

METHOD FOR CONTINUOUS MONITORING OF RESIDUAL STAPLE QUANTITY IN DISPENSING DEVICES

Field of the Invention

[0001] The present invention relates to a method and apparatus for continuously monitoring the amount of staples remaining in a stapling device, in particular to a staple strip with a visual indicator.

Background of the Invention

[0002] The applications of staples have evolved from pure stationary usage to many professional and specialized fields. Large staples might be used with a hammer or staple gun for fencing, masonry, roofing and cardboard boxes. Surgical staples made of biologically safe materials are used for the closing of incisions and wounds in place of sutures.

[0003] Efforts have been made to improve the functionality of staples or stapling devices in order to meet the specialized needs in the respective fields. Several methods have been developed to alert the user to "staple low" situation, and can be divided into two major solution categories. In the first category, a mechanism, either mechanical or electronical, is incorporated into a stapling device. The mechanism either send alerting signals when only a predetermined amount of staples are left in a stapling device, or detect and display the residual staple quantity. Known prior art includes GB 2428018, JP2004322639, JP2004034243, US5992724, US26016847A1 and US5441191. Due to the complexity of the indication mechanism, the cost of such stapling device is substantially higher than the conventional counterparts.

[0004] In the second category, as disclosed in JP20055019A2 and JP10118958A2, colour is imparted to a last few staples of a staple strip in respect of the loading direction. FIG. 1 shows a perspective view of a coloured staple strip according to the prior art. The ejection of such coloured staples from the stapling device suggests it is the time to replenish the stapling device. However, such coloured staple strips neither inform the degree of usage, nor allow continuous monitoring of the amount of remaining staples,

since the alerting signal appears only when the residual staple quantity is below a pre-determined amount, and remains the same intensity despite the increasing staple shortage due to further usage.

[0005] In view of the above-discussed disadvantages of the currently available solutions, a simple but effective indication mechanism for continuously monitoring the residual staple quantity is needed.

Summary of the Invention

[0006] The present invention provides a staple strip, which is operable to be loaded into and used with a stapling device, the staple strip comprising a plurality of staples defining a longitudinal axis of the staple strip, and operable to be successively ejected from the stapling device; and a visual indicator imparted to the staple strip, wherein the visual indicator is so configured that when one of the staples is ejected from the stapling device, the coverage of the visual indicator thereon is operable to indicate the amount of staples remaining in the stapling device.

[0007] According to one aspect of the invention, the visual indicator is so configured that when one of the staples is ejected from the stapling device, the coverage of the visual indicator thereon in percentage corresponds to the amount of staples remaining in the stapling device in percentage.

[0008] According to another aspect of the invention, the visual indicator is so configured that when one of the staple is ejected from the stapling device, the coverage of the visual indicator thereon in percentage corresponds to the amount of staples that have been ejected therefore in percentage.

[0009] According to yet another aspect of the invention, the coverage of the visual indicator on the staple strip is configured to change continuously in a linear manner along the longitudinal axis.

[0010] According to further another aspect of the invention, the staple strip defines a first end and a second end along the longitudinal axis, and the visual indicator is configured so as to generate a pattern in triangle, which has a side located on and overlapping with the first end, and a vertex of the opposite angle falling on the second end.

[0011] According to another aspect of the invention, the staple strip defines a top surface in relation to the loading orientation into the stapling device, and the visual indicator is imparted to the top surface.

[0012] According to yet another aspect of the invention, the staple strip defines a first and a second side surfaces in relation to the loading orientation into the stapling device, and the visual indicator is imparted to at least one of the side surfaces.

[0013] According to one aspect, the present invention also provides a reference card for being used with the staple strip to facilitate the estimation of the amount of staples remaining in the stapling device.

[0014] According to another aspect, the present invention further provides a method for continuously monitoring the amount of staples in a stapling device, the method comprising the steps of providing a staple strip with a visual indicator, loading the staple strip into the stapling device; performing stapling operation with the stapling device; and estimating the amount of the staples remaining in the stapling device based on the coverage of the visual indicator on the most recently ejected staples.

