Dec. 7, 1965 W. B. FISCHLER ETAL 3,221,428

TRANSPARENT ENCASEMENT FOR DOCUMENTS AND THE LIKE

Filed March 19, 1963

FIG. 1

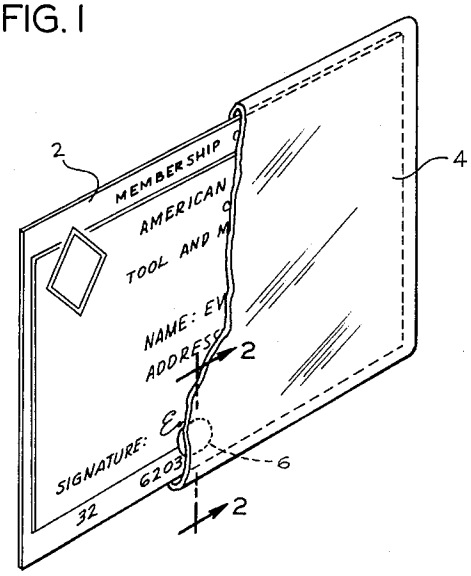


FIG. 2

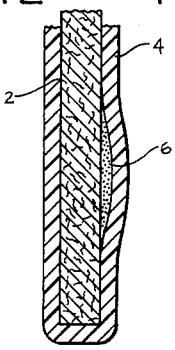


FIG. 3

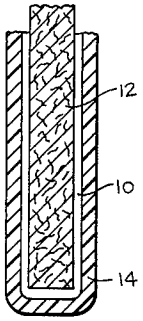


FIG. 4

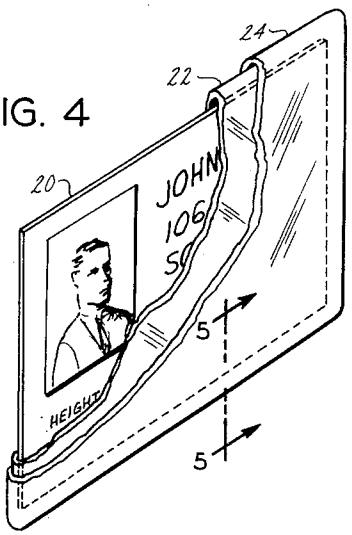


FIG. 5

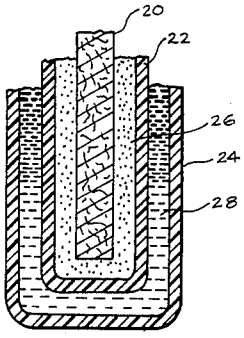


FIG. 6

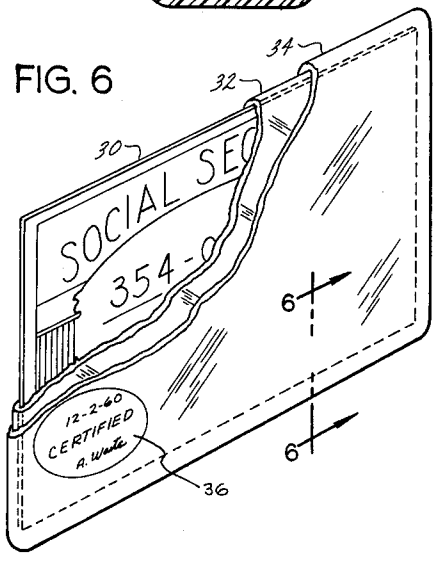
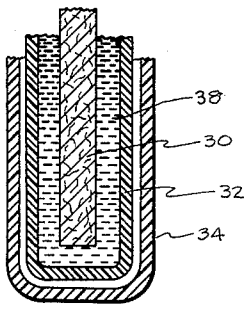


FIG. 7



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3,221,428

TRANSPARENT ENCASEMENT FOR DOCUMENTS AND THE LIKE

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14 Claims. (Cl. 40—2.2)

The present invention relates to transparent encasements for documents, cards, and the like, which are adapted to provide evidence of tampering therewith.

