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METHOD OF UPDATING A RECORD MEMBER

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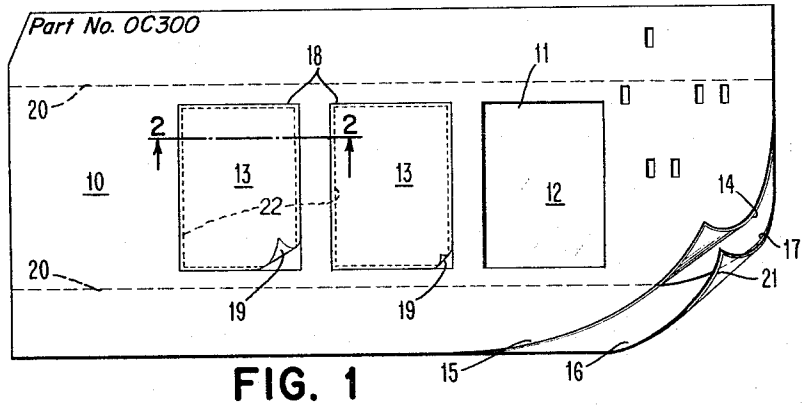


FIG. 1

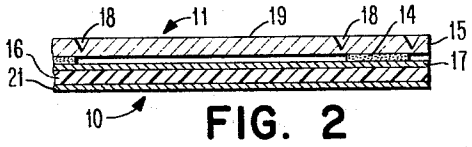


FIG. 2

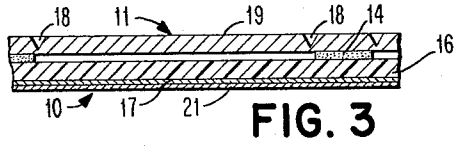


FIG. 3

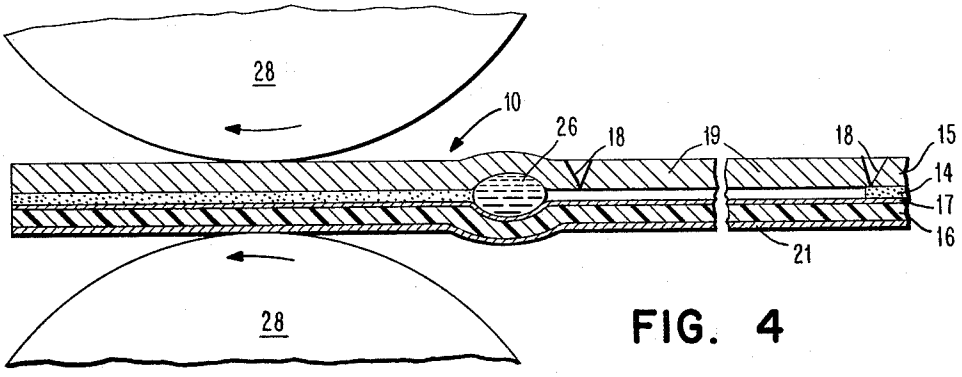


FIG. 4

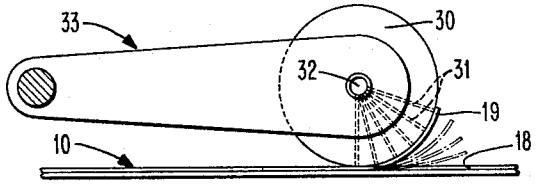


FIG. 5

INVENTORS

ALVIN H. BATTISON

HERMAN C. SCHEER

BY K. P. Johnson

ATTORNEY

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METHOD OF UPDATING A RECORD MEMBER

Alvin H. Battison, Vestal, and Herman C. Scheer, Endicott, N.Y., assignors to International Business Machines Corporation, New York, N.Y., a corporation of New York

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This invention relates generally to unit record cards of the kind employed in tabulating machines, and more particularly to such record cards which are also adapted to store data photographically therein.

