comprising a shortenable coupler structure and can be adjusted to the width of the textile label, the textile article, or the tag by cutting while maintaining a closed coupling loop.

17. The textile information carrier according to any of claims 1 through 16, characterized in that the detection plate and/or the textile label, the textile article, or the tag comprise a multi-part antenna and/or coupling elements, which result in frequency and impedance matching only when operating jointly and mutually complementarily.

18. The textile information carrier according to claim 17, characterized in that the components of the multi-part antenna and/or coupling elements are mounted on different carriers that are unambiguously assigned to one another in terms of location in order to ensure the functionality.

19. The textile information carrier according to claim 17 or 18, characterized in that at least one subcomponent of the multi-part antenna and/or the coupling elements is concealed inside the detection plate and/or in the textile label, in the textile article, or in the tag.

20. The textile information carrier according to any of Claims 1 through 19, characterized in that at least two detection plates are provided, which are jointly queryable.

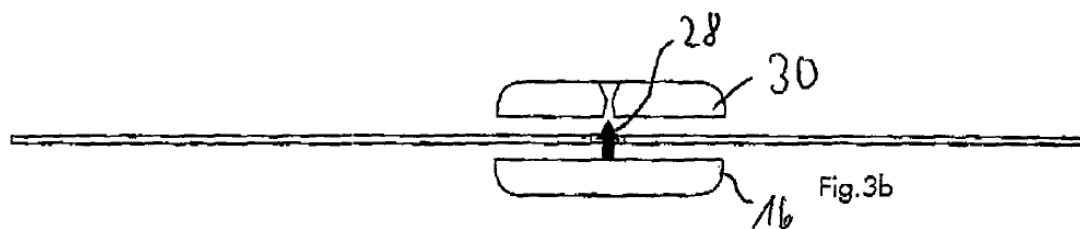
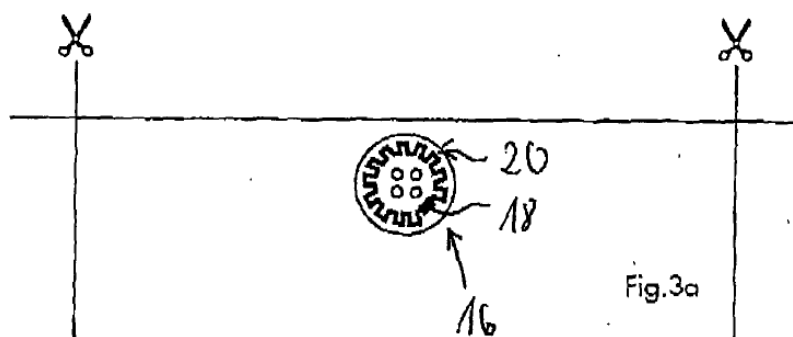
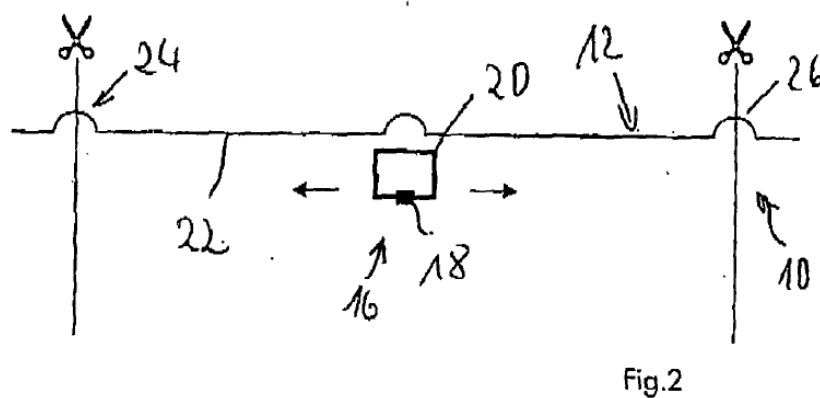
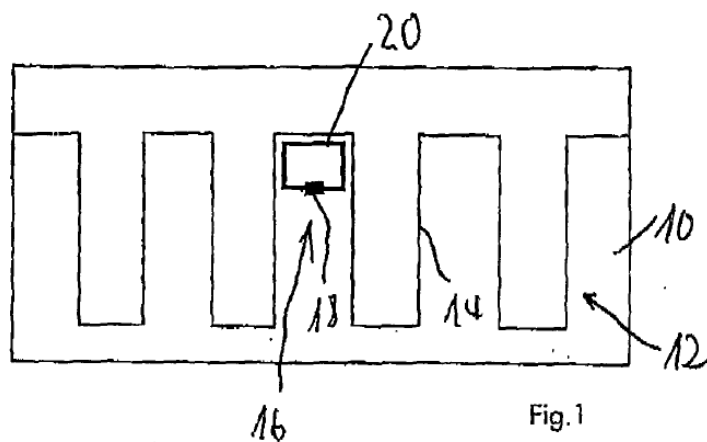
21. The textile information carrier according to claim 20, characterized in that at least two spatially separated detection plates feature a joint electrical antenna.

