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TRANSFER SHEET.

No Drawing.

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To all whom it may concern:

Be it known that I, JACOB A. L. MÖLLER, a citizen of the United States, residing at New York city, county of New York, State of New York, have invented a certain new and useful Improvement in Transfer Sheets, of which the following is a clear, full, and exact description.

The present invention relates to transfer sheets, and more particularly to an improved carbon paper and a method of making the same.

The form of transfer sheets or particularly carbon paper which is now in use for making copies in typewriting comprises a sheet of paper or tissue which is generally white and translucent or semi-transparent in character, upon which a suitable coating is applied to one side thereof, which is capable of being transferred under impact of the typewriter-type to a separate sheet of paper.

A carbon paper or tissue which is suitable for use must have certain characteristics such as sufficient tensile strength, so as not to be easily torn or injured, and must have a high friction strength to enable it to stand pounding under the keys of the typewriter without deterioration. The paper must also have a certain softness so that the so-called "dope" or ink material will adhere to the paper after it is applied thereto without producing flaking or cracking either during handling or while the sheet is in use. The paper must be suitably prepared or made so as to produce a paper of uniform thickness, and a smooth uniform surface to which the transfer material may be smoothly and evenly applied. Moreover, the composition of the transfer material must be such with respect to the absorption or penetration properties of the paper that the transfer material or carbon composition will penetrate a proper distance only into the paper without going entirely through the soil or be transferred to the surface of the paper in front of and in contact with the reverse side of the carbon paper. In other words the paper must be absorbent but not really porous, as will be readily apparent to those familiar with the usual process of making carbon paper.

The control of the various factors involved in the production of a suitable carbon paper are well known to those skilled in the art and no detailed description of the methods of

applying transfer material to paper or the process involved in the production of the paper upon which the transfer material is applied forms a part of the present invention and need not, therefore, be described in detail.

In the form of carbon papers heretofore produced the life of the paper is comparatively short and the paper is discarded or thrown away as soon as it has a "worn-out" or stenciled appearance. The "worn-out" appearance is present in carbon paper long before the life or utility is exhausted and it is common practice on the part of most users to throw away the carbon sheets after they have been used comparatively few times. It is apparent that the "worn-out" appearance of the paper has a psychological effect, giving the impression that the paper is no longer of service, when as a matter of fact, such papers could usually be used an additional twenty times or sometimes more with satisfactory results, depending on the quality of the sheet.

Obviously, the test in determining when a carbon paper is exhausted is not its appearance, which is misleading; the point of exhaustion should logically be determined by noting when the type actually fails to register a sufficiently legible impression; or, by determining the initial point at which it becomes difficult to read the carbon copy produced, or in other words, where the exhaustion of the carbon first becomes noticeable by the effect produced on the carbon copies. The improvement which constitutes the basis of my invention necessitates the application of the latter test, and renders the application of the "appearance" test impossible.

It is a primary object of the present invention to provide a new form of carbon paper the life of which will be greatly increased in actual use.

Another object of the invention is to provide a carbon paper which will not show stencilling, or which will not show "wear", at least until it is actually worn out, so that it will be necessary to determine the point of exhaustion of the carbon paper by noting the effect produced on the carbon copies.

With these and other objects in view the invention comprises the features hereinafter described and more particularly defined in the claims.

In considering the psychological effect

produced by the stenciled or worn appearance of carbon paper after it has been used slightly, it is apparent that if a paper could be produced in which the stencilling effect would not take place, so that only data or index which could be relied on for determining the point of exhaustion of the carbon paper would be by noting the point at which there is a noticeable decrease in the legibility of the carbon copies, then the carbons would be used to a greater extent than with ordinary carbon papers, and probably to the full extent of its usefulness. By this means the saving of a large amount of carbon paper heretofore wasted would be attained and would obviously greatly cut down costs in business offices and in fact wherever carbon sheets are used.

I have found that by suitably introducing a portion of coloring material or a darkening composition into the paper preferably during its manufacture, the desired result is obtained. The material may be incorporated into the fibers of the paper or made a part thereof. By means of the process which I prefer to employ, the paper is rendered substantially opaque, without increasing the thickness of paper or, in other words, employing the same thickness of paper as are generally used. By this means the stencilling effect or "exhausted" appearance of the carbon paper after slight use is wholly avoided, whereby an increased life and utility of the carbon paper is attained.

