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Advancement in Indian Passport- A Forensic Perspective

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Abstract - *A passport is basically a proof of identity of a person used throughout the world to travel from one country to another. No person shall depart from, or attempt to depart from India unless he holds in this behalf a valid passport or travel document. There are a number of security features present in the current Indian passport i.e. background printing (e.g. guilloches and micro printing), security printing (e.g. fugitive and fluorescent ink), stitching thread, gothic numbering, Heat Applied Ultra Violet (HAUV) film, dicuts, fibres, watermark, barcode, Letter Screen Image (LSI) etc. Counterfeiting of passport is not a new problem. Infect, it starts from the manufacturing of passport itself. This problem is very common in India due to various loopholes in security features. To overcome this problem Ministry of External Affairs, India has launched new security features, such as LSI, barcode, double lamination, etc. A layman may not be aware about any of the security features of his/her passport. Only a trained eye can detect a fake passport. The aim of the current research article is to empower a document examiner and a layman with the knowledge of security features to detect a fake passport. The research is based on the analysis of security features by which one can easily identify genuine Indian passport.*

Key Words*: *Indian passport, genuine Indian passport, fake Indian passport, LSI, bar code, double lamination.

1.INTRODUCTION

"Passport" includes a document which having been issued by or under the authority of the Government of a foreign country satisfies the conditions prescribed under the Passport (Entry into India) Act, 1920 in respect of the 34 of 1920 class of passports to which it belongs."Travel document" includes a document which having been issued by or under the authority of the Government of a foreign country satisfies the conditions prescribed. - **The Passports Act, 1967**.

Classes of Passports

The following classes of passports (Fig.1) may be issued under the Passport Act 1967, namely:

1. **Ordinary/Regular/Tourist Passport** (*Deep Blue/Black cover*) – Issued for ordinary travel, such as vacations and business trips (36 or 60 pages). It is a 'Type P' passport, where 'P' stands for Personal.
2. **Official/Service/Special Passport** (*White cover*) - Issued to individuals representing the Indian government on official business. It is a 'Type S' passport, where 'S' stands for Service.
3. **Diplomatic Passport** (*Maroon cover*) - Issued to Indian diplomats, top ranking government officials and diplomatic couriers. It is a "Type D" passport, where 'D' stands for Diplomatic.

Fig 1: Classes of Indian Passport

Offenses and Penalties

According to the **Passport Act 1967**; Whoever (a) contravenes the provisions of section 3; or (b) knowingly furnishes any false information or suppresses any material information; or (c) fails to produce for inspection his passport or travel document; or (d) knowingly uses a passport or travel document issued to another person; or (e) knowingly allows another person to use a passport or travel document issued to him, shall be punishable with imprisonment for a term which may extend to 2 years or with fine which may extend to Rs.5000 or with both.

Indian passport (IP) is issued to a citizen of India for the purpose of international travel. It acts as a proof of Indian nationality. The Consular, Passport & Visa (CPV) Division of the Ministry of External Affairs (MEA), functioning as the

central passport organisation, is responsible for issuance of Indian passports to all eligible Indian citizens. Passports are issued from Regional Passport Offices (RPOs)/Passport Offices (POs) across the country and Indian missions abroad. - **MEA, India**.

The India Security Press (ISP) is a unit of Security Printing and Minting Corporation of India Ltd. (SPMCIL) which is a wholly owned company of the Government of India. SPMCIL was formed after corporatisation of nine units including four mints (Mumbai, Kolkata, Hyderabad and Noida), four presses (Nashik, Dewas, Salboni and Mysore) and one paper mill (Hoshangabad) which were earlier functioning under the Ministry of Finance. India Security Press (Nashik) prints passports, visa stickers and other travel documents for Ministry of External Affairs. - **SPMCIL**

As international travel has increased, passport has become a more frequent questioned documents submitted for examination. Passport examination is both a general questioned document problem and a technical field in its own right. The purpose of this article is to better acquaint the document examiner as well as to a layman with the various types of problems common in passports and the types of examinations that generally offer the best results. This research is carried out by using various scientific instruments i.e. Video Spectral Comparator (VSC), Twin Video Comparator, Stereo Zoom Microscope, Ultraviolet Lamp, Magnifying Glasses, etc.