With the progress of scientific techniques and expanding knowledge of methods of analysis, alteration of security and identification documents has become more facile and more difficult to detect. Industrial espionage as well as international governmental espionage often can utilize alteration of security identification documents for allowing agents to gain access to otherwise restricted areas, for varying the contents of important documents and for falsifying records. Unscrupulous individuals can utilize such techniques to alter legal documents such as contracts, bills of sale, wills and deeds.

The term "documents" as employed hereinafter refers to various kinds and sizes of documents and cards, including legal and sales documents, maps, ledger sheets, and identification cards and badges.

It is the aim of the present invention to provide a transparent encasement for documents which will evidence tampering therewith or destroy the document upon tampering therewith.

Another aim is to provide such a transparent encasement which is relatively easy to fabricate, simple in construction, and relatively long lasting.

The drawing shows a preferred embodiment of the invention and such embodiment will be described; but it will be understood that various changes may be made from the construction disclosed, and that the drawing and description are not to be construed as defining or limiting the scope of the invention, the claims forming a part of this specification being relied upon for that purpose.

Of the drawing:

FIG. 1 is a perspective view of an identification card encasement embodying one form of the present invention with a portion of the synthetic plastic envelope broken away to reveal internal construction;

FIG. 2 is a fragmentary sectional view to an enlarged scale along the line 2—2 of FIG. 1;

FIG. 3 is a similar fragmentary sectional view of an encasement embodying an alternative form of the invention;

FIG. 4 is a perspective view of an identification card encasement embodying another form of the present invention with portions of the synthetic plastic envelopes broken away to reveal internal construction;

FIG. 5 is a fragmentary sectional view to an enlarged scale along the line 5—5 of FIG. 4;

FIG. 6 is a perspective view of an identification card encasement embodying still another form of the present invention with portions of the synthetic plastic envelopes broken away to reveal internal construction; and

FIG. 7 is a fragmentary sectional view to an enlarged scale along the line 7—7 of FIG. 6.

It has now been found that the foregoing and related aims can be attained by a novel sealed assembly wherein there is provided a document in an encasement of transparent synthetic plastic material which also contains chemical reagent means substantially inert to the components in contact therewith and reactive upon rupturing of the encasement. The encasement may be a single envelope of synthetic plastic material containing a reagent which is reactive upon contact with the atmosphere or the

encasement may be provided by a pair of envelopes of synthetic plastic material with a reagent in the inner envelope which is reactive with a second reagent contained in the outer envelope or with the outer envelope itself.

Referring first to the embodiment of FIGS. 1 and 2, an identification card 2 is encased in an envelope 4 of transparent synthetic plastic sheet material. A small deposit of a reagent 6 is provided within the envelope 4 as best seen in FIG. 2. Although the reagent 6 may be of a fine particle size and dispersed in small quantity throughout the envelope 4 so as not to interfere substantially with visibility, it is preferred to confine the reagent to a small area on the document conveniently by laminating the envelope 4 to the card 2 over at least the surrounding area or by embedding the reagent 6 in the surface of the card 2 or bonding it thereto by use of an inert noninterfering binder or adhesive if necessary.

The reagent 6 is one which will react with the atmosphere to destroy or discolor the card, or be changed in color itself. For example, a reactive metal such as lithium, sodium, potassium or phosphorus may be employed which will spontaneously combust upon contact with the atmosphere to destroy or discolor the card 2. If such a reactive metal is employed, the material of the card 2 should be relatively free from moisture and a synthetic plastic or metal foil may be desirably utilized to advantage. Also, the plastic sheet material of the envelope 4 should be substantially impermeable to moisture vapor and/or gases.

Vinylidene chloride-vinyl chloride copolymer, polyethylene terephthalate, coated cellophane, polyethylene, biaxially oriented polystyrene, nylon, and laminates thereof are exemplary of films which may be satisfactorily employed.