Record cards capable of photographic storage are generally formed with one or more openings in the paper body of the card in which are mounted photographic transparencies or microfilm inserts. Such record cards are commonly referred to as "photo-aperture" or "aperture" cards, and they experience wide application in the field of information retrieval. Aperture cards are especially valuable because of their ability to store by microfilm masses of data such as drawings, maps, charts, correspondence, account statements, and the like, yet retaining the ability to be machine processed for selective recovery of the stored data.

Aperture cards are generally prepared by successively exposing a series of documents or objects on a roll of photographic film, developing the film, and cutting and mounting the film in the apertures of the cards. This procedure makes the production of completed cards time-consuming and costly. Furthermore, the insertion of transparencies must be done carefully to insure that each transparency is centered within the aperture and adequately secured by adhesive at its edges. Even though done cautiously, the inserts are subject to loosening with handling or deterioration of the narrow peripheral band of adhesive becoming lost or separated from the card within the file.

A further difficulty encountered with the usual aperture cards is that of updating the card with the addition of more current data as for example an account sheet or engineering drawings. To provide for the updating feature, aperture cards are generally prepared with a plurality of insert positions for the subsequent addition of transparencies. The usual updating procedure, however, is relatively inconvenient since a particular card sought must be correlated with the piece of film to be added thereto. Cards can be conveniently sorted from a file by machine but the film insert poses certain inconveniences because it must be sorted from other inserts prepared from the same film roll or batch. This procedure necessitates careful matching of the insert and card.

One method of improving the efficiency with which aperture cards are prepared has been to provide each card with an unexposed film portion which enables photographic records to be made by merely selecting the proper card and positioning it for exposure. The card and film therein are subsequently processed to develop the exposed film. The film used in this method, however, is a dry process film which has poor definition relative to the conventional silver halide process so that the reproduction of fine detail from such transparencies is unsatisfactory. Reproductions may be required from photo-aperture card to photo-aperture card or from the aperture card to a document so that the reproduction of fine detail may be critical, especially in the instances where engineering drawings, maps, etc. are to be reproduced from the card. A further problem with some dry process films is that the fixing time necessary after exposure is on the order of 2 to 4 hours, thus creating a storage problem during development. A disadvantage of preloading cards with unexposed film is that of storage until use. Preloaded cards must be stored so as to avoid accidental exposure, usually in complete darkness. The dry process films, however, may be stored in lighted areas but must be shielded from ultraviolet light.

Accordingly, it is a primary object of this invention to provide a photo-aperture card having therein multiple areas of unexposed, sensitized photographic film which may be selectively exposed and developed as desired to produce photographic records of improved quality.

Another object of this invention is to provide a photo-aperture record card employing photographic film having a silver halide sensitized coating which may be updated without the necessity of selectively combining the card and transparency subsequent to exposure.

Another object of this invention is to provide a photo-aperture record card preloaded with unexposed sensitized photographic film which may be subjected to storage in lighted areas until exposure is required.

Another object of this invention is to provide a photo-aperture record card having therein unexposed photographic film and a quantity of developing solution which can be selectively released to develop the film subsequent to exposure.

A further object of this invention is to provide a photo-aperture card adapted for storage in lighted areas and having an unexposed, silver halide sensitized photographic film preloaded therein which may be subsequently exposed and developed without removal from the card.

In accordance with the foregoing objects, this invention provides for the lamination of opaque paper card-stock, scored to define removable portions thereof, with a photographic film having an unexposed, light-sensitive coating on one side thereof. On the unlaminated side of the film, a removable opaque coating is applied to protect the sensitized film surface from accidental exposure to light during storage. An area of the laminated record card is reserved for other forms of recordings such as printing and punching. When the photo-aperture record card is to be photographically recorded, the opaque film coating or a scored opaque card portion are removed to enable exposure of the sensitized film. The exposed film is then developed without removal from the photo-aperture card.

The invention has the feature of making available an increased amount of surface area by which paper card-stock and film may be secured to each other with maximum adhesive design rather than a compromise to developed film insert techniques, thus decreasing the likelihood that the film and card will become separated through use and age.

The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of preferred embodiments of the invention as illustrated in the accompanying drawings.

In the drawings:

FIGURE 1 is a plan view of the photo-aperture record card showing the essential features of the invention;

FIGURE 2 is a partial sectional view of the record card of the invention taken on line 2—2 of FIG. 1;

FIGURE 3 is a partial sectional view similar to FIG. 2 showing a modified form of the photo-aperture record card;

FIGURE 4 is a partial sectional view of a second modification of a photo-aperture record card of the invention having disposed therein a pod of developing solution selectively releasable subsequent to exposure;

FIGURE 5 is an elevational view of a device for removing the scored portions of the record cards shown in FIGS. 1, 3 and 4.

Referring to FIGS. 1 and 2, there is shown the photo-aperture card **10** of the invention having therein an aperture **11**, in which is located a photographic record **12**, and a pair of additional aperture areas **13** which may be subsequently recorded for updating the record or used merely to provide additional photographic record space. Although the card is shown with three photographic record areas, there may be a single area or other number of areas as desired, or as the capacity of the card will permit. The card illustrated is similar in size and configuration to those generally used with tabulating machines, and the photographic apertures are so located in the card to reserve additional areas for printing and punching or other indicia as necessary for machine processing.

Photo-aperture card **10** comprises a layer of opaque paper cardstock **15** to which is laminated by an adhesive coating **14** a thin, transparent film **16**, such as acetate, having thereon an unexposed light-sensitive photographic emulsion layer **17**. The paper cardstock is made thinner than the usual tabulating card so that when laminated with film **16**, the total thickness will not be sufficient to produce misfeeding in tabulating machines. Paper layer **15** is scored at lines **18** to define portions **19** thereof which may be individually removed for subsequent selective exposure of photographic emulsion **17** thereunder. Paper layer **15** is cut sufficiently deep at the score marks so that an entire portion **19** can be removed. The upper surface is preferably made of a suitable color so that printing thereon may be readily discernible. A coating **14** of adhesive is applied to the entire lower surface of paper layer **15** except on the removable portions **19**, and may be, for instance, rubber cement, cellulose ester or other solvent-activated cements.

Film **16** is of the same length and width as the paper layer and is coated on its upper surface with a light-sensitive photographic emulsion **17**. A photographic emulsion of fine grain silver halide is preferred because of its excellent definition quality when enlarged by optical projection or used for photographic reproductions. The emulsion may cover the entire film surface or be decreased, for example, to a longitudinal strip, indicated between phantom lines **20**, sufficiently wide to provide a sensitized photographic surface for each aperture area.

After the paper stock has been scored and coated with adhesive, it is laminated to sensitized film **16** to form the composite record member **10**. In order, however, to fully protect the light-sensitive emulsion on the film a layer **21** of an opaque material is added to the underside of film **16**. This opaque material should be selectively removable for subsequent exposure of the film. A material suitable for this purpose is a colloidal graphite dispersion, plasticized to prevent accidental removal by abrasion and chipping. The colloidal graphite is water soluble and may be removed by controlled washing, such as with a rotating brush, to expose the film area opposite a desired aperture **11**. The use of a graphite coating provides an additional advantage in card handling by facilitating the removal of static electricity that accumulates as cards are processed by machine. An electrical conductor may be placed in contact with the underside of moving card and thus bleed off the accumulated electrical charge.

The photo-aperture record card of the invention is adapted for mass production since the paper stock and acetate film may be combined from separate supply reels. Paper cardstock may be separately preprocessed as to scoring and coating with adhesive, and the film may be passed through a coating station for receiving its photographic emulsion. The two laminar layers are then passed through pressure rolls for laminating and subsequently through a cutting station where the laminated web is cut into lengths the size of tabulating cards. The opaque layer **21** on the underside of film **16** may be applied either before or after laminating by spraying or coating by roller.

