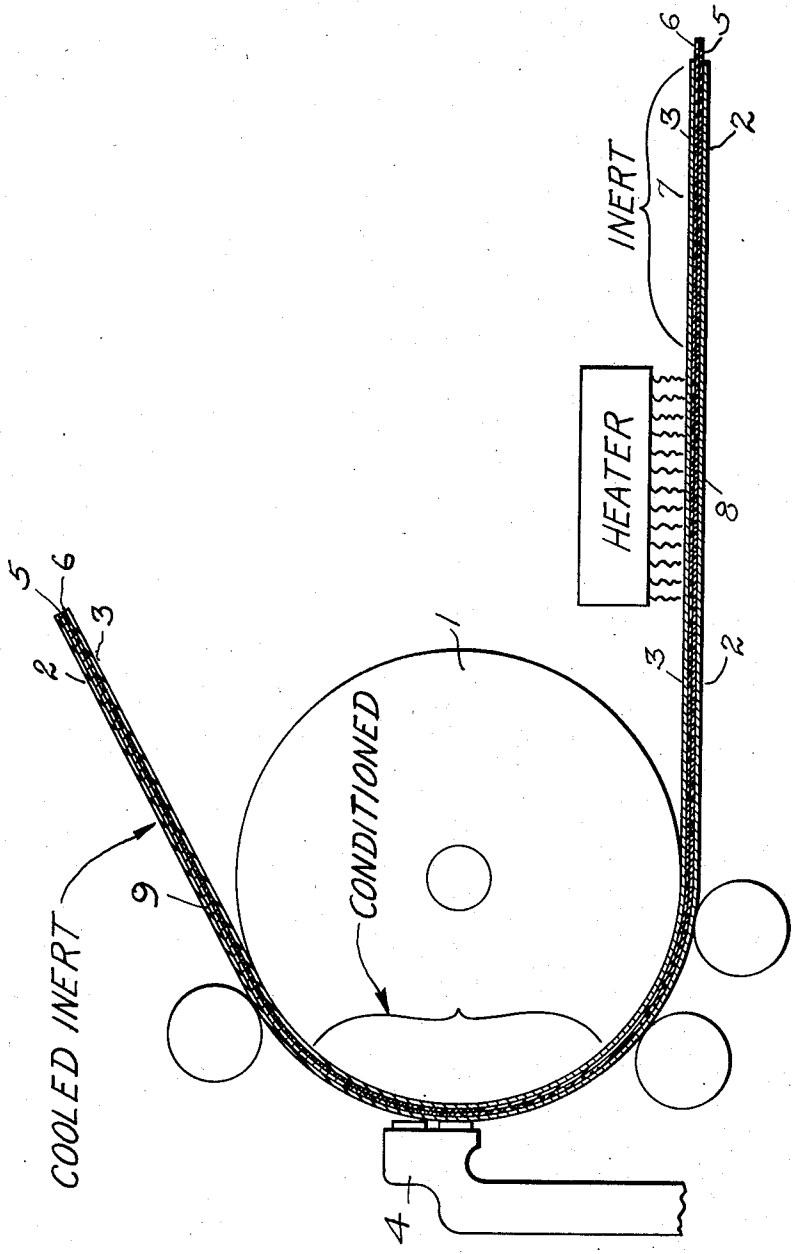
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NORMALLY INERT MANIFOLDING MATERIAL

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INVENTOR
JOHN Q. SHERMAN
BY
J. C. Walker
ATTORNEY

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NORMALLY INERT MANIFOLDING MATERIAL

John Q. Sherman, Dayton, Ohio; Katherine M. Sherman, William C. Sherman, and Wellmore B. Turner, executors of said John Q. Sherman, deceased

Original application January 27, 1934, Serial No. 708,631. Divided and this application April 15, 1936, Serial No. 74,511

2 Claims. (Cl. 282—28)

This invention relates to manifolding or transfer material and more particularly to a material which is normally noncommunicative but which becomes responsive to impact or pressure only when suitably preconditioned. The material forming the subject matter hereof is that adapted for use in one or another of the several forms of manifolding apparatus set forth and described in Patent No. 2,057,696, issued October 20, 1936, resulting from an application, Serial Number 708,631, filed January 27, 1934, of which the present application is a division.