If an organic agent which is sensitive to oxygen is employed for the reagent 6, it may be embedded into the card 2, printed thereon in a suitable vehicle, or a separate strip of absorbent material such as paper may be impregnated therewith and affixed to the card 2. Of the dyestuffs which will be affected rapidly upon exposure to air to change color, indoxyl, triphenylmethyl and tri-p-biphenylmethyl are advantageously employed.

With respect to the embodiment of FIG. 3, a slightly different version of the invention is therein illustrated wherein a gas or liquid 10 is employed as the reagent and distributed substantially throughout the envelope. In this embodiment, the gas or liquid 10 is one which will readily react with oxygen or moisture in the atmosphere to change in color itself or to discolor the card 12. Exemplary of such reagents are liquid bromine which will change from a brown to purple color upon contact with oxygen, or chlorine and hydrogen chloride gases which will react with the moisture in the air to provide a bleaching action upon the ink printing of the card 12. The synthetic plastic film used for the envelope 14 also should be substantially impermeable to gas and water vapor as in the case of the embodiment of FIGS. 1 and 2.

Referring now to the embodiment of FIGS. 4 and 5, the card 20 is encased within an inner envelope 22 and an outer envelope 24, both of transparent synthetic plastic material. Within the inner envelope 22 is provided a first chemical agent 26 which will react with a second chemical agent 28 in the outer envelope 24 when the inner envelope 22 is ruptured.

Although various combinations of chemical agents may be employed, a highly effective and simply prepared combination is that of a dye which is sensitive to change in pH or which will change color when dissolved. The dye 26 may be in powder form and dusted in small quantities over the entire surface of the card 20 so as to increase the likelihood of contact with the agent 28 when the envelope 22 is ruptured or it may be printed or embedded about the pe-

riphery of the card 20. Alternatively, a small volume of colorless solution may be utilized when pH sensitivity is the mechanism employed. The agent 28 in the outer envelope may be simply a small volume of water or alcohol when solution alone produces a color change in the agent 26. When acidity or alkalinity of the agent 28 is necessary to effect the change, a small volume of a reagent solution of effective concentration is employed. To avoid the likelihood of injury to clothing or person in the event of accidental rupturing of the outer envelope 24 when the pH change mechanism is employed, dyes which are sensitive to pH change in the range of about 4 to 9 are most desirably utilized. Exemplary of suitable dyes are phenolphthalein, litmus blue, thymol blue, m-cresol purple, bromcresol green and methyl red. Suitable basic solutions for the agent 28 may then be those of calcium carbonate, sodium bicarbonate, magnesium carbonate, trisodium phosphate, and hydroxylamine, or dilute solutions of sodium and potassium hydroxide. Suitable acid solutions for the agent 28 may then be those of boric acid, carbonic acid and potassium aluminum sulfate.

Both envelopes 22, 24 should be fabricated of a synthetic plastic which is both water-resistant and impermeable and resistant to the active component of the chemical agent 28. Vinylidene chloride-vinyl chloride copolymer, polyethylene terephthalate, polyvinyl chloride, polyvinyl chloride-acetate copolymer, and polyethylene are exemplary films suitable for most chemical agents.

Referring lastly to the embodiment illustrated in FIGS. 6 and 7, the card 30 is encased in an inner envelope 32 and an outer envelope 34 of transparent synthetic plastic material. The outer envelope 34 is provided with a certifying stamp indicated by the numeral 36 on either its external or its internal surface. Within the internal envelope 32 is placed a chemical agent 38 which will attack the plastic material of the outer envelope 34 when the inner envelope 32 is ruptured. The plastic material of the envelope 32 and the card 30 must necessarily be substantially inert to the agent 38. Thus, if tampering occurs, the outer envelope 34 bearing the certifying stamp 36 will evidence the fact.