Checklist for Forensic Screening/Examination of Passports

- Bio data: photograph, name, date of birth, issue and expiration date, signature
- General inspection: exterior view, binder thread, numbering by perforation, watermark
- Transmitted light examination: all the pages, fibres, printing processes, substrates, laminations under 10X magnification
- UV light examination: fibres, printing inks, paper including overt and covert security features
- Visible light examination: security features such as passport papers/pages, gothic/punched number, biographical/bio data page, LSI, barcode, micro printing, fugitive/sensitizing ink
- Stereomicroscopic examination: document number, substrate elements, print processes, lamination
- Oblique light examination: dicuts

Security Features of Indian Passport

Although the identification of passport is a big hill task for a layman but after comprehensive visualization of all the mentioned security features in the paper, it is quite easy to identify the genuine passport. There are number of security features, which are currently present in the Indian passports. Both, Genuine Indian Passport (GIP) and Fake Indian Passport (FIP) can be distinguished from each other on the basis of security features. In the current research work, all the security features present in the passport are examined under visible, ultraviolet, transmitted and oblique light, which are discussed as follow.

A. Visible Light Examination- Examination of passport can be performed by front eye view examination as shown in the Fig. 2. Visible light examination includes detailed examination of security features such as passport papers/pages, gothic/punched number, biographical/bio data page, LSI, barcode, micro printing, fugitive/sensitizing ink.

Fig 2: Visible Light Examination of Indian Passport

1. Passport Papers/Pages- The high quality papers are used in Indian passports that are of **100 GSM** [grams per square meter]. The number of pages in the passport depends upon the passport booklet type. All the pages of the passport show fine trimming and finishing as per the prescribed standards. Alignment of pages and passport cover/smoothening of folds/creases is also done as per the standards.(Fig.3)

Fig 3: Passport Papers/Pages

2. Gothic/Punched Number- Passport number is perforated through the half back part of the passport with laser. This numbering is called **Gothic Numbering** (Fig.4), which is present in the half back part of the passport i.e. from page 19 to 35 and back cover of the passport in case of 36 type booklet. Typical distinguishing marks are produced which include traces of burning round the edges of the holes. Raised edges around the holes on the back of the perforations should be absent. When viewed from front to back, conical decrease in size of the perforated holes in the passport booklet should be present. This feature is incorporated to avoid tampering in the passports.

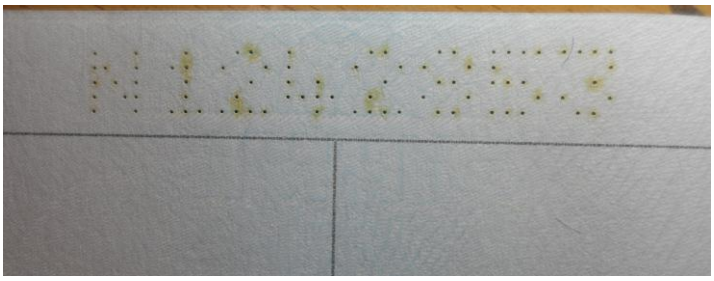

Fig 4: Gothic/Punched Number

3. Biographical/Bio Data Page- It includes personal details of the bearer of the document which appeared as text in the visual and machine readable zones. Biographical page is composed of several layers of **Polycarbonate** (PC), which is a thermoplastic polymer with excellent durability (lifecycle can exceed up to 10 years) and fused at high temperature and pressure to form a single monolithic structure. Background printing is done with coloured offset printing i.e. pre-printed text.

Fig 5: Biographical/Bio Data Page of Front Side

Fig 6: Biographical/Bio Data Page of Back Side

Personalization is the process, whereby the passport holder's image, signature and biographical data are incorporated into the passport. The holder's biographical data (Biodata) appears both in the Visual Inspection Zone (VIZ) and in the Machine Readable Zone (MRZ) on the bio data page. Photograph of the holder, signature and bio data text are incorporated directly by the process of integration during personalization. The photo is transferred to the bio data page by digital means which is called as Integrated Digital Photograph and it printed by Thermal Wax Printing.

Apparently, the personal data page has been shifted from inner cover to page 2, while data on last page is shifted to page 35. The signature and seal of passport issuing authority has been shifted from page 1 to the overleaf of front cover page (Fig.5, 6).

