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ARTISTIC SCREENING – CONSTRUCTION AND APPLICATION FOR DOCUMENT SECURITY

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ABSTRACT
This document gives information about Document security, security feature classification according to application criteria, security features involved at printing technique, Difference between the conventional screening gradation and artistic screening gradation, halftone dot generation in conventional screen and artistic screening technique, customised dot generation for document security.

KEYWORDS: Security features, Printed security features, Artistic screening, Dot shape manipulation, Document Security.

INTRODUCTION

In current scenario of Globalisation for commercial transactions, legal documents, educational sector, agricultural and real estate land conversion, production and market economy and many other sectors where authorisation of document and money concern are important and vital need to secure the document to avoid duplication and counterfeiting. Security printing deals with printed document, certificates, legal documents and all kind certificates given for authenticity, ownership or educational achievements. There are many steps and different features involved to secure the document. Security printing is the field of the printing industry that deals with the printing of items such as banknotes, passports, tamper-evident labels, stock certificates, postage stamps and identity cards. The main goal of security printing is to prevent forgery, tampering, or counterfeiting.

Security printing deals with printed document, certificates, legal documents and all kind certificates given for authenticity, ownership or educational achievements. there are many steps and different features involved to secure the document. There are many features which used for security and they get involved in different steps production, i.e. security involved at substrate level when it is manufactured , the designing elements which are involved in document for security, the printing processes and special applications used and at last different postpress special applications used. The contents of security printing which are incorporated in document security are differentiated on the basis of where and how these involved and added. There are different aspects where the security is involved as

Substrate Base Security Feature

Paper Substrates security features are according to the composition of paper, it,s feel, sound, tint, gloss, watermark included in it at a time of manufacturing or after manufacturing using special watermark generating chemicals. Chemical reactivity, fluorescence of paper also acts as security feature. The physical composition of paper having color fibre, planchets, perforation, blind embossing, transmission hologram of synthetic paper gives major contribution in security. Plastic substrate used for value cards have laser engraving, digital hologram, digital watermark, electronic circuits which are embedded in card as security feature.

Visual interference Base Security feature

It deals with the optical variable features, holograms, foil printing, multi reflective films, transmission films, OVDs having single or multilayer structures

Printing Security Ink

Security ink performs there functions according to their response to change in temperature, environment, viewing condition, ink composition, it's physical and chemical properties.

Printed Security Pattern

Security printing patterns which are added at the time of designing of document, the printing techniques used for document reproductions, image carrier which are composed or designed to add security element in document.

PRINTED SECURITY FEATURE

Screen-decoded images

Image containing embedded information which is invisible to naked eyes, but it can be visualized by interference between printed screen pattern and the frequency band of scanning equipment or between printed screens and marching overlay screens.

Guilloche

The guilloche, a geometric fine-line pattern, it is an architectural ornament formed from two or more interlaced bands with openings containing round devices or a pattern made by interlacing curved lines. The intricacy of guilloche patterns originally aimed at raising a barrier against recrimination. Guilloche patterns are created using mathematical equations in dedicated programme for the security printing.

Microprinting

Microprinting or micro lettering consists of very fine lettering, beyond the resolution of the unaided human eye. While small lettering of sufficient contrast is legible with-out magnification down to characters of about 0.5-mm high, the height of micro-printed characters is smaller, even down to 0.15 mm.

See-Trough Register

Modern printing machines allow the printing of specially related image elements in seamless front-to-back register on both sides of a document. If held against the light, the register of front and back image elements is revealed. Such images are called see-through devices.

Engraved Portrait

Since early days of currency printing engraved portraits, have been applied as, an anticounterfeiting feature. The intaglio printing process allows the printing of high-resolution line portraits with high line contrast, and the superior resolution and contrast of intaglio printing cannot be achieved with any other printing technique. This approach has been widely regarded effectual human factors design, and it has resulted in a world-wide application of portraits on currency.

Transitory Images

Transitory images are based on the application of relief patterns to document substrates. Such patterns can be either intaglio-printed relief patterns or blind-embossed relief patterns. Transitory images are characterized by the distinct changes in contrast of the printed design, depending on their angle of observation and illumination.

- LATENT IMAGE - Latent images consist of a foreground intaglio line grating and background line grating that generally stand at right angles The lines generally printed with frequency so fine enough to make the lines hardly perceptible by the naked eye so that, under normal illumination, a more or less uniform field is observed. Under oblique illumination foreground pattern will appear darker with respect to the surrounding background line pattern
- Transient Image - An application of blind-embossed patterns is their combination with printed background patterns. Under oblique illumination, the printed pattern can either be located on the shadowed flanks of the embossed relief or on its illuminated flanks.

Anti Copping Mark

The distinct design in complex format and arrangement of fine line elements placed in such way that , that are not get noticed on first observation and get neglected by counter fitter so it get detected at time of inspection.

Artistic Screening

In traditional printing, halftone dots are most commonly used to create the illusion of gradients and tones. Artistic screening takes this idea a step further and instead of using dots as a halftone, graphics and even text can be used to build the image.

ARTISTIC SCREENING

Conventional halftone reproduction by constant screen dot shape is replaced by customised dot shape used for halftone reproduction. Color reproduction in printing techniques are done by different halftone color screen angles for that individual process. The printed images show the color gamut of individual process but by using constant color screen angle color gamut's ranges can be manipulated.

Artistic screening is designed to have manipulation for dot frequencies and dot shapes to incorporates several important anti-counterfeiting features in documents used for bank transaction, legal transactions. For the manipulation of screen dot, it is on both side for shape and size of dots. Dot having the shape of complex design on graphical element or the text matter in any script. This manipulation gives halftone gradation as achieved by conventional screening by changing no of dots in unit area for FM screening or by changing size of dots for AM screening. Artistic Screening can be used for generating screen dots at varying frequencies and orientations, which are well known for inducing strong moiré effects when scanned by a digital colour copier or a desktop scanner. Moiré effects due to scanning of frequency modulated dots and lines. While changing dot frequency for artistic screen as per frequency modulated screening, size and shape of element may remain same but it acts differently with respect to each other for dot gain control. The intensity of elements changes when we try to control the frequency changes for gradation.

Generation of Artistic screening involves steps as basic element generation, second step - designing the elements according to intensity levels, and periodicity and dimensions of screen dot distribution. and in third step positioning and contour grown rate for elements;

- Element designing consist of the drawing base dot element as graphics or the text matter and its different basic variations. As the text or graphical element have lines or strokes so according to change in intensity variation in thickness of strokes, distance between lines etc are selected and few key step variations are drawn. All these designing work are performed with help of designer using dedicated software.

Fig 1 Element with contour intensity variations

- According to the basic key steps of intensity element is represented in no of intensity levels. For intensity levels parts of elements as line thickness, variations steps, placement of parts according to graphical deviation of element in array, and positioning of newly generated element to achieve steps wise intensity variations. By changing position and dimension of element it can give no of variation in screen gradation. Dot repetition at regularly spaced, periodic intervals that gives a screen its unique aspect. By modifying periodic repetition and dimension as the orientation of dot it plays important role in screen designing.

Fig 2 Periodic repetition with change in orintation

- In third step positioning of dots are selected, in two dimensional graphics X and Y axis position are changes, if for positioning only one axis values are manipulated it give the visible patches or structural separation in screen gradations. To avoid these kind of separations value for X and Y axis i.e. position of dot is changes on both horizontal and vertical axis. It gives smooth screen gradation. The rate of change of intensity as per the dot percentage and area covered by dot element is decided to represent respective dot percentage by appropriate intensity level.

Fig 3 Groth rate and Positioning of dot element.

Fig 4 Image having continues gray levels

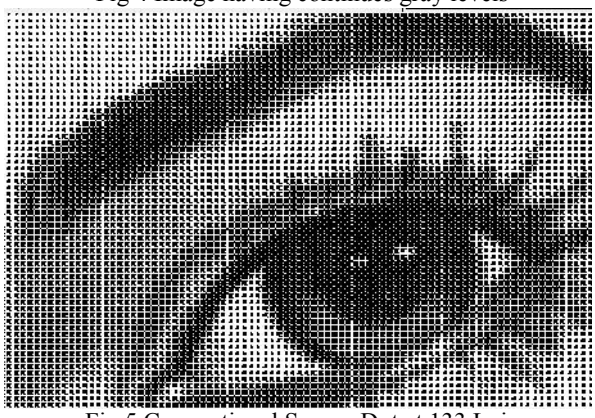

Fig 5 Conventional Square Dot at 133 Lpi

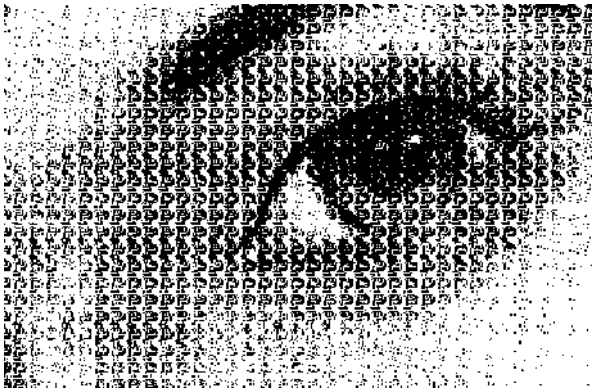

Fig 6 Dot having shape of "P" at 133 Lpi

CONCLUSION

- By using complex elements and designing interference we can generate the Artistic screening. The interference gives no of manipulation options to create different screening with unconventional dot shape.
- Artistic screening technique can generate entirely new image manipulation path which helps in Document security and product commercial protection.

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