Although organic solvents may be employed if the printing on the card 30 is inert thereto, small volume of acid or alkaline solutions are conveniently utilized in conjunction with synthetic plastics for the outer envelope 34 which are readily susceptible to attack by the acid or alkaline solutions. Exemplary of such materials are ethyl and methyl cellulose, cellulose nitrate, cellulose acetate and coated cellophane. The synthetic plastic material used for the envelope 32 should be both water-resistant and substantially inert to the chemical agent 36 such as vinylidene chloride-vinyl chloride copolymer, biaxially-oriented polystyrene, polyethylene, polypropylene and polyamide.

As will be readily appreciated, the preparation of the sealed document assemblies using chemical agents sensitive to air should be conducted in vacuo or in an inert atmosphere and, with those sensitive to moisture, a dried atmosphere should be employed. The envelopes may be partially preformed with only one side left open for insertion of the document after which the open side is sealed by heat, adhesive or solvent, or strips of sheet material may be folded and sealed to form the envelope at the time of assembly. In the instance of the embodiment of FIGS. 1 and 2, the envelope may be laminated to the card if so desired, further requiring a tamperer to delaminate the structure.

Since only small amounts of reagents need be employed, the likelihood of harm to apparel or person in the event of accidental rupturing of the encasement is minimal. Generally, less than 2 cc. of a liquid or gas and less than 1 gram of solid need be employed; and, most usually, much lesser amounts will suffice.

Exemplary of the efficacy of the present invention are the following specific examples:

Example 1

A paperboard identity card was inserted in an envelope of polyvinyl chloride-acetate copolymer after having been dusted over substantially its surface with about 0.2 gram of phenolphthalein. This envelope was then heat-sealed and inserted into a second envelope of polyvinyl chloride-acetate copolymer. Into the second envelope was inserted about 1 cc. of a 2 percent by weight aqueous solution of sodium hydroxide after which the second envelope was heat-sealed. The resultant sealed assembly provided good visibility with respect to the card and did not rupture under test conditions representing normal usage.

Upon rupturing of the plastic envelopes in an effort to extricate the card, the sodium hydroxide solution contacted phenolphthalein particles causing them to turn red and stain the card.

Example 2

About 0.2 gram of metallic sodium was placed upon the surface of an identification card in a noninterfering position with respect to the printing thereon and an envelope of polyvinyl chloride-acetate copolymer was laminated therearound to hold the sodium in position. The resultant sealed assembly withstood test conditions resembling normal usage without mishap.

Upon rupturing the envelope in a normal atmosphere in an effort to extricate the card, the metallic sodium spontaneously oxidized upon contact with the atmosphere to char the card.

Example 3

A card was inserted in an envelope of polyethylene and about 0.7 cc. of bromine was also injected therein. The envelope was then heat-sealed, all operations being conducted in a bell jar to prevent contact with the atmosphere. The card in the resultant assembly was visible and legible although a slight brown caste was clearly evident.

Upon rupturing the film, the brownish bromine rapidly turned purplish in contact with the atmosphere.

Example 4

About 0.3 gram of indoxyl was pressed into the surface of an identification card at a noninterfering position with respect to the printing thereon, and the card was then sealed in an envelope of polyethylene, the operation being conducted in a bell jar to avoid oxidation of the indoxyl. The resultant assembly provided good visibility and the indoxyl had a yellow color.

Upon rupturing of the film in an effort to extricate the card, the indoxyl rapidly turned blue in color.

Example 5

An identification card was sealed in an envelope of vinylidene chloride-vinyl chloride copolymer also containing about 2.0 cc. of a 5 percent by weight aqueous solution of hydrochloric acid. This envelope was then sealed in a second envelope of cellulose acetate having a simulated certification stamp. The sealed assembly provided good visibility for the card and withstood test conditions representing normal usage.

Upon rupturing of the envelopes in an effort to extricate the card, the hydrochloric acid solution from the inner envelope contacted the cellulose acetate outer envelope and etched the surface thereof.