While many attempts have been made to provide a "non-smut" transfer or carbon material for manifolding purposes such material to be effective for copying purposes will rub off under pressure and will produce marks on underlying record material as result of accidental pressure, friction or impact. Likewise "carbon-backed" sales and record slips wherein the transfer material is applied directly to the reverse sides of the record slips in lieu of interleaved carbon sheets, are unpopular due to the tendency of the pigmented material to rub off and soil the fingers of the operator or others who handle such slips. Such objections of smudging and undesired marks and impressions are overcome in the present instance by providing a pigmented coating which is non-transferable in response to pressure except when properly preconditioned or activated. Normally non-transferable transfer material of different composition may be differently preconditioned, such as by being exposed to moisture, vapor or gases, or by action of a chemical reagent, or by being passed through a thermal zone, heated, electrically, chemically, by steam, hot air, or otherwise. For illustrative purposes but with no intention of unduly limiting or restricting the invention thereto, the material is here primarily described as being subject to thermal conditioning, but it is to be understood that it is more broadly claimed to include other modes of preconditioning.

However mere application of heat or other conditioning treatment to the material is insufficient to effect transfer or reproduction of an inscription, design, or other indicia. Pressure or impact upon the prepared area additional to the preconditioning is necessary to effect transfer or reproduction of inscribed indicia. The surface of the sheet or sales slip, or a predetermined area thereof is coated throughout with the pigmented material, thermally or otherwise responsive, which is ordinarily non-transferable in response to pencil pressure or impact of a writing machine type, but which when suitably preconditioned or activated will be transposed by pressure within unpredetermined and restricted areas commensurate with the face of the writing machine type or path of travel of the pencil.

It is in this respect that the material forming the subject matter hereof differs from pattern transfers or the like wherein only predetermined delineations or designs previously prepared upon the transfer sheet are reproduced. To follow the teaching of such pattern transfer art would produce only a continuous colored area commensurate with the pigmented area of the transfer sheet or back of a sales or record slips. Pattern transfers are made directly by and during the application of heat and the transferred indicia must be predetermined at the time the transfer material is made.

The purpose of the present invention is to reproduce handwritten or typewritten text, drawings, designs, or other indicia of unpredetermined character by the use of normally non-transferable material which is temporarily preconditioned for transfer purpose and which automatically returns to its non-transferable condition for subsequent reuse upon expiration of the preconditioning period. It follows that the material transposed to a contiguous surface after being suitably activated or preconditioned will also automatically assume a non-transferable condition and will, like the material before it is activated or preconditioned, not be susceptible to smudging or rubbing off under pressure, friction, or impact.

The commercial objection to carbon back sales and record slips being so great due to the "smutting" characteristic and the extent to which the ordinary transfer material soils the fingers of the operator, there may be some sales resistance because of the similar dark appearance of the present normally inert material.

To overcome this objection the normally non-transferable thermally responsive transfer material may be disguised by superposing thereon another coating of normally non-transferable transfer material of approximately the same color shade as the paper stock of the sales or record strip or other supporting sheet which carries the primary transfer material. In such case the stratum of colored transfer material would lie between the support sheet and the overlying, differently colored coating. The material of the disguising coating would be deposited onto the manifolded copy with the different colored transfer material with which it would adhere when the

superposed coats of transfer material are preconditioned and would not be especially noticeable in the reproduced copy, nor prevent adhesion of the primary transfer material. Where the transfer material is deposited onto the contiguous sheet, the position of the two differently colored coatings of transfer material will be in reversed order. In this respect the present invention is a further development and improvement of the surface sealed manifolding material which forms the subject matter of prior Patents Numbers 1,864,079 issued June 21, 1932, and 1,865,708, issued July 5, 1932, which are hereby made of record.

The object of the invention is to provide a transfer material of the character described, which may not only be economically manufactured, but which will be more efficient in use, of increased durability, and unlikely to deteriorate with age.

An important object of the invention is to provide a transfer material which will be normally non-transferable in response to pressure, and which will not rub off upon the fingers of the operator or others handling "carbon backed" record or sales slips or interleaved sheets of transfer material.

A further object of the invention is to provide a normally non-transferable transfer material which may be repeatedly used as a substitute for the conventional form of carbon material or transfer sheets now used.

A further object of the invention is to provide a transfer material which is subject to temporary preconditioning immediately before use and which will automatically return to a non-transferable condition after use.

A further object of the invention is to provide a sheet coated with transfer material and useable for manifolding purposes upon which the pigmented coating is disguised and hidden from view, and the coated surface is given the appearance of an uncoated sheet.

A further object of the invention is to provide as an article of commerce a transfer material for manifolding purposes having the particular features of advantage and the meritorious characteristics herein mentioned.

With the above primary and other incidental objects in view, as will more fully appear in the specification, the invention intended to be protected by Letters Patent consists of the normally inert transfer sheet which is subject to use only upon preconditioning treatment and the structure thereof and disposition of coating materials or their equivalents as hereinafter described and set forth in the claims.

In the drawing there is illustrated diagrammatically the progress of a manifolding assembly embodying the present thermally responsive transfer material past a recording position.

In the usual commercial types of writing machines, tabulating and imprinting apparatus employing conventional carbon and transfer material for manifolding purposes the duplicate copies are produced by the impingement of the imprinting type upon superposed plies of record material having sheets of carbon or transfer material interleaved therebetween. In lieu of separable interleaved transfer sheets, the reverse sides of the original and each succeeding record sheet except the last or innermost may be coated with transfer or carbon material. In such case the duplication of copies is effected in the same manner by the impingement of the imprinting type upon the superposed plies of "carbon backed" sheets. In either event instead of employing a writing or imprinting machine, manifolded records may be had of hand written inscriptions or drawn designs and indicia by writing or drawing upon the uppermost or original copy record sheet with a pencil or stylus. Such copies are made at the temperature prevailing at the point of use, the coating material used upon conventional transfer sheets being responsive at all temperatures. It is this necessity of being responsive at all temperatures which causes the material to smudge and smear surfaces with which it comes in contact, including the operator's fingers. It is the same necessity for capability of transfer at all temperatures that causes transfer of markings by accidental pressure, friction or impact upon the sheets while in storage or while being inserted in or removed from a writing or imprinting machine. In order to be efficient such material must be of a waxy or relatively soft character. As it dries out it loses its sensitiveness and capacity for producing good copies.

In the drawing 1 indicates the platen roll of a conventional writing or imprinting machine about which superposed original and duplicate copy record sheets 2 and 3 are progressively advanced past a writing position defined by the type bar 4. Interposed between the original and duplicate record sheets is a sheet 5 of transfer material having a coating 6 of thermally responsive carbon or transfer material, embodying the subject matter hereof. As the manifolding assembly approaches the platen roll at 7 it is inert and not responsive to pressure or impact. However as it passes through the zone 8 it is subject to temperature change by which it is preconditioned and reaches the platen roll 1 in condition to effect transfer to the underlying sheet 3 of matter inscribed on the record sheet 2. After passing the writing position to the zone 9 the heat is dissipated and the transfer material is permitted to cool whereupon it again returns to an inert condition.

The present invention provides a transfer material which is inert or non-transferable at the atmospheric temperature prevailing at the point of use and consequently will not smudge, smear, nor reproduce impressions accidentally or otherwise until it is has been preconditioned or activated preparatory to such use. Being normally non-transferable in response to pressure and dependent upon a preconditioning treatment the material does not dry out or deteriorate with age as does ordinary commercial transfer or carbon material. Like conventional transfer or carbon material the present coating material may be applied to any suitable supporting sheet to be interleaved between superposed record sheets or the material may be directly applied to the reverse side of record sheets or sale slips. In either event the material is normally noncommunicative and before reaching the writing position it must receive preconditioning treatment by which the normally non-transferable material is rendered transferable. The particular preconditioning treatment to be given the normally inert material is dependent upon the character and composition of the coating material. As before stated in some instances according to the material used such preconditioning may be effected by exposing the material to vapors or fumes or by a preliminary treatment with the chemical reagent or even by moistening. However as illustrative of the preferred form which has been

satisfactorily developed for commercial use a thermally responsive medium is hereafter described. This thermally conditioned material which may be preconditioned through temperature rise above the prevailing atmospheric temperature by being passed through a zone heated electrically or by steam, hot air, chemical reaction or otherwise, or by being positioned upon a heated platen roller or an artificially heated writing tablet preferably consists of a coating containing a synthetic resin such as chlorinated biphenyl, sulphonamide formaldehyde or resin esters, such as ester gum, combined with a pigment such as carbon black, iron blue or an organic pigment such as alizarine, lithol red methyl violet. Such materials are ordinarily combined in the proportions of synthetic resin or an ester gum 91% and pigment or an organic coloring material 9% to which clay may be added for the purpose of keeping the pigment in suspension for even distribution upon the supporting sheet of paper or cloth. An alternative combination of these materials which may be suggested comprises synthetic resin or an ester gum 88.3%, pigment or an organic coloring material 8.8%, and clay 2.9%. In preparing the material the quantity of resin is placed in a heated grinding mill and allowed to melt. The pigment or coloring matter and clay is added and ground to obtain better dispersion of the pigment through the resin. Such thermally responsive transfer media can be applied to the supporting sheet of paper or cloth with any standard coating machine or by brushing or spraying. The following formulas for coating material have been found quite suitable and effective and are here suggested merely for illustrative purposes but not as a limitation and with no intent to restrict the scope or application of the invention, but merely illustrative thereof. Such formulas are:

No. 1—Black

Nitrated cotton solution (approximately 450–700 centipoises for a 25% solution at 15 deg. C.)	lb.	50
Fossil gum (Zanzibar copal, Congo copal, kauri copal, Manila copal)	lb.	1
Non-drying oil (castor oil)	oz.	12
Solvent. Alkyl esters (ethyl acetate, butyl acetate, amyl acetate, butyl propionate)	lb.	36
Diluent. Aromatic hydrocarbons (benzol, toluol)	lb.	84
Alcohols. Alkyl alcohols (methyl alcohol, ethyl alcohol, amyl alcohol)	lb.	27
Carbon black	lb.	20
Methyl violet dye	lb.	2
Plasticizer (triphenyl phosphate, tricresyl phosphate, dibutyl phthalate)	lb.	10

No. 2—Blue

	Pounds
Nitrated cotton solution (approximately 45–60 centipoises for a 25% solution at 15 deg. C.)	22
Polymerized drying oil (polymerized tung—China-wood—oil)	32
Solvent. Alkyl esters (ethyl acetate, butyl acetate, amyl acetate, butyl propionate)	50
Diluent. Aromatic hydrocarbons (benzol, toluol)	50
Milori blue	15
Methyl violet dye	1
Plasticizer (triphenyl phosphate, tricresyl phosphate, dibutyl phthalate)	8

No. 3—Blue

Nitrated cotton solution (approximately 450–700 centipoises for a 25% solution at 15 deg. C.)	lb.	50
Fossil gum (Zanzibar copal, Congo copal, kauri copal, Manila copal)	lb.	1
Non-drying oil (castor oil)	oz.	12
Solvent. Alkyl esters (ethyl acetate, butyl acetate, amyl acetate, butyl propionate)	lb.	36
Diluent. Aromatic hydrocarbons (benzol, toluol)	lb.	84
Alcohols. Alkyl alcohols (methyl alcohol, ethyl alcohol, amyl alcohol)	lb.	27
Milori blue	lb.	20
Methyl violet dye	lb.	2
Plasticizer (triphenyl phosphate, tricresyl phosphate, dibutyl phthalate)	lb.	10