The manufacture of these record cards must, of course, be accomplished in the absence of light which would expose silver halide emulsion. Because of score marks **18** in the opaque paper stock, some light may penetrate sufficiently to partially expose a narrow margin of the film under each portion **19**. This light, however, will be limited to a narrow band between marks **18** and broken line **22**, for instance.

The photo-aperture record card described above may be modified as shown in FIG. 3. In this embodiment, the light-sensitive emulsion layer **17** is on the underside of film **16** and opaque coating **21** is applied thereover. The remaining elements of the card are disposed the same as shown in FIGS. 1 and 2. With the light-sensitive layer so placed, exposure may be made by removing a portion of opaque coating **21**. The removable card portion **19** may then be removed after development of the exposed film area. This embodiment has the advantage that there is less light penetration through the sensitive emulsion through score marks **18**. However, when emulsion layer **17** is so placed on the bottom of the film, the opaque coating must be carefully removed to avoid damage to the emulsion layer.

A second modification of the photo-aperture record card is shown in FIG. 4. In this embodiment, development of the film negative is accomplished prior to the removal of the scored card portion **19**. The record card **10** is similar to that described above with reference to FIGS. 1 and 2 with the exception that a pod **26** of developer reagent in liquid or paste form is inserted between the paper cardstock layer **15** and film **16**. A pod is provided for each aperture **11** and contains sufficient developer for exposed film in each aperture. The pods may be oriented parallel to a longitudinal or transverse edge of each aperture in the body of card **10**.

Recording is accomplished by selectively removing opaque coating **21** opposite the desired aperture and exposing the light-sensitive silver halide emulsion layer **17** through the bottom of film **16**. When exposure has been completed, the photo-aperture card is moved between a pair of oppositely dispersed rollers **28** which are spaced to compress and rupture pod **26**, squeezing the developing reagent therein evenly over the surface of the exposed emulsion layer **17**. When multiple apertures are provided in the card, the pod of developer is preferably placed along one of the longitudinal edges of each aperture so that the pressure rollers may be selectively aligned with the desired photographic exposure. The pods may, of course, be filled with a combination develop and fix solution.

In FIG. 5, there is shown a roller device which may be used to detach the removable portion **19** of the card body prior to exposure for the record cards shown in FIGS. 1 and 2 and subsequent to exposure for the cards shown in FIGS. 3 and 4. Card **10** is passed under roller **30** which has a plurality of vacuum channels **31** connected through the roller hub **32** to a source of vacuum (not shown). The roller carriage **33** may be lowered by any well known means such as a cam to bring the roller into contact with the portion **19** as it is moved along its path, and then the roller may be lifted therefrom after the removable card portion has been detached. The card is then moved to an exposure station or to a series of develop, fix or wash stations, and the opaque coating **21** is removed from the underside of the card.

While the invention has been particularly shown and described with reference to preferred embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention.

What is claimed is:

1. The method of updating a record member, composed of an opaque card having a plurality of removable portions laminated to a transparent, photographic film having unexposed silver halide emulsion thereon and

coated on the nonlaminated surfaces with an opaque removable material, comprising the steps of:

removing a first one of said card portions and the opaque material aligned therewith;

exposing said unexposed film under said removed portion and material to record data thereon;

developing said exposed film to produce a transparent photographic negative of said data; and

repeating said removing, exposing, and developing steps in the stated sequence for the unexposed film at the second of said portions when said recorded data is to be subsequently modified.

2. The method as described in claim 1 further comprising the step of entering other data on said card in a nonremovable portion thereof.

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NORMAN G. TORCHIN, *Primary Examiner.*

G. H. BJORGE, J. T. BROWN, *Assistant Examiners.*