The invention claimed is:

1. A sealed document assembly adapted to indicate tampering therewith comprising a document with visible indicia thereon; an encasement of transparent synthetic plastic material extending about said document; and chemical reagent means within said encasement substantially inert to said document during sealed assembly and reactive upon rupturing of said encasement to evidence tampering.

2. A sealed document assembly adapted to indicate tampering therewith comprising a document with visible

indicia thereon; an envelope of transparent synthetic plastic material encasing said document; and a chemical reagent within said envelope substantially inert to said document during sealed assembly and reactive upon contact with the atmosphere upon rupturing of said envelope to evidence tampering.

3. The sealed document assembly of claim 2 wherein said reagent is a metal reactive upon contact with the atmosphere.

4. The sealed document assembly of claim 2 wherein said reagent is a dye which changes color upon contact with the atmosphere.

5. The sealed document assembly of claim 2 wherein said reagent is a fluid selected from the group consisting of liquids and gases.

6. A sealed document assembly adapted to indicate tampering therewith comprising a document with visible indicia thereon; a transparent encasement for said document comprising a first envelope of transparent synthetic plastic material encasing said document and a second envelope of transparent synthetic plastic material encasing said first envelope; and chemical indicator means in said encasement reactive upon rupturing of said envelopes and including a chemical reagent in said first envelope substantially inert to said document during sealed assembly.

7. The sealed document assembly of claim 6 wherein said chemical reagent is substantially inert toward said document and first envelope and reactive toward said second envelope and wherein said second envelope has a certifying mark thereon.

8. The sealed document assembly of claim 7 wherein said chemical reagent is a solution selected from the group consisting of acids and bases and wherein said second envelope is formed of a material readily susceptible to attack by said chemical reagent and is provided with a certifying mark thereon.

9. A sealed document assembly adapted to indicate tampering therewith comprising a document with visible indicia thereon; a first envelope of transparent synthetic plastic material encasing said document; a second envelope of transparent synthetic plastic material encasing said first envelope; a first chemical reagent in said first envelope substantially inert to said document; and a second chemical reagent in said second envelope reactive with said first reagent upon rupturing of said first envelope to evidence tampering with the sealed assembly.

10. The sealed document of claim 9 wherein said first reagent is a dye and said second reagent is a liquid which will produce a color change in said dye.

11. The sealed document assembly of claim 10 wherein said second reagent is a solution selected from the group consisting of acids and bases.

12. A sealed document assembly adapted to indicate tampering therewith comprising a document with visible indicia thereon; a minor amount of an alkali metal disposed thereon; and an envelope of transparent synthetic plastic material encasing said document and alkali metal, said envelope being bonded to said document at least about the periphery of said alkali metal to maintain it in a predetermined location and said envelope of synthetic plastic sheet material being substantially impervious to water vapor.

13. A sealed document assembly adapted to indicate tampering therewith comprising a document with visible indicia thereon; a minor amount of an alkali metal disundergoes color change upon contact with oxygen; and an envelope of synthetic plastic sheet material encasing said document and dye, said envelope being substantially impermeable to oxygen.

14. A sealed document assembly adapted to evidence tampering therewith comprising a document with visible indicia thereon; a minor amount of a substantially colorless dye distributed substantially entirely over the entire surface of said document; a first envelope encasing said document and dye; a second envelope encasing said first envelope; and a liquid reagent selected from the group consisting of acids and bases reactive with said dye upon rupturing of said first envelope to produce a color change in said dye.

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JEROME SCHNALL, *Primary Examiner.*

LEONARD W. VARNER, *Examiner.*

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,221,428 December 7, 1965

Wanda B. Fischler et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 3, line 44, for "volume" read -- volumes --; column 6, line 19, strike out "a minor amount of an alkali metal dis-" and insert instead -- a dye upon the surface thereof which --.

Signed and sealed this 4th day of October 1966.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents