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Fig. 1.

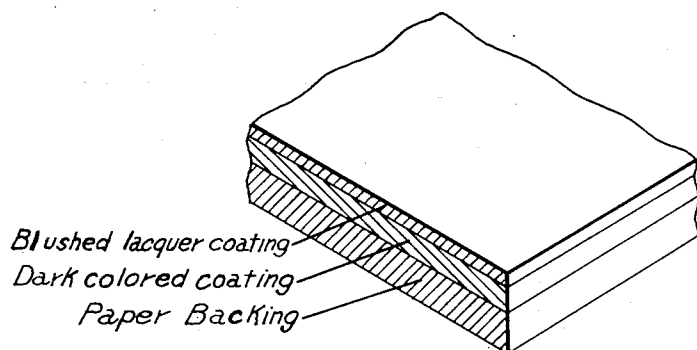
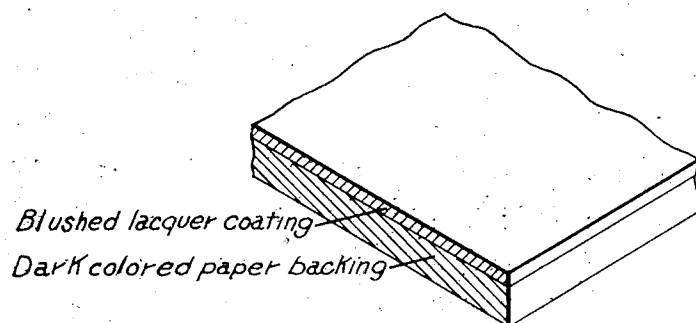


Fig. 2.



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CHART PAPER

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7 Claims. (Cl. 234-74)

This invention relates to a novel pressure-sensitive paper adapted to receive and record inkless or other impressions imparted by a stylus, typewriter, or other manually or mechanically operated writing or printing means. The invention finds one principal application in the production of inkless recording charts for various recording instruments, though it is also useful in other applications wherein pressure- or stylus-sensitive paper is utilized for the recording of data. Heretofore, it has been common to provide a black-surfaced paper with a solvent-applied waxy or soap-like coating with attendant disadvantages because such coatings are easily subject to even light abrasion in handling, are temperature sensitive so as to be brittle and stiff at low atmospheric temperatures, and soften objectionably at high atmospheric temperatures. Such wax coated paper is also difficult to print with the graduations, lines, or designations which some recording charts require.

The present invention avoids these disadvantages and provides a pressure-sensitive paper which can be handled with very much less chance of objectionable marking by abrasion or handling than the wax coated material, one that can be used at high temperatures, and one that can be readily printed. Moreover, a better and more uniform color can be provided in that white or other light colors can be employed in the surface coating providing a greater contrast between such surface coating and the relatively darker coating of the base layer. Also, the coating can be applied with greater uniformity and precision than coatings heretofore employed in the prior art pressure-sensitive inkless recording papers.

Fig. 1 is an enlarged perspective view of the chart paper of my invention involving a blushed lacquer coating, an intermediate dark-colored coating, and a paper backing layer; and

Fig. 2 is an enlarged perspective view of a modified form of the chart paper of my invention involving a blushed lacquer coating and a dark-colored paper backing.

In the preferred practice of the present invention there is provided a dark-colored base or foundation layer which may be of dark-colored paper or paper of a light shade may be suitably colored or coated so as to form a relatively dark-colored foundation. For example, ordinary paper of the grade desired is coated with any suitable hardenable dark-colored coating by a reverse roll coater or other means, as well known in the art. Following the provision of such a

dark-colored foundation, it is provided with an opaque surface layer of blushing lacquer, as well known in the art, for example, as in U. S. patent to Willkie, No. 1,449,157, (which blushes to either white or some light tint or color) and which, it has been discovered, may, in accordance with this invention, be modified to render it stylus-sensitive so that, upon the application of pressure, the surface layer becomes transparent wherever such localized pressure has been employed. The color of the base, where pressure has been applied, thus appears in contrast to the color of the areas where no such pressure has been applied. This blushing lacquer may be made up by adding a suitable softener to a blushing lacquer, for example, as follows (all parts being by weight):

	Parts
Cellulose nitrate (5-6 sec.)	10
Acetone	25
Alcohol	68
Water	2
Glycerine	2.3
Butyl stearate	5-8.7

The above illustrates my preferred practice of the invention and includes a typical blushing lacquer modified by the addition of a substantial quantity of a suitable softening agent, and, as is well known in the art, various other cellulose derivatives, including cellulose esters, ethers, and/or ether-esters may be employed instead of cellulose nitrate, for example, cellulose acetate with or without the inclusion of a resin or resins. Examples of cellulose esters include cellulose butyrate, oleate, stearate, phthalate, naphthenate, laurate, aceto-butyrate, aceto-maleate, and aceto-nitrate; of cellulose ethers,—ethyl cellulose, benzyl cellulose, and glycol cellulose; of cellulose ether-esters,—ethyl cellulose-nitrate, benzyl cellulose-acetate, ethyl cellulose-acetate, and glycol cellulose-acetate.

