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(54) Method of manufacturing smoking articles

(57) In a method of manufacturing smoking articles, an endless strip of web material (14) is used to provide, in each finished smoking article, a wrapping having a nominal length. To the endless strip (14), there is applied a varying pattern (12) of at least one characteristic, e.g. printing ink or a flavourant. The pattern (12) has a variation length (l_G) greater than the nominal length. Preferably, the pattern (12) periodically repeats with the variation length (l_G). Typically, in a filter cigarette, the nominal length of the cigarette paper is the length of the tobacco rod, and the nominal length of the tipping paper is the circumference of the filter cigarette plus the width of a seam area.

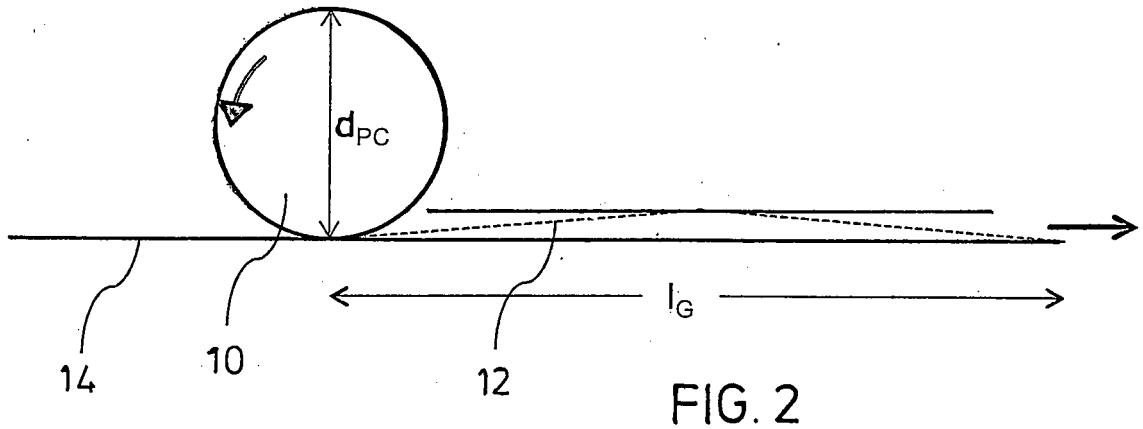

FIG. 2

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Description

[0001] The invention relates to a method of manufacturing smoking articles.

[0002] Smoking articles like cigarettes are usually uniform in appearance and colour within each pack. Nevertheless it might provide an advantageous effect if smoking articles in one pack look different from each other, e.g. to allow consumers to choose a colour or pattern that reflects their actual mood or to make the open pack look more interesting. Cigarettes with different colours of the cigarette paper in one pack have been on the market for a long time, e.g. under the brand name "Sobranie Cocktail (TM)".

[0003] The current method to produce such smoking articles is to pre-produce batches of smoking articles with each of the differently coloured materials separately. The smoking articles from these batches are then mixed or combined into multi-colour groups for packaging. This process requires additional equipment for storing and properly combining the differently coloured batches. The same principle applies if different patterns on the smoking articles are required.

[0004] DE 10 2010 047 590 A describes a paper strip for manufacturing tipping papers with the length of this strip being substantially larger than its width. Design elements are placed on that strip in repeat so that one design element appears on each smoking article or cigarette. Usually, the length of such a repeat will be chosen equivalent to the circumference of the smoking article. It is also disclosed to have a plurality of different elements printed on one paper strip. In this case, a registered cutting of the paper strip is required to avoid that a design element is cut and, in consequence, two parts of different design elements would appear on one smoking article.

[0005] The object of the invention is to provide a method of manufacturing smoking articles resulting in smoking articles differing, when packaged in the same pack, e.g. in pattern or colour, wherein the method is to use standard equipment and processes, without an extra effort for mixing different batches.

[0006] This object is achieved by the method of manufacturing smoking articles according to claim 1. Advantageous versions of the invention follow from the dependent claims. Claim 15 relates to a bundle or pack of smoking articles manufactured according to the method of claim 1.