4. Letter Screen Image (LSI) - The Ministry of External Affairs launched a new series of passport booklets in April 2013 with the Letter Screen Image (LSI) of the holders. In LSI passport booklets, the personal data such as name, address, date of birth, file number, etc. of the applicant are embedded in tiny fonts, which forms the ghost/shadow image of the holder. The LSI passport is now being issued by all passport issuing authorities in India and abroad. LSI is appearing as ghost images of the applicant and it is the replica of the applicant's original photograph. (Fig 7)

Fig 7: Letter Screen Image on Front Bio Data Page

The text of LSI cannot be checked by naked eye, but can be seen with a magnifying glass and cannot be forged. After filing the necessary information of the applicant that includes name, date of birth, address and after affixing the scanned photograph, the ghost image of the photograph, along with the applicant's information will be printed in dots on the booklet by using the LSI machine at the regional passport office.

5. Barcode- A barcode is an optical, machine-readable, representation of data. The data usually describes something about the object that carries the barcode. Code 128, used in the Indian passport is a very high-density barcode symbology. It is used for alphanumeric barcodes. It can encode all 128 characters of American Standard Code for Information Interchange (ASCII) and by use of an extension character (FNC4), the Latin-1 characters defined in ISO/IEC 8859-1. Basically, Barcode present in the passport is made from passport number of the concerned individual (Fig 8).

Fig 8: Bar code on Back Bio Data Page

6. Micro Printing- Lines or motifs made up of very small letters or numbers that are barely perceptible to the eye are called as micro prints. Micro prints contain printed text smaller than 0.25 mm/ 0.7 pica points which require the use of low magnification, e.g. a magnifier or a loupe. That is the reason forged passports often show unreadable micro prints.

Fig 9: Micro printing on Biographical Page

Microprinting is present as "GOVERNMENT OF INDIA" and "BHARAT SARKAR" (in Hindi) subsequently on biographical page (Fig 9). All the printed lines (horizontal & vertical) on the VISA pages of the passport are also printed as "VISA PAGE (Respective Page No.)" and VISA PRASTHA (Respective

Page No.)" in Hindi on each remaining page (Visa Page) of the passport.

7. **Fugitive/Sensitizing Ink-** The base printing of the passport is done by fugitive ink. Fugitive ink present in the passport can react to chemicals/solvents. Once in contact with a specific chemical, the ink will migrate or changes colour resulting in a visible distortion. The phenomenon of this bleaching effect is called as fugitation/sensitization. The text (except biographical page), page no., lines and all the security printing, etc. shows fluorescence of greenish colour.

B. Ultra-Violet Light Examination- Ultra-Violet light can be used for the examination of passport cover, stitching/binding thread, HAUV/laminated film, guilloches/fine line pattern, fibres, fluorescent ink and is carried out using UV lamp/torch (Fig. 10).

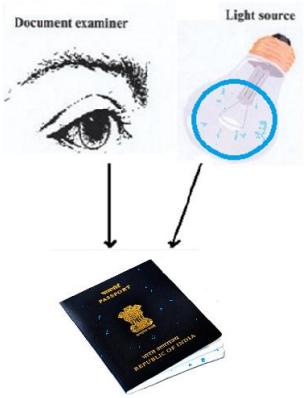

Fig 10: Ultraviolet Light Examination of Indian Passport

1. Passport Cover- There is three types of passport covers depending upon the colour/class of passport. The front part of the cover shows **golden embossing** over it.

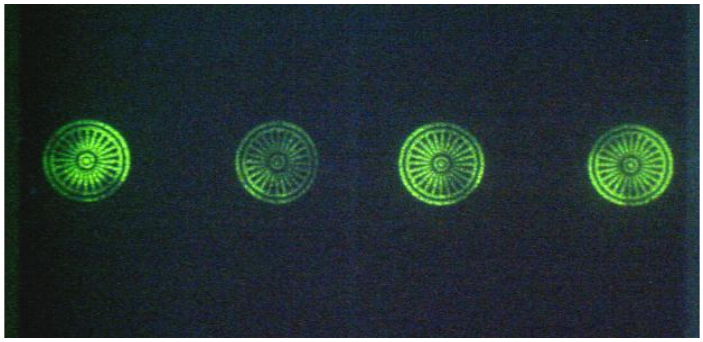

Fig 11: Passport Cover under UV Light

The Emblem of India is emblazoned in the centre of the front cover. The word 'passport' (in Hindi as well as in English) are inscribed above the Emblem whereas 'Bharat Ganrajya' (Hindi) and 'Republic of India' (English) are inscribed below the Emblem. The back part of the cover contains **punched passport number**. When the passport cover is viewed under the UV light it shows **Ashoka Chakra** in both front and back of the cover (Fig. 11).

2. Stitching/Binding Thread- Stitching thread [stitched in the spine] is used for stitching the pages of a booklet of passport. Stitching is sewn with a set pattern by using reverse stitching machine that is known as **Saddle Stitching**. The thread shows multi-coloured fluorescence with green, yellow and red colour when exposed to UV light (Fig. 12).

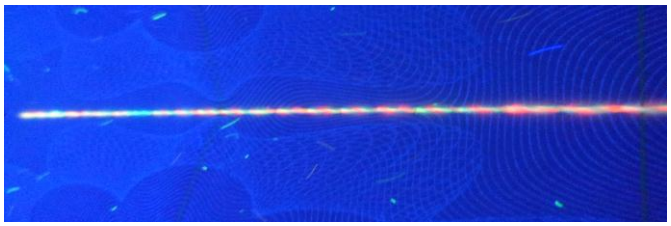

Fig 12: Stitching/Binding Thread

3. HAUV/Laminated Film- A laminated sheet is a type of plastic sheet with invisible security features that is affixed to the bio data page in order to protect data entries against falsification. Lamination is done by using HAUV [Heat Applied Ultra Violet] film by fusing it at 160 to 180 degree Celsius temperature. The key aim of any security laminate is data protection: securing and protecting it from fraudulent alteration.

Previously, lamination was present on the inner side of the passport cover i.e. biographical page. But currently passport is having 'double laminations' on both the bio data pages (front and back) and their respective back sides. Provision of double lamination has been included on pages 1, 2, 35 and 36. It is a new security feature implemented in Indian passport to enhance the overall quality of passports as well as to improve their security.

When biographical page is seen under the Ultra Violet light, it shows "GOVERNMENT OF INDIA" {Reddish in colour} repeatedly [in few lines] and "BHARAT SARKAR" {Greenish in colour, in Hindi} repeatedly [in multiple lines]. It has to be noticed that there will be only three lines of "BHARAT SARKAR" between the both lines of "GOVERNMENT OF INDIA" (Fig. 13). The printed text on the laminated sheet can be viewed under normal light. It means lamination contains visible and invisible printing.

Fig 13: HAUV Film under UV Light

4. Guilloches/Fine Line Pattern- Guilloches are decorative engraving technique by which a very precise intricate repetitive pattern or design is mechanically engraved into an underlying material with fine detail. They are the traditional elements of the document design comprising regular geometrical patterns of fine lines, which are produced by special machines or on a computer. These also serve as a security feature against counterfeiting. Indian passports contain guilloches pattern which is visible under UV light and fluoresce with various colours in different wavelength i.e. visa page shows light greenish colour of Guilloches Pattern under UV (Fig. 14).

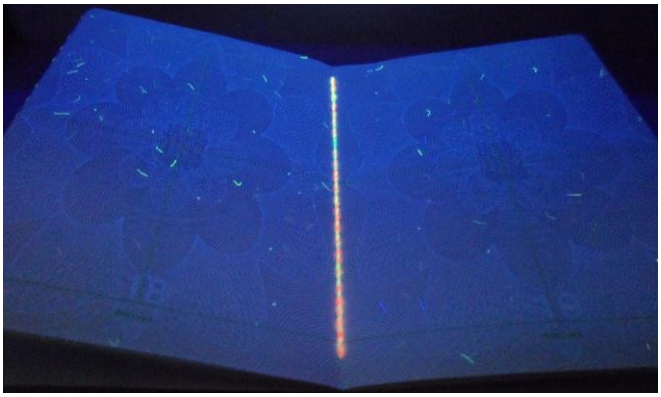

Fig 14: Guilloches/Fine Line Pattern

5. Fibers- Fibres are small, thread-like particles embedded in a substrate during manufacture. During the early stages of the paper manufacturing process, small fibres with various colours and properties are randomly placed on to the paper (Fig. 15). Fibers are the integral part of the paper structure and can only be lifted away from the paper by mechanical means. Fibres may be visible without equipment or with UV light sources.

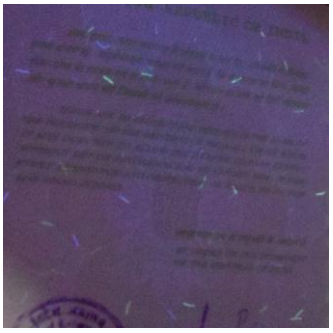

Fig 15: Fibers

6. Fluorescent Ink- Fluorescent Ink is used to print background text or motifs. This type of ink is visible under visible light and fluoresces under UV light. Fluorescence is a short-lived light emission which ceases within 10^{-8} seconds. Ultraviolet light is not visible itself, only its effect, i.e. the visible fluorescence stimulated by UV light can be seen in fluorescent ink. Indian passports show greenish fluorescence of all printed text (Fig. 16).

Fig 16: Fluorescent Ink

C. Transmitted Light Examination-In transmitted light examination, passport is held between the light source and eye as shown in the diagram (Fig. 17). Watermark is examined by using transmitted light.

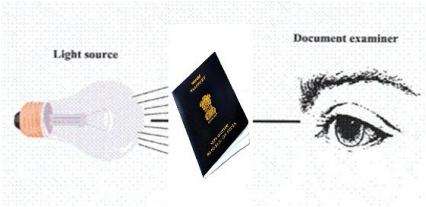

Fig 17: Transmitted Light Examination of Indian Passport

1. Watermark- A watermark is a translucent design produced during the paper manufacturing process and it contains tonal gradation, formed in the paper or other substrate. It is created by the displacement of paper by

making certain areas of the paper slightly thinner or thicker than the rest of the sheet. Side light may be used to recognize the uneven structure of a watermark. The watermark should not appear under UV light. Indian passport contains single tone watermark that is of dark shade. Indian passport contains **2 and ½ Ashoka Pillar** as head to head or tail to tail condition on each page except biographical page (Fig. 18).

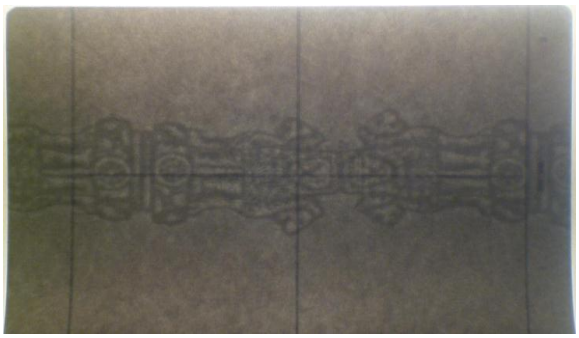

Fig 18: Watermark

D. Oblique Light Examination- Oblique light is impacted from the side with at a shallow angle and used to examine dicuts in Passport (Fig. 19).

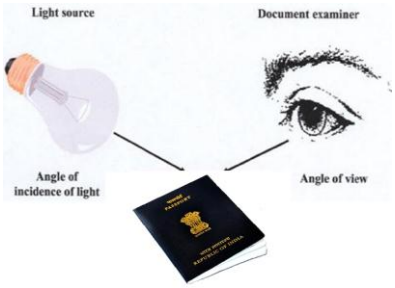

Fig 19: Oblique Light Examination of Indian Passport

1. Dicuts- Dicuts are the type of horizontal/ oblique lines, which are present in front and back page of biographical page. In earlier passports 'two special dicuts' were formed on biographical page having shape of Ashoka Pillar form. But now in the recent passport, it is eliminated (Fig. 20).

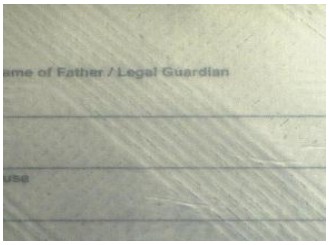

Fig 20: Dicuts

3. CONCLUSIONS

The increased security of the passport is a laudable step on the part of the government so as to ensure complete security. Now the new passport is coming with ghost image along with all the details that will be mentioned on it. The ghost image is a tamper proof security feature, which means that nothing can be done to destroy it. Even the details mentioned on the passport are now being double laminated so that the information cannot be duplicated in any case. New passport additionally contains a barcode, which represent the passport number of the bearer. Although there are number of security features but still these features need to be improved and amended in comparison with the passports of other countries. It should be notice that some security features need to be changed after some time interval e.g. annually. The present research article may be useful to forensic scientists, police officers and airport officers as well as for a layman.

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