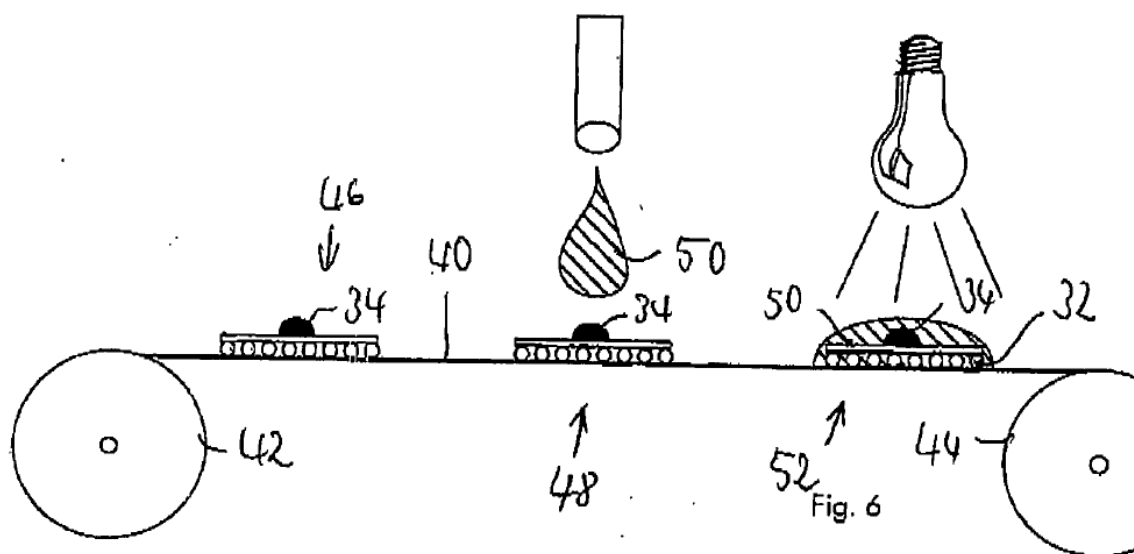
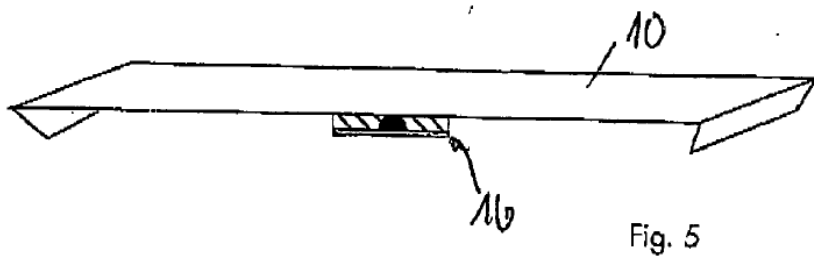
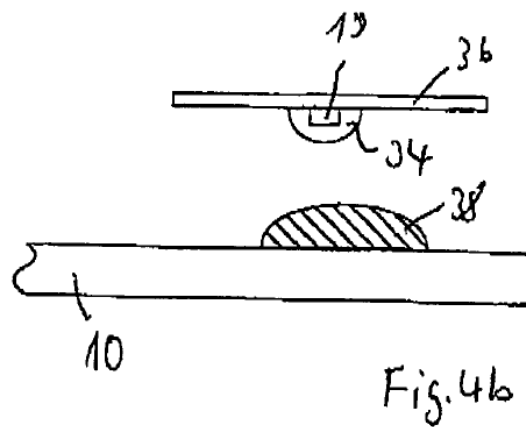
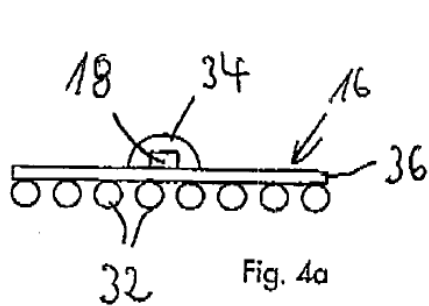
22. The textile information carrier according to claim 20 or 21, characterized in that the detection plates comprise mutually complementary data and can be assessed as valid or invalid by means of a joint query.