[0007] In the method according to the invention, smoking articles (e.g. filter cigarettes) are manufactured. During manufacture, an endless strip of web material is used to provide, in each finished smoking article, a wrapping having a nominal length. For example, when, on a rod maker, an endless strip of cigarette paper is wrapped about an endless tobacco rod, the nominal length of the cigarette paper in the finished cigarette equals the length of the tobacco rod, or when an endless strip of tipping paper is forwarded transversely with respect to rods wrapped with cigarette paper in order to attach filters, the nominal length of the tipping paper wrapping in the finished cigarette equals the circumference of the cigarette (plus some extra length to provide for an overlap).

[0008] According to the invention, to the endless strip there is applied (e.g. printed or sprayed, but not provided as holes or cutouts) a varying pattern of at least one characteristic. This pattern has a variation length greater than the nominal length discussed above.

[0009] Preferably, the pattern periodically repeats with the variation length. If the pattern is the same at a start point of the variation length and at an end point of the variation length, any abrupt pattern changes can be avoided. In advantageous embodiments, the pattern is continuous, i.e. without any abrupt changes.

[0010] Before further explaining the invention, some terms are to be defined.

[0011] Web material is the base material that is used to cut and print strips for the manufacturing of smoking articles. The usual web material is paper but other materials like polymer films, non-cellulose fibre webs etc. can be applied as well.

[0012] A strip of web material is a cut portion of the web material being substantially longer than wide. The strip of web material is usually wound on bobbins for storage and transportation.

[0013] The length (or nominal length) of the strip of web material used in an individual smoking article as a wrapping is the length of the cut strip of web material required to manufacture one smoking article. As already indicated, for cigarette paper, this is equal to the length of the tobacco rod. For tipping paper, this is equal to the circumference of the smoking article plus the width of a seam line.

[0014] The variation length of a pattern is, in a periodically repeating pattern, the distance between identical repetitions on the strip of web material. If the pattern does not repeat periodically, the variation length is the length of a typical section of the strip of web material which is representative for the variety in the pattern, i.e. which shows an essential or major part of the elements present in the pattern. A periodically repeating pattern can be printed by means of a printing cylinder. In this case, the pattern repeats with the circumference of the printing cylinder (or half its circumference, etc., see below), and the variation length usually equals the circumference of the printing cylinder. If the variation length is very large or if the pattern is non-periodic, the pattern can be printed on a computer-controlled printer.

[0015] It is known to a person skilled in the art that the printing of web material is preferably performed at a width that is greater than that of the final strip of web material used for making smoking articles. The final width is generated by suitable cutting, and the strip of web material is wound on bobbins for transport, storage and feeding into the production line for smoking articles.

[0016] The invention has the following effect. Immediately after manufacture of the smoking articles, consecutively produced smoking articles only differ slightly with

respect to the pattern, because the variation length thereof is (preferably significantly) greater than, e.g., the length of an individual tobacco rod. In particular, the pattern looks largely uniform on each individual smoking article and varies between different smoking articles. When using a standard equipment, however, a mixing of the smoking articles is caused by transporting and buffering the smoking articles between the making and packing operation. This results in a stochastical mixture of smoking articles having different pattern elements along the variation length so that, after packaging, the smoking articles present in an individual package are well mixed.

[0017] Further above, the pattern has been defined as a varying pattern of at least one characteristic. Characteristics suitable for forming the pattern are, e.g., coloured printing ink or black printing ink. Generally, patterns made by printing ink are visible patterns.

[0018] Other suitable characteristics are smell-providing substances or taste-providing substances, e.g., flavourants in a general sense or sweeteners. Smell- or taste-providing substances can be used in a pure form or, e.g., dissolved in a suitable solvent and can be applied, e.g., to tipping paper by, e.g., a printing process like rotogravure printing so that the resulting smoking articles differ in taste or smell.

[0019] Any mixtures of such characteristics are conceivable as well. For example, in the varying pattern, coloured printing ink and a smell- or taste-providing substance can be printed in register so that a consumer may associate the intensity of a certain colour with the strength of a certain taste. This enables the consumer to select a desired taste or smell intensity based on the optical appearance.

[0020] To apply a suitable varying pattern having a certain variation length to web material or a strip of web material, usual printing methods like offset, rotogravure, spraying or digital inkjet printing can be applied. While the size of the variation length is principally unlimited in digital printing, it is limited by the circumference of the printing cylinder used for offset or rotogravure printing. For a limited variation length, the pattern at the start position and at the end position of the variation length should be the same to avoid any discontinuities. Depending on the dimensions of the printing cylinder and the smoking articles to be manufactured, it is also possible to have two or more variation lengths on one printing cylinder.

