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PROCESS OF PROVIDING CELLULOID WITH AN ADHESIVE

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My invention relates to the process of providing celluloid with an adhesive. More particularly, my invention relates to providing a sheet of celluloid with an adhesive, which may then be stocked and used when required, and then be readily caused to adhere to the desired object by merely moistening after the manner of attaching gummed sheets generally such as postage stamps, envelope flaps, etc., said adhesive not interfering with the transparency of the celluloid.

For purposes of illustration and definiteness, I will set forth and describe my invention as applied to the providing of a telephone directory index of celluloid, i. e., an index having tabs with transparent celluloid attaching portions, which portions may be attached by gluing to the sheets of the telephone directory and leave the numbers or printed matter immediately under the attaching portion visible,—it being understood that the margins of a telephone directory are frequently too narrow for index tabs having non-transparent attaching portions. Wherever the term "celluloid" is used herein, it is intended to cover related substances, such as fiberloid and pyralin or other transparent nitro-cellulose materials. One of the conditions to be met in providing a transparent substance for tab purposes is that such substance must be strong and tough, that is, must not be brittle. However, while I thus describe my invention as applied to a directory tab, nevertheless it is not to be presumed that it is to be thus limited to any such specific application, but is applicable to all fields of use where like conditions obtain, in part or in toto.

It is already known that celluloid may be cemented to wood, leather, etc., by means of a solution of shellac and camphor in alcohol. Also, celluloid may be caused to adhere by heating the celluloid sheet and pressing the said sheet and other object together firmly. But, manifestly, such methods or processes are not adaptable to use by those who may have occasion to cause celluloid to adhere, who have not such special equipment and such special provisions made for attaching the celluloid. Also, cements involving celluloid or pyroxylin in solution are known, but such cements are expensive, and do not accomplish the purposes of this invention. For the practical marketing of a telephone directory index of celluloid, it is practically necessary that such celluloid index be capable of being attached, by those without special equipment, to the sheets much in the same manner as one secures a stamp to a letter. That is, a means such as water soluble glue is preferable as the means for securing such index tabs to the directory sheets. However, the structure of celluloid is such that ordinary glue will not serve the purpose indicated. To provide such an index tab of celluloid having a coating of adhesive on the attaching portion is a primary purpose of my invention.

Moreover, there are celluloid tabs on the market for attaching by the ultimate user, but these have an opaque attaching portion surface. A primary object of my invention is to provide a celluloid index tab which is transparent as to its attaching portion.

One of the difficulties to be carefully avoided in employing celluloid is that of causing the celluloid sheet to curl and warp. Ordinarily, when applied to the page or sheet, that portion of the page or sheet immediately surrounding the tab will be caused to wrinkle and will not lie flat. A primary object of my invention is to provide a tab having a celluloid attaching portion, which may be caused to adhere without such curling or wrinkling of the surrounding portions of the sheet to which it is attached.

Further, a primary object of my invention is to provide a celluloid sheet with a glue retaining coating. Also, a primary object of my invention is to provide a celluloid sheet with a glue retaining coating and a glue coating disposed on said glue retaining coating, so that said celluloid may be readily caused to adhere to paper after the same manner as gummed paper is caused to adhere, such as stamps, envelope flaps, etc., that is, where the adhesive is applied at one time to the article and said article is caused to adhere to another article at a time remote from the time of its preparation or manufacture.

In carrying out my said invention where the celluloid is to be attached to paper, two

classes of papers are recognized,—first, papers known in the art as "flat" or "book" paper; and, second, "bond" or "ledger" paper. If the celluloid sheet is to be attached to said "flat" or "book" paper, then the celluloid sheet may be treated with a coating of spirit varnish, amyl acetate, and flexible glue diluted with vinegar to the proper consistency. The proportions for these ingredients which have been found to work satisfactorily are: one-half part spirit varnish, one part amyl acetate added to ten parts flexible glue diluted with vinegar to the proper consistency.

If the celluloid sheet is to be prepared to be attached generally, i. e., either to said "flat" or "book" paper or to said "bond" or "ledger" paper, then I have found that by supplying a first coating, herein termed a "glue retaining coating," composed of a varnish and a softening agent for celluloid, and then applying a glue to said first coating, I can cause said celluloid to adhere firmly to paper, be transparent, not curl, and not cause a wrinkling of that portion of the paper to which it is attached. Such product of my process is characterized by the glue not becoming flaky and brittle and breaking away. It will remain firm and secure even when fully dried and its adhering quality is not affected by a change of temperature such as is common in the range of climatic variations. In short, it accomplishes the requirements herein set forth, and meets in every way the demands for a tab having a celluloid attaching portion for a directory index, to be marketed as herein set forth, i. e., where the tab is to be attached by the user and this at a time subsequent to the time of manufacture of the tab.

Preferably, the varnish portion of the first coating consists of a varnish gum dissolved in spirits such as alcohol or ether. The softening agent for the celluloid of the first coating may be amyl acetate or acetone, neither of which, I have found, cause the celluloid to curl or warp. After such coating is dried, the glue coating is applied. Among other ways, the drying may be accomplished by simply setting aside the product for a period of time. The second coating may be any flexible glue. Preferably, there is added to such glue a varnish softening or corroding agent such as vinegar (or dilute acetic acid) or amyl acetate, i. e., an agent which will permit the glue to penetrate slightly the retaining coating.

A formula which I have found to work entirely satisfactorily is as follows: For the first coating, three to five parts of spirit varnish and one-half to two parts of amyl acetate; for the second coating, a flexible glue may be diluted with vinegar to the proper consistency so that it can be applied with a brush, and then a softening or corroding agent may be added, such as amyl acetate, to the extent of about one part to twenty parts of the diluted glue. Too much amyl acetate involves the danger of dissolving the celluloid.