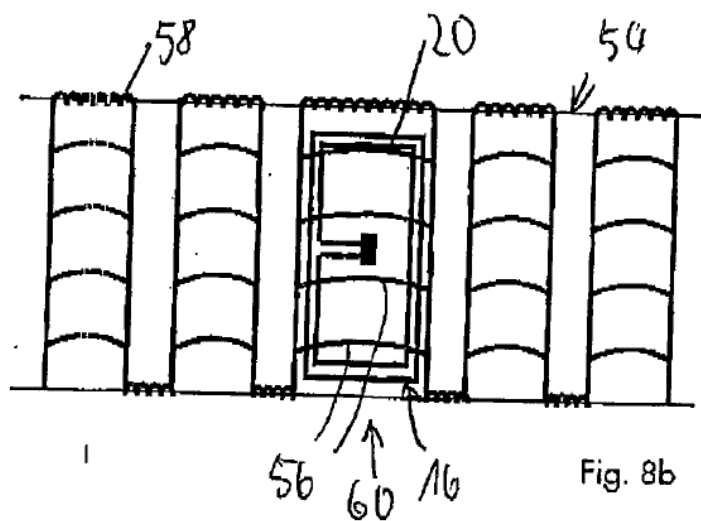
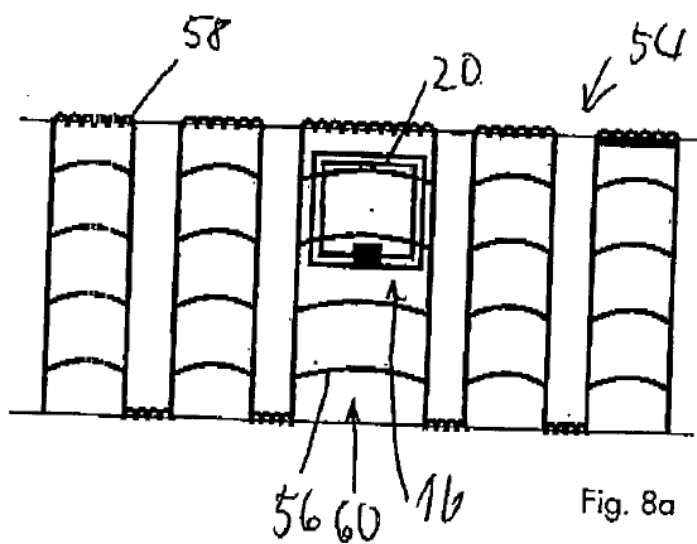
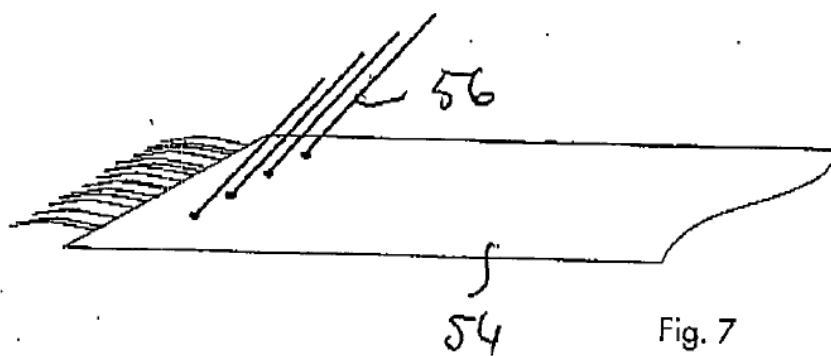
23. The textile information carrier according to any of claims 20 through 22, characterized in that the detection plates exchange mutually complementary data with each other by means of a reader, and can be assessed as valid or invalid by means of an individual or a joint query.

Followed by 5 pages of drawings.

Appended Drawings







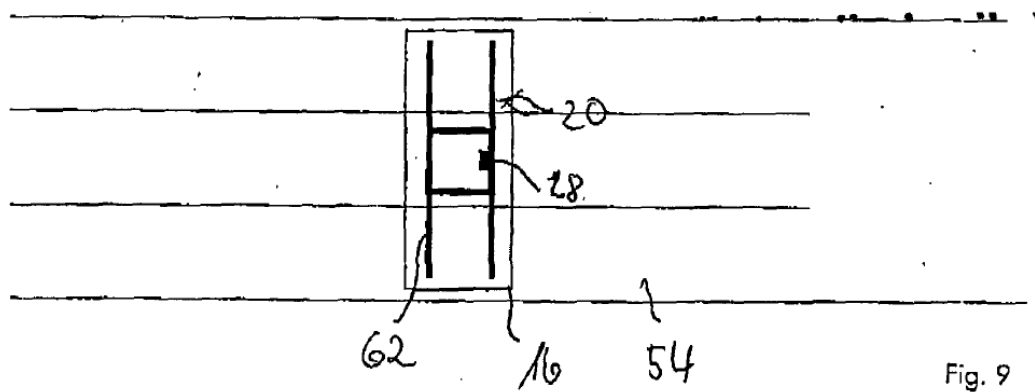


Fig. 9

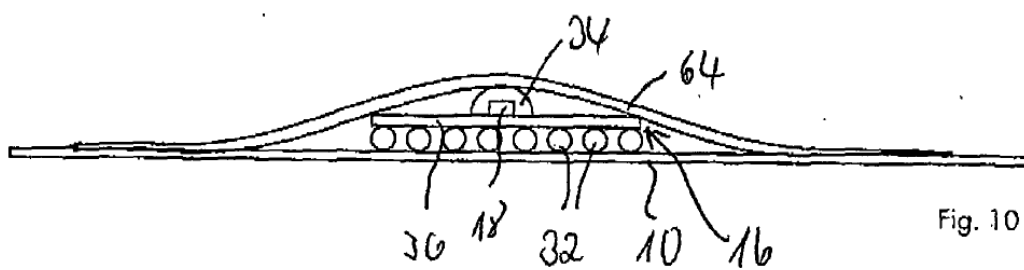


Fig. 10

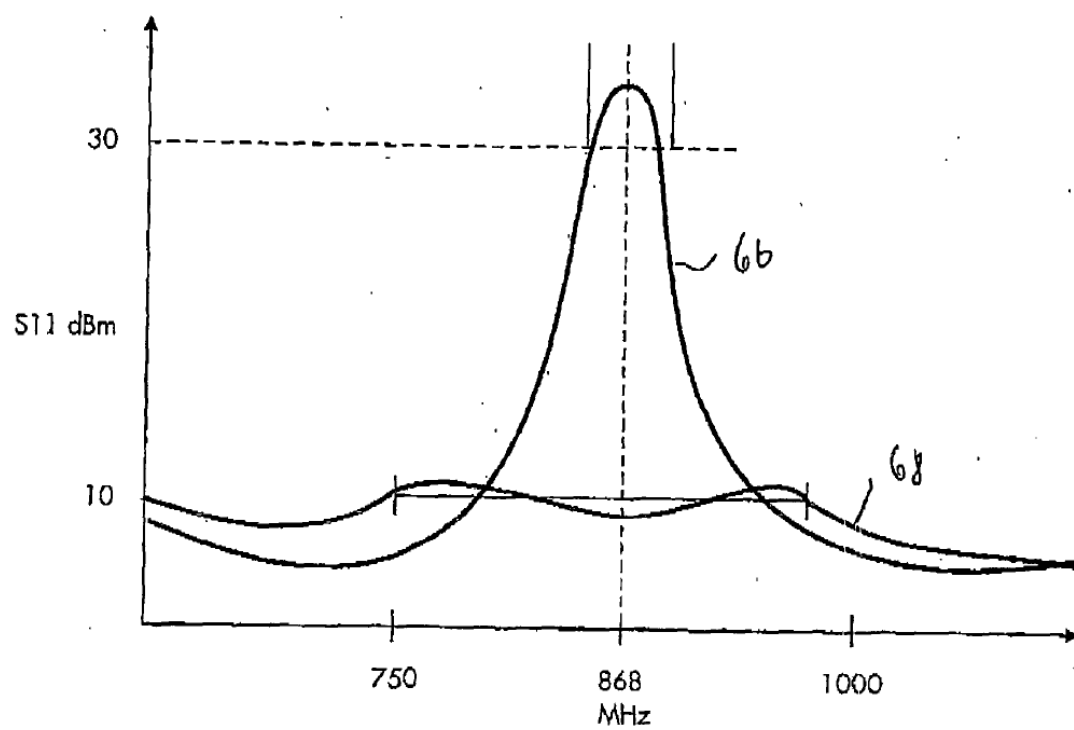


Fig. 11

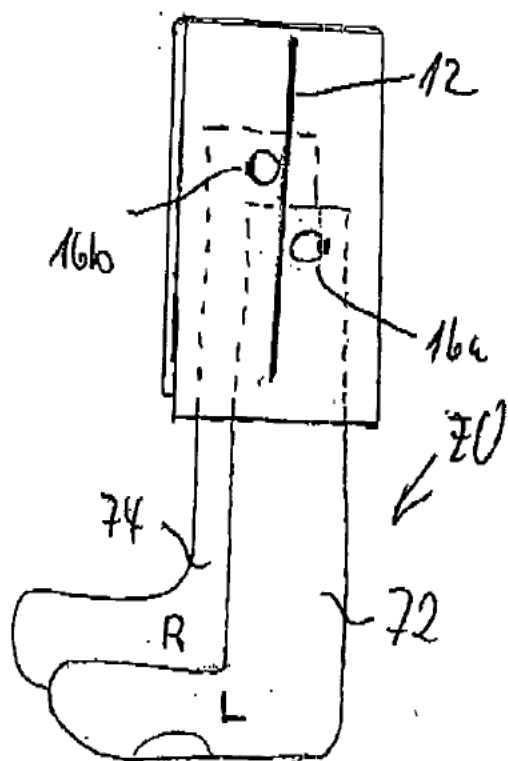


Fig. 12