[0021] A varying pattern can encompass, e.g., variations in colour, size, shape or position of pattern elements. A colour (or grey scale) variation may extend to the intensity of one single colour (or grey scale value), for example changing from white to black. The variation may be linear or represented by any other, preferably continuous function. Moreover, hue, saturation or light intensity may vary, which may cause various colours blending into each other, for example creating a rainbow effect. A multi-colour variation producing a rainbow effect from printing different patterns of red, green and blue is another example. To obtain the latter effect, usually two or more printing cylinders are used in sequence, each one printing one specific color of the multi-color pattern.

[0022] A varying pattern can also be applied by methods like water-marking or embossing, with similar limitations as above in case cylindrical tools are used.

[0023] A taste- or smell-modifying agent (e.g. a sweetener or flavourant) may be applied in a similar manner so that the smoking articles manufactured by the method according to the invention differ in taste or smell.

[0024] In advantageous versions of the invention, the ratio of the variation length to the nominal length is greater than 3:1, e.g. greater than 5:1, greater than 10:1 or greater than 20:1. A generally large ratio avoids that a variation is visible on an individual smoking article so that each smoking article looks (or tastes) generally uniform with respect to its pattern.

[0025] On the other hand, this ratio should not be too large. A very large ratio might result in a relatively large number of consecutively produced smoking articles looking very similar, which are not sufficiently mixed, on their way to the packing station, with smoking articles exhibiting a different pattern. For example, the ratio of the variation length to the nominal length may be smaller than 100:1 or smaller than 50:1. An appropriate ratio depends on details of the manufacturing line, in particular on the degree of stochastical mixing, and can be determined by experiments. When using a printing cylinder, e.g., the upper limit of the ratio is also determined by the diameter of the printing cylinder.

[0026] The smoking articles manufactured in the method according to the invention may be filter cigarettes, as already indicated above, or filter tubes, which are hollow tubes connected to a filter and to be filled with tobacco by the consumer. Other kinds of smoking articles are possible as well, e.g. cigarettes without filters (filterless cigarettes) or cigars having a filter connected via tipping paper (filter-tipped cigars).

[0027] If the web material comprises cigarette paper, the nominal length of the cigarette paper wrapping can be the length of a tobacco rod in a filter cigarette or the length of a hollow tube in a filter tube. Cigarette paper is the paper that is wrapped around the tobacco to form a rod.

[0028] If the web material comprises tipping paper, the nominal length of the tipping paper wrapping can be the circumference of a filter cigarette or filter tube, preferably plus some extra length to provide for an overlap of the tipping paper in the wrapped state corresponding to the width of a seam area. Tipping paper is the paper that is wound around the filter tip and parts of the wrapped tobacco rod for joining both.

[0029] Generally, a registered cutting as disclosed in DE 10 2010 047 590 A is not required for tipping papers used in the method according to the invention, as the change between two consecutively manufactured smoking articles is generally small and thus hardly visible, even at the overlap of a seam which contains cut pattern elements.

[0030] If the direction of an endless tobacco rod during manufacture is designated as longitudinal, a wrapping of cigarette paper is applied longitudinally, whereas a strip of tipping paper is fed in a transverse direction. In the usual way of manufacturing cigarettes, a double-length filter plug is placed between two tobacco rods and wrapped with a tipping paper strip that has twice the width of the tipping paper on each individual cigarette. The resulting double-cigarette is then cut in the middle of the double-filter to obtain two single cigarettes.

[0031] In an embodiment of the invention, a double-width tipping paper strip is used to produce double-filter cigarettes or double-filter tubes in an intermediate step, which are cut at a centre line of the respective double-filters thereafter, wherein a longitudinal centre line of the double-width tipping paper strip defines two halves of the double-width tipping paper strip, which halves are printed with different patterns. The two sides or halves of the double-width tipping paper being printed with different patterns will result in a larger variation of the final products. The different patterns in the two halves of the double-width tipping paper strip may even have different variation lengths.

[0032] Thus, the cigarette paper or the tipping paper may comprise a varying pattern. It is also possible that both the cigarette paper and the tipping paper comprise a varying pattern. In this case, an endless strip of cigarette paper is used to provide, in each finished smoking article, a cigarette paper wrapping and an endless strip of tipping paper or double-width tipping paper is used to provide, in each finished smoking article, a tipping paper wrapping, wherein to the endless strip of cigarette paper and to the endless strip of tipping paper or double-width tipping paper there are applied varying patterns of at least one respective characteristic.

[0033] In a bundle or pack of smoking articles manufactured as explained before, the individual smoking articles are different with respect to the pattern.

[0034] The following description of the invention refers to cigarette papers and tipping papers which mainly determine the optical appearance of cigarettes. Nevertheless, other web materials like filter plug wrap, pouch material for smokeless tobacco or cigar wrappers are also in the scope of the invention.

[0035] In the following, the invention is further described by means of embodiments. The drawings show in

Figure 1 a diagram displaying the variation of a characteristic over the length co-ordinate of a strip of web material, which illustrates the principle of the invention,

Figure 2 a schematic view of a printing cylinder used to apply a varying pattern of a characteristic to web material,

Figure 3 a diagram showing the variation of three characteristics over the length co-ordinate of a strip of web material, i.e. of the saturation of red, blue and green printing ink, respectively, which results in a rainbow effect, and

Figure 4 in parts (a) to (d) several examples for varying patterns of separate elements constituted by printing ink printed on a strip of web material, i.e. in part (a) a pattern of dots having varying colour, in part (b) a pattern of dots having varying size, in part (c) a pattern of dot-like symbols having varying shape, and in part (d) a pattern of like dots arranged along a sloped line.

[0036] The principle used for manufacturing smoking articles which have a variable appearance when packaged in a single pack is illustrated by means of Figure 1.

[0037] Figure 1 is a schematic representation of a characteristic which varies along the length co-ordinate of a strip of web material. For example, the strip of web material is an endless strip of cigarette paper extending from the left to the right (x axis), which is the direction of its length co-ordinate. Each cigarette rod to be wrapped with this cigarette paper has a length l_A. Along the *y* axis, the strength of a varying pattern of a characteristic is plotted. For example, the characteristic is blue printing ink, and the variation relates to its saturation, which is represented by the dotted curve. In this embodiment, the saturation increases along a linear section 1 of the dotted curve, and after reaching a maximum value it decreases along a linear section 2 of the dotted curve to its initial value. In this way, e.g., the colour of the ink printed on the strip of cigarette paper gradually changes from light blue at the left to intense blue at the maximmum and then back to light blue at the right. The distance from the left to the right extending over one full cycle of variation is designated as variation length, l_G in Figure 1. l_G is significantly greater than l_A. It is evident from Figure 1 that the colour of the cigarette paper for each individual cigarette of rod length l_A does not change much, whereas the overall variation over the total variation length l_G is much greater.

[0038] In the further process, an endless tobacco rod wrapped with this endless strip of cigarette paper is cut into pieces of length l_A each and a filter is attached to each piece, which results in a plurality of individual cigarettes. Each individual cigarette looks largely uniform, whereas consecutively produced cigarettes gradually change colour. During their passage to a packing station, these cigarettes mix stochastically so that a certain number of cigarettes (a bundle) put into one pack comprises largely randomly mixed colours, varying from light blue to intense blue in this embodiment.

[0039] In another embodiment, an endless strip of tipping paper is printed with a varying pattern, analogous to Figure 1, which is fed orthogonally with respect to wrapped cigarettes rods in order to attach a filter to each wrapped cigarette rod. In this case, l_A corresponds to the circumference of a wrapped cigarette rod or filter plus

some overlap (seam area). After packaging, the cigarettes in one pack exhibit a full range of variation in the appearance of their tipping papers.

[0040] In other embodiments, the characteristic constituting a varying pattern analogous to Figure 1 is a substance or agent providing a smell or taste, e.g. a sweetener or a flavourant. Preferably, such agents have a low volatility so that they stay with individual cigarettes and do not significantly spread inside a pack of cigarettes.

[0041] To apply a suitable varying pattern of a characteristic (like printing ink or a flavourant) to a strip of web material, usual printing methods like offset, rotogravure, spray or digital inkjet printing can be used. While the variation length l_G is principally unlimited in digital printing, it is limited by the circumference of the printing cylinder applied for offset and rotogravure printing. For a limited variation length it is required that the pattern is the same at a start point of the variation length and at an end point of the variation length to avoid any discontinuities. Figure 2 schematically shows a printing cylinder 10 with the diameter d_{PC} producing a varying pattern with the variation length $l_G = \pi \cdot d_{PC}$. The dotted line 12 represents the change in the pattern, e.g. color or flavour, as web material 14 moves along the rotating printing cylinder 10.

[0042] Depending on the dimensions of the printing cylinder and the smoking article, it is also possible to have two or more variation lengths on one printing cylinder, i.e. $l_G = \pi \cdot d_{PC}/m$, m = 2, 3, 4 ...

[0043] If desired, a printed web having a relatively large width can be cut into endless strips of web material (e.g. endless strips of cigarette paper or endless strips of tipping paper), as required in a manufacturing process.

[0044] In the embodiment explained in the context of Figure 1, the saturation (intensity) of blue printing ink varies linearly along the endless strip of web material. Generally, the saturation of any colour may also vary according to any other continuous function. This also holds for black and white on a grey scale. Moreover, the variation may extend to hue, saturation and light intensity causing various colours blending into each other, for example in creating a rainbow effect. An example of a multi-colour variation producing a rainbow effect from printing different patterns of red, green and blue printing ink is shown in Figure 3, which is a representation analogous to Figure 1. To obtain the rainbow effect, usually two or more printing cylinders are used in sequence, each one printing one specific coloured ink for the multi-colour pattern.

[0045] Figure 4 illustrates several embodiments for non-continuous varying patterns consisting of separate elements made of printing ink printed on a strip 20 of web material. In Figure 4(a), individual and equally spaced dots 21 of equal size vary in colour or in intensity on a grey scale. Figure 4(b) shows a pattern of dots 22 having varying size. In Figure 4(c), dot-like symbols 23 vary in shape, from square to circular and back to square. The dots 24 shown in Figure 4(d) are nor aligned along the center line of the strip 20, as in Figures 4(a) to 4(c), but they are arranged along sloped lines so that they move back and forth in transversal direction of the strip 20.

[0046] To test the method, cigarettes according to the following examples were manufactured.

Example 1:

[0047] An endless tipping paper strip of 54 mm width and a yellow base colour was repeatedly printed in length direction with a pattern linearly varying from 0% to 100% brown and back to 0% (and not varying in width direction) using a rotogravure printing cylinder with a diameter of 22.9 cm. The variation length of 71.9 cm was equal to the circumference of the printing cylinder.

[0048] Standard King Size Cigarettes with a circumference of 2.43 cm were manufactured on a standard filter cigarette maker using that tipping paper. The cigarettes were conveyed to a standard packaging machine and packs of 20 cigarettes each were produced. The opened packs showed a stochastical mixture of the colour of the tipping papers of the cigarettes, ranging from yellow to dark brown tipping colour. Each individual cigarette did not show a significant colour difference at its tipping seam line.

Example 2:

[0049] An endless tipping paper strip of 54 mm width and a white base colour was repeatedly printed in length direction with a pattern linearly varying from 0% to 100% green and back to 0% (and not varying in width direction) using a rotogravure printing cylinder with a diameter of 22.9 cm. The variation length of 71.9 cm was equal to the circumference of the printing cylinder. On the same printing line, a varying pattern of an aqueous solution of citric acid was applied in register with the colour pattern using a second printing cylinder of the same dimensions.

[0050] Standard King Size Cigarettes with a circumference of 2.43 cm were manufactured on a standard filter cigarette maker using that tipping paper. The cigarettes were conveyed to a standard packaging machine and packs of 20 cigarettes each were produced. The opened packs showed a stochastical mixture of the colour of the tipping papers of the cigarettes, ranging from white to green tipping colour. It was found that the sour taste of the filter end when put in the mouth was highest for the green tips and lowest for the white ones.

[0051] These embodiments and examples as well as the explanations in the introductory part of the specification demonstrate that, generally, there exists a virtually unlimited number of possibilities for providing varying patterns of at least one characteristic on a strip of web material.

Claims

1. Method of manufacturing smoking articles, in which an endless strip of web material (14; 20) is used to

provide, in each finished smoking article, a wrapping having a nominal length (l_A), **characterised in that** to the endless strip (14; 20) is applied a varying pattern (1, 2; 12; 21, 22, 23, 24) of at least one characteristic, which pattern has a variation length (l_G) greater than the nominal length (l_A).

2. Method according to claim 1, **characterised in that** the pattern (1, 2; 12; 21, 22, 23, 24) periodically repeats with the variation length (l_G).

3. Method according to claim 2, **characterised in that** the pattern (1, 2; 12; 21, 22, 23, 24) is the same at a start point of the variation length (l_G) and at an end point of the variation length (l_G).

4. Method according to any one of claims 1 to 3, **characterised in that** the varying pattern (1, 2; 12) is continuous.

5. Method according to any one of claims 1 to 4, **characterised in that** the at least one characteristic forming the pattern (1, 2; 12; 21, 22, 23, 24) is selected from the following set: coloured printing ink, black printing ink, smell-providing substances, taste-providing substances.

6. Method according to any one of claims 1 to 5, **characterised in that** the ratio of the variation length (l_G) to the nominal length (l_A) is greater than 3:1, preferably greater than 5:1, more preferably greater than 10:1 and most preferably greater than 20:1.

7. Method according to any one of claims 1 to 6, **characterised in that** the ratio of the variation length (l_G) to the nominal length (l_A) is smaller than 100:1, preferably smaller than 50:1.

8. Method according to any one of claims 1 to 7, **characterised in that** the smoking articles are filter cigarettes or filter tubes.

9. Method according to claim 8, **characterised in that** the web material (14; 20) comprises cigarette paper, wherein the nominal length (l_A) is the length of a tobacco rod in a respective filter cigarette or the length of a hollow tube in a respective filter tube, respectively.

10. Method according to claim 8, **characterised in that** the web material (14; 20) comprises tipping paper, wherein the nominal length (l_A) is the circumference of a respective filter cigarette or filter tube plus the width of a seam line.

11. Method according to claim 10, **characterised in that** a double-width tipping paper strip is used to produce double filter cigarettes or double filter tubes in an intermediate step, which are cut at a centre line of the respective double filters thereafter, wherein a longitudinal centre line of the double-width tipping paper strip defines two halves of the double-width tipping paper strip, which halves are printed with different patterns.

12. Method according to claim 11, **characterised in that** the different patterns in the two halves of the double-width tipping paper strip have different variation lengths.

13. Method according to claim 9 and claim 10, **characterised in that** an endless strip (14; 20) of cigarette paper is used to provide, in each finished smoking article, a cigarette paper wrapping and **in that** an endless strip (14; 20) of tipping paper or double-width tipping paper is used to provide, in each finished smoking article, a tipping paper wrapping, wherein to both the endless strip (14; 20) of cigarette paper and the endless strip (14; 20) of tipping paper or double-width tipping paper there are applied varying patterns (1, 2; 12; 21, 22, 23, 24) of at least one respective characteristic.

14. Method according to any one of claims 1 to 13, **characterised in that**, in the varying pattern (1, 2; 12; 21, 22, 23, 24), coloured printing ink and a smell- or taste-providing substance are printed in register.

15. Bundle or pack of smoking articles manufactured according to any one of claims 1 to 14, **characterised in that**, in the bundle or pack, the individual smoking articles are different with respect to the pattern (1, 2; 12; 21, 22, 23, 24).