I preferably first obtain a paper of substantially the shade which is desired for the final carbon paper, and then apply transfer pigment in any suitable manner. The process, more in detail is as follows:

At any suitable stage during the process of manufacturing the particular paper which is to be used for making the carbon sheets, I add a small amount of color or pigment or both, preferably in to the beaters or hollenders in which the paper stock, which may consist mainly of rags or linen, hemp, cotton, jute, or other suitable material or materials, is treated. The material may be added dry or in any other preferred manner, as in solution or suspension, or as a paste, and I preferably employ a carbon black, or a pigment which will produce a dark color or shade in the paper which is substantially identical with that of the coating or transfer material of the carbon paper which is to be produced, although I do not desire to be limited as to the color or shade employed. It is obvious that the gloss cannot be matched and that the paper stock will be comparatively dull in appearance, but by the use of suitable amounts of pigment or color material the paper to which the transfer medium is to be applied will be substantially opaque and have substantially the shade or tone of the coating of the finished carbon paper.

It has in some cases been found advisable to add during the manufacture of the paper itself, a quantity of loading material or filler to assist in attaining the desired opacity therein. Such loading material may comprise any suitable filler such as talc, clay, or Fuller's earth for example, or a mixture of two or more materials. I might also employ a combination of a filling material with a suitable dye such as may be obtained for example, by precipitating barium sulphate in the presence of an aniline dye or other soluble dye. I might employ a suitable black mineral material such as pyrolucite, which would serve the purpose of a filler and render the paper opaque, and would also impart a dark color or shade thereto. The filling material might be incorporated if desired, into the paper fibres by precipitating the material from a solution in the presence of the paper stock, such as manganese dioxide, for example from a potassium permanganate solution. The material which is to be employed for making the paper can obviously all be added in the beater, including the secondary stock, such as cuttings or "broke" which may be returned to the process after the cutting of the sheets of the final or partly prepared uncoated paper.

After the paper has been suitably prepared the transfer material, which may comprise pigments or dye, together with suitable quantities of a wax, or mixture of waxes such as carnauba wax, ceresin or montan, or other carrying medium, together with suitable amounts of oils, if desired, such as petroleum, linseed, or cotton seed oil, and fats, if desired, is applied to the paper. The particular composition of the transfer material depends upon the properties required in the finished material, as will be apparent to those skilled in the art. The transfer material or "dope" composition is coated on one side of the paper, which may be accomplished by passing the paper over a cylindrical drum, for example, which may be heated during the time the "dope" is applied on the surface of the paper by suitable means such as a roll, spray, brush or scraper. The transfer composition is generally applied hot so as to attain the desired flow and penetration into the surface layer of the paper, after which it is cooled or chilled, and the coating on the paper may thereafter be polished if desired.

Obviously, the composition of the "dope" or transfer material may be modified or regulated to suit the requirements of the paper employed in the process or in accordance with the final product desired, and any suitable thickness of paper may be employed.

It is to be understood that I may use any material or combination of materials in the beater or hollender which will give the desired opacity and color to the paper be-

fore the "dope" or transfer material is applied thereto. Instead of incorporating a pigment or composition into the paper during the paper making process, I might add a dye to the paper after it has been prepared and before the "dope" is applied thereto. I might also vary the method of applying the paper coloring material to render the paper opaque by adding a pigment such as a carbon black, for example, together with a small amount of basic color, such as methyl violet, for example, to give the desired black color or shade to the paper before the application of the "dope" or transfer medium.

It will be understood, therefore, that various changes or modifications may be made in the process and product as will be apparent to those skilled in the art, without departing from the spirit or scope of the invention as defined in the claims.

What I claim as new is—

1. A transfer sheet comprising a permanently opaque sheet of paper having on one side only thereof a coating of transfer material, the said sheet being so colored throughout the body thereof as to correspond substantially with the color of the said transfer material, whereby stencilling of the said sheet is avoided and its appearance is substantially unaltered by the removal of transfer material from the coated surface thereof.

2. A carbon paper comprising a substantially opaque black paper sheet having a

black pigment distributed throughout the body thereof and a black transfer material applied to one surface thereof, whereby stencilling effect during use of the carbon paper is substantially avoided.

3. A transfer sheet comprising a substantially opaque black paper sheet, one side of which is coated with a transfer material having substantially the same shade as that of the paper to which it is applied, whereby stencilling effect or type markings produced by use of the transfer sheet are substantially invisible.

4. A carbon paper comprising a substantially black opaque paper of suitable thickness having a coating on one surface thereof of transfer material capable of being transferred under impact whereby stencilling effect will be avoided, thus requiring the user to observe the carbon copies obtained by the use of the carbon paper to determine the point of exhaustion thereof.

5. A transfer sheet comprising a sheet of paper having an inherent opacity produced during manufacture of the paper, the said sheet being unaffected by impact or pressure, and having thereon a coating of transfer material, said sheet being so colored throughout the body thereof as to correspond with the color of said transfer material.

Signed at New York this 17 day of April, 1924.

J. A. L. MÖLLER.