[0015] The objectives and advantages of the present invention will become apparent from the following detailed description of embodiments thereof in connection with the accompanying drawings.

Brief Description of the Drawings

[0016] Preferred embodiments according to the present invention will now be described with reference to the Figures accompanied herein, in which like reference numerals denote like elements.

[0017] FIG. 1 shows a perspective view of a staple strip colored at one end, in accordance with the prior art.

[0018] FIG. 2A shows a perspective view of a staple strip in accordance with one embodiment of the present invention, and FIG. 2B shows a enlarged view of a staple sampled therefrom.

[0019] FIG. 3 shows a perspective view of a staple strip in accordance with another embodiment of the present invention.

[0020] FIG. 4 shows a top view of a reference card in pair with the staple strip shown in FIG. 2A, in accordance with yet another embodiment of the present invention.

[0021] FIG. 5 shows a top view of another reference card in pair with the staple strip shown in FIG. 3 in accordance with further another embodiment of the present invention.

[0022] FIG. 6A shows a perspective view of a staple strip in accordance with yet another embodiment of the present invention; and FIG. 6B shows enlarged views of three staples sampled therefrom.

[0023] FIG. 7 shows the use of the staple strip in FIG. 6A with a stapling device.

Detailed Description of the Invention

[0024] The present invention may be understood more readily by reference to the following detailed description of certain embodiments of the invention.

[0025] Now referring to FIG. 2A and 2B, there are provided a perspective view of a staple strip 1 and an enlarged view of a staple 10 sampled therefrom respectively, in accordance with one embodiment of the present invention. The staple strip 1 is constituted by a plurality of staples 10 that are placed side-by-side and connected together in a sheet-like form. Crowns 102 of the staples 10 form a top surface 14 of the staple strip 1, whilst legs 104 form two side surfaces 16 thereof. The front 11 and rear 12 ends of the staple strip 1 along the longitudinal axis are defined based on their relative locations to the ejecting opening of a stapling device when the staple strip 1 is loaded therein. A visual indicator 18 is imparted to the top surface 14 of the staple strip 1. The color or shade of the visual indicator 18 is distinct from that of staples 10. The visual indicator 18 is so configured that when an individual staple 10 is ejected out of the stapling device, the remaining amount of staples 10 can be estimated based on the coverage of the visual indicator 18 on the crown 102 of the ejected staple 10. Hence, by simply using the staple strip 1 and observing the ejected staple 10, a user is able to continuously monitor the usage of the staples 10 and determine the right time to replenish the stapling device.

[0026] In accordance with the embodiment shown in FIG. 2A, the staple strip 1 has a flat rectangular top surface 14. The visual indicator 18 applied thereon has an outline in a shape of a rectangled triangle, the hypotenuse of which falls on a diagonal line of the top

surface 14. The staple 10 at the rear end 12, which is the last to be ejected out of the stapling device, has full coverage of visual indicator 18 on the crown 102. The coverage decreases gradually from the rear end 12 towards the front end 11 in a linear manner.

[0027] When the staple strip 1 is loaded into a stapling device for use, during the stapling process, the successively ejected staples 10 display increasing coverage of visual indicator 18, which sends stronger alerting signals to the user that the residual staple quantity is running lower. The user is also able to estimate the amount of remaining staples 10, since the coverage of the visual indicator 18 on each ejected staples 10 relative to the width of the crown 102 corresponds to the amount of staples ejected therebefore in percentage.

[0028] Now referring to FIG. 3, there is provided a perspective view of a staple strip 2 in accordance with another embodiment of the present invention. The top surface 24 is in a shape of inverted V, having two symmetric halves 24a and 24b. The visual indicator 28 applied thereon has an outline similar to a slightly folded isosceles triangle, which has the base located on and overlapping with the crown of the last staple at rear end 22 in full width, and the topmost vertex falling on the apex of the first staple at front end 21.

[0029] It is to be understood by a person skilled in the art that the indicative pattern on the top surface of the staple strip generated by the visual indicator is not so limited. In one embodiment, the indicative pattern is in a shape of a scalene triangle, which has one side located on and overlapping with the crown of the last staple at rear end in full width, and the vertex of the opposite angle falling on the first staple at front end.

[0030] In addition, it is to be understood that the visual indicator can also be configured to directly indicate the percentage of staples remaining in the stapling device, rather than the percentage of staples that have been consumed as shown in the previous embodiments. In one embodiment, the staple strip has an inverse visual indicator compared to the embodiment shown in FIG. 2A, so that the first staple to be ejected is the one having the full visual indicator coverage. During the stapling process, the coverage of visual indicator on the successively ejected staples decreases, being proportional to the residual staple quantity.

[0031] To improve accuracy of the estimate of the visual indicator coverage on ejected staples by the user, a reference card may be provided and used together with the staple strip. Now referring to FIG. 4 and 5, there are provided top views of two reference

cards in pairs with the corresponding staple strips shown in FIG. 2A and FIG. 3 respectively. Take the reference card 15 in FIG. 4 as an illustrative example. The reference card 15 has an indication box 152, being the same size as the top surface 14 of staple strip 1, and having a visual indicator 154 of the same pattern. At one side along the longitudinal axis of the indication box 152, is there a scale 156, which creates proportional linear measurements. The index numbers 158 of the scale 156 are percentages, indicating the stretch of the region uncovered by the visual indicator 154 in the corresponding marked cross-section, in relation to the width of the indication box 152.

[0032] In one embodiment, the indication box 152 is translucent or transparent. In use, the reference card 15 can be superimposed on the ejected staple 10. By moving the reference card 15 relative to the ejected staple 10 along the longitudinal axis, the user is able to find a match in the pattern of visual indicator between the two and directly read or estimate the residual staple quantity based on the index numbers 156 close to the matching cross section found in the indication box 152.

[0033] In another embodiment, the indication box 152 is opaque. In use, the reference card is placed side-by-side with the ejected staple 10.

[0034] In yet another embodiment, the orientation of the scale 156 is the inverse of the one shown in FIG. 4, so that the index numbers indicate the stretch of the region covered by the visual indicator 154 in the corresponding marked cross-section, in relation to the width of the indication box 152.

[0035] In further another embodiment, the index numbers 158 are the absolute counts, rather than percentages, with the knowledge of the total staple number per strip.

[0036] Now referring to FIG. 6A and 6B, there is provided a staple strip 3 in accordance with yet another embodiment of the present invention. FIG. 6A shows a perspective view of the staple strip 3; and FIG. 6B shows three staples 30a, 30b, 30c sampled therefrom. Compared to the embodiment in FIG. 2A, the staple strip in FIG. 6A has identical features, except that the visual indicator 38 extends onto one side surface 36 of the staple strip 3.

[0037] The extended visual indicator 38 on the side surface 36 offers another way for continuously monitoring the staple usage, which is illustrated in FIG. 7. As shown in FIG. 7, a conventional mechanical stapler 4 has a rectangular window 41 carved in the sidewall of a staple magazine 42, through which the visual indicator 38 on the side surface

36 of the loaded staple strip 3 is visible. Based on the observed pattern of visual indicator 38, the user is able to roughly track the staple usage/ residual staple quantity, so as to timely replenish the stapler 4.

[0038] In one embodiment, the visual indicator 38 is extended to both side surfaces 36 of the staple strip 3. In another embodiment, the visual indicator 38 is applied to the side surface 36 only, without co-existence on the top surface 34.

[0039] Many techniques have been available in the industry for imparting the visual indicator to the staple strip. In one embodiment, the visual indicator is imparted by painting. The paint may be of industry grade for stationary or construction purpose, whereas the paint is of bio-safety grade for surgical purpose. In another embodiment, the visual indicator is imparted by laser marking.

[0040] While the present invention has been described with reference to particular embodiments, it will be understood that the embodiments are illustrative and that the invention scope is not so limited. Alternative embodiments of the present invention will become apparent to those having ordinary skill in the art to which the present invention pertains. Such alternate embodiments are considered to be encompassed within the spirit and scope of the present invention. Accordingly, the scope of the present invention is described by the appended claims and is supported by the foregoing description.

Claims

1. A staple strip for being loaded into and used with a stapling device, the staple strip comprising:
 - a plurality of staples defining a longitudinal axis of the staple strip, and operable to be successively ejected from the stapling device; and
 - a continuous visual indicator imparted to the staple strip along the longitudinal axis;
 - wherein the coverage of the visual indicator on each staple is unique; and
 - wherein the visual indicator is so configured that when one of the staples is ejected from the stapling device, the coverage of the visual indicator thereon consistently indicates the amount of staples remaining in the stapling device.
2. The staple strip in accordance with claim 1, wherein the visual indicator is so configured that when one of the staples is ejected from the stapling device, the coverage of the visual indicator thereon in percentage corresponds to the amount of staples remaining in the stapling device in percentage.
3. The staple strip in accordance with claim 1, wherein the visual indicator is so configured that when one of the staple is ejected from the stapling device, the coverage of the visual indicator thereon in percentage corresponds to the amount of staples that have been ejected therefore in percentage.
4. The staple strip in accordance with claim 1, wherein the coverage of the visual indicator on the staple strip is configured to change continuously in a linear manner along the longitudinal axis.
5. The staple strip in accordance with claim 4, wherein the staple strip defines a first end and a second end along the longitudinal axis; and
 - wherein the visual indicator is configured so as to generate a pattern in triangle, which has a side located on and overlapping with the first end, and a vertex of the opposite angle falling on the second end.

6. The staple strip in accordance with claim 5, wherein the patterned region is imparted with the visual indicator.
7. The staple strip in accordance with claim 5, wherein the unpatterned region is imparted with the visual indicator.
8. The staple strip in accordance with claim 1, wherein the staple strip defines a top surface in relation to the loading orientation into the stapling device; and wherein the visual indicator is imparted to the top surface.
9. The staple strip in accordance with claim 1, wherein the staple strip defines a first and a second side surfaces in relation to the loading orientation into the stapling device; and wherein the visual indicator is imparted to at least one of the side surfaces.
10. The staple strip in accordance with claim 1, wherein the visual indicator is painted thereon.
11. The staple strip in accordance with claim 10, wherein the paint is of bio-safety grade.
12. The staple strip in accordance with claim 10, wherein the paint is of industry grade.
13. The staple strip in accordance with claim 1, wherein the visual indicator is marked thereon by laser.
14. The staple strip in accordance with claim 1, wherein the visual indicator is affixed thereon.
15. A reference card for being used with the staple strip in accordance with claim 1 to facilitate the estimation of the amount of staples remaining in the stapling device.
16. The reference card in accordance with claim 15, which comprises:

an indication box having the same shape and visual indicator imparted as the staple strip; and

a scale along the longitudinal axis of the indication box.

17. The reference card in accordance with claim 16, wherein the indication box is the same size as the staple strip.
18. The reference card in accordance with claim 16, wherein the scale has a plurality of index numbers for indicating the amount of staples in percentage.
19. The reference card in accordance with claim 16, wherein the scale has a plurality of index numbers for indicating the amount of staples in counts.
20. The reference card in accordance with claim 16, which is translucent or transparent, so that the card is operable to be superimposed on the ejected staple for reference.
21. A method for continuously monitoring the amount of staples in a stapling device, the method comprising the steps of:
 - providing the staple strip in accordance with claim 1;
 - loading the staple strip into the stapling device;
 - performing stapling operation with the stapling device; and
 - estimating the amount of the staples remaining in the stapling device based on the coverage of the visual indicator on the most recently ejected staples.