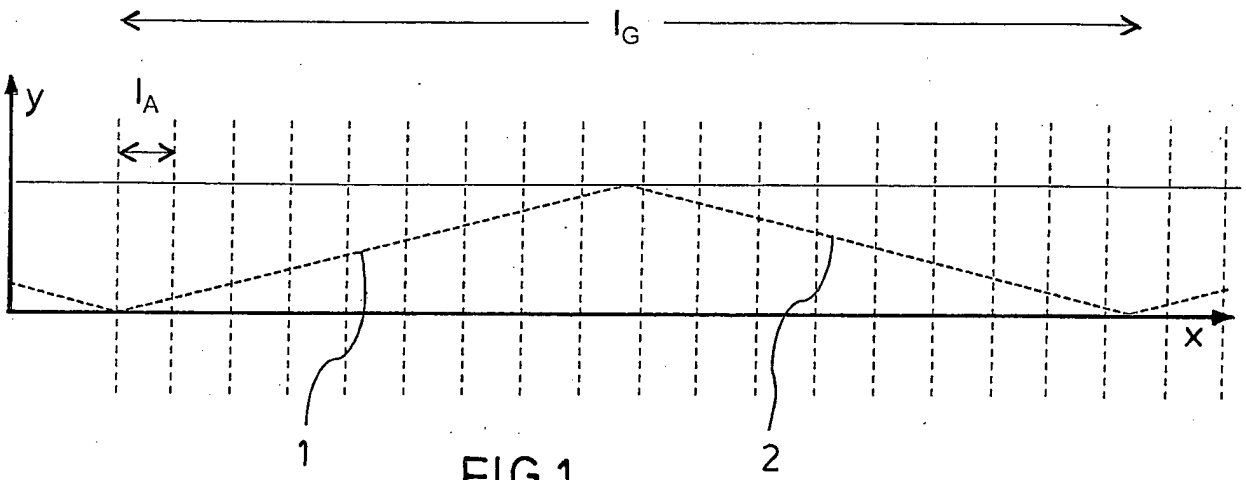

FIG.1

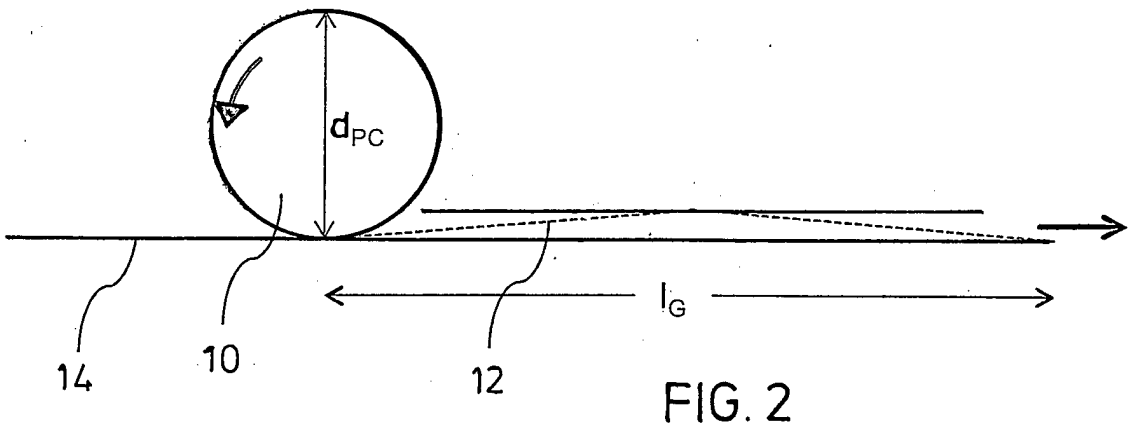

FIG. 2

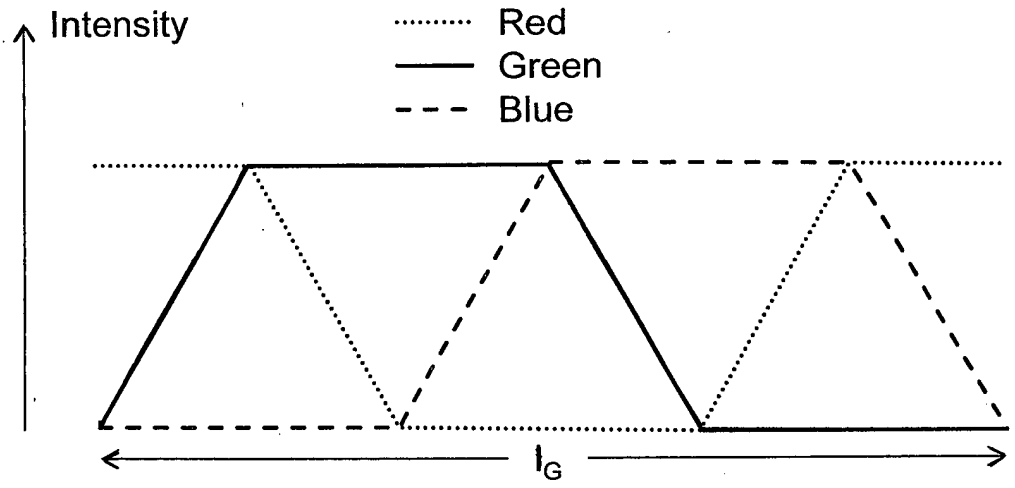

FIG. 3

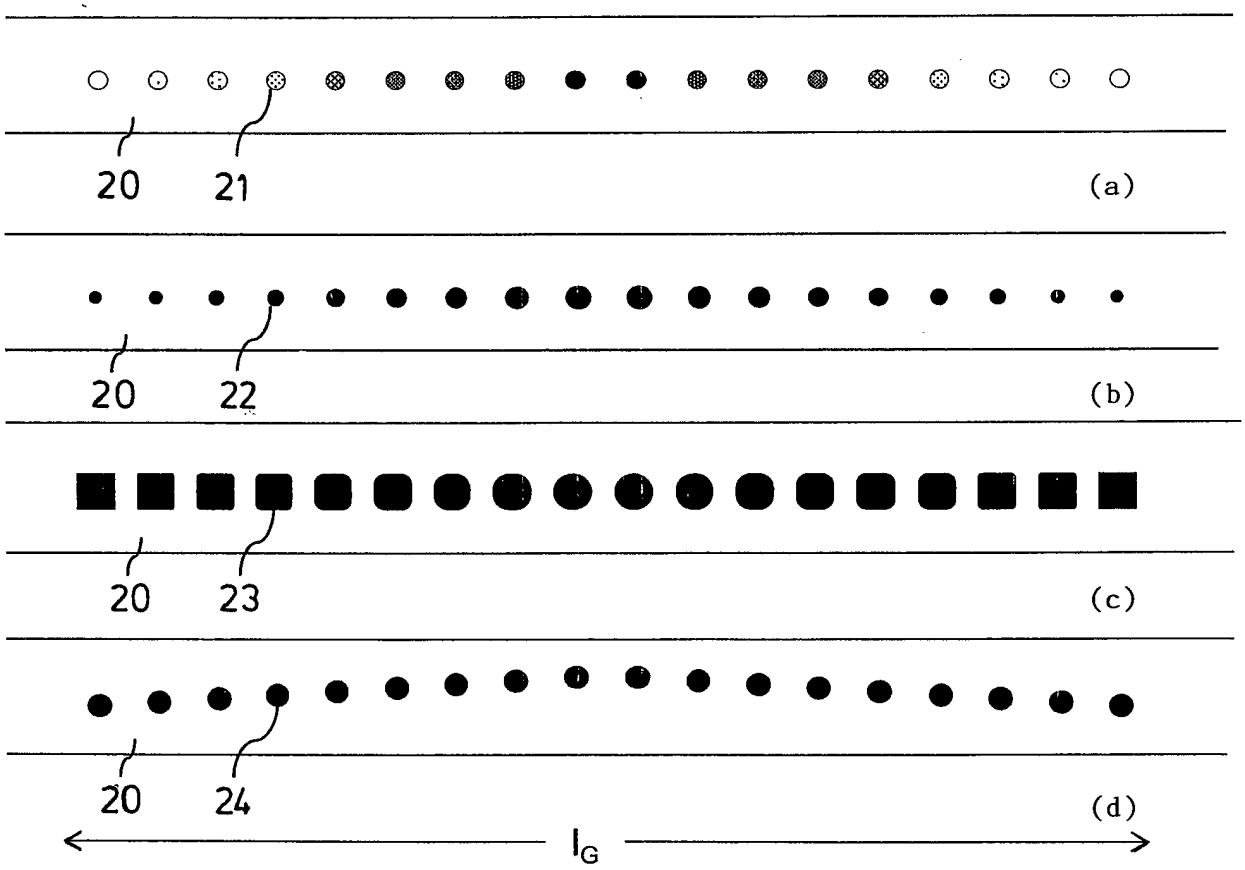

FIG. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 14 00 3519

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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TECHNICAL FIELDS SEARCHED (IPC)

A24D
A24C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	20 April 2015	MacCormick, Duncan

CATEGORY OF CITED DOCUMENTS

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

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