The modifying or softening agent, which functions by reason of its physical effect on the blushing lacquer, need not be butyl stearate, and, in lieu of all or a part of the butyl stearate there may be employed additional glycerine or equivalents or other salts or esters of various fatty acids or fatty acids themselves, or other hardenable oily, fatty, or waxy materials,—all of which for convenience are herein termed softening agents. For example, stearic and other fatty acids are also found to be useful as blushing lacquer softening agents which, like those just referred to, will not inhibit or materially retard

precipitation of the small discrete particles which render the lacquer opaque.

In practice, it is found that the application of this surface layer provides a sufficiently hard and abrasion-resisting surface so that there results a continuous film that can withstand handling without objectionable marring. The film itself functions in the manner of normal blushing lacquer so as to provide a white or very light colored surface layer which will not melt or soften at ordinary atmospheric temperatures. The hardness can be increased by decreasing the amount of butyl stearate, increasing slightly the amount of water, or adding a small amount of ethyl acetate which increases the amount of unprecipitated film-forming material of the lacquer. It is found that suitable lines and indicia may be readily printed thereon, using ordinary inks and ordinary printing processes that heretofore have been employed in making paper charts with lines and indicia thereon. For all practical purposes, pressure-sensitive paper made in accordance with the above preferred formula provides a commercially satisfactory and much improved product.

In the foregoing specification and in the appended claims, the backing material is referred to as "paper," but it will be appreciated that any one of various other thin flexible backings may be employed as functionally equivalent backings. Also, by "light-colored" it is intended to include white as well as various light colors.

Having described my invention, what I wish to claim and secure by Letters Patent is:

1. A pressure-sensitive inkless recording medium comprising a backing layer of paper providing a relatively dark-surfaced foundation and having thereon a relatively soft, stylus-pressure-sensitive blushed light-colored lacquer film, said film being normally opaque but adapted to become sufficiently transparent to disclose the underlying dark surface upon the application of stylus-pressure to said film.

2. A pressure-sensitive inkless recording medium comprising a backing layer of paper having a dark-colored coating thereon providing a relatively dark-surfaced foundation and having on said foundation a relatively soft, stylus-pressure-sensitive blushed light-colored lacquer film, said film being normally opaque but adapted to become sufficiently transparent to disclose the underlying dark surface upon the application of stylus-pressure to said film.

3. A pressure-sensitive inkless recording medium comprising a colored backing layer of paper providing a relatively dark-surfaced foundation and having thereon a relatively soft stylus-pressure-sensitive blushed light-colored lacquer film including printed lines and indicia on the exposed surface of said film, said film being normally opaque but adapted to become sufficiently transparent to disclose the underlying dark surface upon the application of stylus-pressure to said film.

4. A pressure-sensitive inkless recording medium comprising a backing layer of paper having a dark-colored coating thereon providing a relatively dark-surfaced foundation and having on said foundation a relatively soft, stylus-pressure-sensitive blushed light-colored lacquer film including printed lines and indicia on the exposed surface of said film, said film being normally opaque but adapted to become sufficiently transparent to disclose the underlying dark surface upon the application of stylus-pressure to said film.

5. A pressure-sensitive inkless recording medium comprising a backing layer of paper providing a relatively dark-surfaced foundation and having thereon a relatively soft, stylus-pressure-sensitive blushed light-colored cellulosic lacquer film, said film being normally opaque but adapted to become sufficiently transparent to disclose the underlying dark surface upon the application of stylus-pressure to said film.

6. A pressure-sensitive inkless recording medium comprising a backing layer of paper having a dark-colored coating thereon providing a relatively dark-surfaced foundation and having on said foundation a relatively soft, stylus-pressure-sensitive blushed light-colored cellulosic lacquer film, said film being normally opaque but adapted to become sufficiently transparent to disclose the underlying dark surface upon the application of stylus-pressure to said film.

7. A pressure-sensitive inkless recording medium comprising a backing layer of paper providing a relatively dark-surfaced foundation and having thereon a relatively soft, stylus-pressure-sensitive blushed light-colored lacquer film containing cellulose nitrate, said film being normally opaque but adapted to become sufficiently transparent to disclose the underlying dark surface upon the application of stylus-pressure to said film.

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