Manifestly, a glue soluble in water at the time of attachment is preferable for general purposes, but for certain uses there are other adhesives which are not soluble in water and which involve having at hand a special preparation or agent for causing the sheet of celluloid supplied with said first coating to adhere. Such special preparations or agents might be a varnish, amyl acetate or acetone. These special agents would be applied by a brush at the time of attachment.

In the above, I have stated that spirit varnish is the preferred type of varnish. However, the oil varnishes might be used, but objection to the same obtains in that they are slow to dry and upon becoming thoroughly dry they become brittle so that the glue flakes off. Flexible glue, according to my experience, gives the most satisfactory results, and is the preferred type of glue to be used in connection with my invention. Nevertheless, my invention is not to be limited to said flexible glue, as other glues may be used.

The principle of the invention involving my process is thought to be as follows: The celluloid softening agent operates to roughen the upper portion of the sheet of celluloid, forming therein, as it were, pockets or teeth-like connections, so that the varnish is impregnated into the celluloid. Enough amyl acetate is provided to accomplish this softening effect in the upper portion of the celluloid sheet. This is to be contrasted with any process which completely dissolves the celluloid, so that the celluloid becomes a sort of cement. Likewise, the glue is preferably impregnated in the varnish coating by means of a softening agent such as the amyl acetate. In other words, the glue coating will not adhere to the celluloid for the most general application of my invention, while the varnish will so adhere. But when the varnish becomes hard, it cannot be caused to adhere, by merely moistening, to the paper which is to be attached to the celluloid. However, the glue may be impregnated in the first coating, i. e., in the varnish, and this glue when moistened at the time of attachment forms an intermediate bond between the article such as paper and the first coating, which in turn is bound to the celluloid sheet. The term "impregnate" is used herein in the sense of securing the varnish to the upper portion of the sheet of celluloid (cross-sectionally considered) by merely softening said celluloid portion and not completely dissolving the same. In short, the softening agent operates as a roughener after the manner of sandpapering a varnished surface, in order to apply another coat of varnish.

My process effects a great economy in the employment of celluloid where it is necessary to cause the same to adhere to another object. Besides applying my invention to the making of telephone directory index tabs, the same may be applied to the manufacture of campaign buttons and medallions,—to mention only a few of the many uses to which said invention may be applied. The cost of production of all such articles will be greatly reduced, as at present manufactured it is necessary to employ heavy presses in a manner permitting of the heating,—(this being the so-called hot-die process), of the celluloid while being operated upon.

Obviously, changes may be made in the proportions and within the range of the equivalents with the substances set forth and their functions indicated. The examples given will serve as general guides for applying my invention.

I claim:

1. In a process of providing a celluloid sheet with an adhesive by which the celluloid sheet can be subsequently attached, the step of impregnating said celluloid with an adhesive-retaining coating by treating the celluloid with varnish and a celluloid softening agent.

2. In a process of providing a celluloid sheet with an adhesive by which the celluloid sheet can be subsequently attached, the step of impregnating said celluloid with an adhesive-retaining coating by treating the celluloid with varnish, and amyl acetate as a softening agent.

3. In a process of providing a celluloid sheet with an adhesive by which the celluloid sheet can be subsequently attached, the steps of impregnating said celluloid with an adhesive-retaining coating; drying said coating; and impregnating said coating with an adhesive coating.

4. In a process of providing a celluloid sheet with an adhesive by which the celluloid sheet can be subsequently attached, the steps of impregnating said celluloid with an adhesive-retaining coating; drying said coating; and impregnating said coating with an adhesive coating of glue having therein a softening agent for said first coating.

5. In a process of providing a celluloid sheet with an adhesive by which the celluloid sheet can be subsequently attached, the steps of impregnating said celluloid with an adhesive-retaining coating by treating the celluloid with varnish, and amyl acetate as a softening agent; drying said coating; and impregnating said retaining coating with an adhesive coating of glue having therein a varnish softening agent.

6. In a process of providing a celluloid sheet with an adhesive by which the celluloid sheet can be subsequetly attached, the steps of impregnating said celluloid with an adhesive-retaining coating; drying said coating; and impregnating said coating with an adhesive coating of glue having therein amyl acetate as a softening agent for the varnish.

7. In a process of providing a celluloid sheet with an adhesive by which the celluloid sheet can be subsequently attached, the steps of impregnating said celluloid with an adhesive-retaining coating by treating the celluloid with varnish, and amyl acetate as a softening agent for the celluloid; drying said coating; and impregnating said retaining coating with an adhesive coating of glue having therein amyl acetate as a varnish softening agent.

8. In a process of providing a celluloid sheet with an adhesive by which the celluloid sheet can be subsequently attached, the steps of impregnating said celluloid with an adhesive-retaining coating of from three to five parts of varnish and one-half to two parts of amyl acetate; drying said coating; and impregnating said retaining coating with an adhesive coating of glue diluted with vinegar to the proper consistency, and amyl acetate as a varnish softening or corroding agent, said amyl acetate being present to the extent of about one part to twenty parts of the diluted glue.

9. In a process of providing a celluloid sheet with an adhesive by which the celluloid sheet can be subsequently attached, the steps of impregnating said celluloid sheet with a varnish coating by a celluloid softening agent, and impregnating said first coating with an adhesive by a softener for said varnish coating.

In witness whereof, I hereunto subscribe my name this 17th day of January, 1925.

CARL F. BRENNE.