As an alternative method of preconditioning the transfer material other than by thermal change as hereinbefore set forth, the sheets coated with transfer material of the character described may be subjected to action of additional of the solvent mentioned, for example, as they approach the transfer points. This may be either by direct contact whereby the transfer material coating is moistened, or by passing the material through a fume box wherein vapors of the solvent will attack and soften the coating. In either event, the coating will be temporarily softened without the application of heat, sufficiently to effect transfer under pressure or impact. After having passed the transfer points, such solvent, being volatile, evaporates. If desired, such evaporation and return of the material to its original inert condition may be accelerated by suitable air-conditioning, or by blowing air currents thereover, or by other neutralizing action.

If it be desired to conceal or disguise the coated surface of the transfer sheet, which is particularly desirable in the event of "carbon backed" material, an opaque coating may be superposed upon the coating of transfer material. Such masking stratum having a color resembling that of the supporting sheet may consist of a nitrocellulose such as nitrated cotton solution and a pigment such as titanium oxide, iron blue, chrome yellow, or other color to correspond to and imitate the color of the supporting sheet to which the coating of transfer material has been applied. In such a case the coating of normally non-transferable transfer material will be interposed between such overlying stratum of masking or disguising material and the underlying support sheet to which the coatings are applied. The result is a sheet of paper or cloth each side of which would be approximately of the same color shade with the stratum of thermally responsive transfer media interposed therebetween.

This color coat could and should be of the same or similar non-transferable substance as the transfer medium, as it is actually the same type of transfer material except that the color is different. As an alternative embodiment of the invention an ordinarily non-transferable transfer medium of any desired color including the same color as the supporting sheet can be used and manifolded paper of contrasting colors to which the transfer material is to be transferred can be utilized. There will thus be provided a single coat of transfer material the same color as its supporting sheet, and yet providing

clearly readable indicia upon the contrasting colored sheet upon which it is transferred.

From the above description it will be apparent that there is thus provided a transfer device of the character described possessing the particular features of advantage before enumerated as desirable, but which obviously is susceptible of modification in its composition, proportions and combination of ingredients, without departing from the principle involved or sacrificing any of its advantages.

While in order to comply with the statute the invention is described in language more or less specific as to certain features, it is to be understood that the invention is not limited to the specific details shown, but that the means and material herein disclosed comprise the preferred form of several modes of putting the invention into effect, and the invention is therefore claimed in any of its forms or modifications within the legitimate and valid scope of the appended claims.

Having thus described my invention, I claim:

1. In a transfer device for manifolding purposes, a supporting sheet, a coating thereon of material normally non-transferable in response to pressure and rendered transferable by subjection to a preconditioning treatment, and while under the influence of which preconditioning treatment portions of the coating less in size than the entire coated area of the supporting sheet are transferable to a contiguous record sheet, and a second coating of material normally non-transferable in response to pressure and rendered responsive thereto by the same preconditioning treatment as the first named coating but of a different color superimposed on the first named coating.

2. In a transfer device for manifolding purposes, a supporting sheet, a coating of transfer material thereon, and a protective coating of sealing material superimposed on the coating of transfer material and confining the transfer material between the coating of sealing material and the supporting sheet, said sealing material being normally inert and permitting transposition of transfer material only when subjected to a preconditioning treatment.

JOHN Q. SHERMAN.

CERTIFICATE OF CORRECTION

Patent No. 2,351,073. June 13, 1944.

JOHN Q. SHERMAN.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, first column, line 12, for the patent number "1,864,079" read --1,864,097--; page 2, second column, line 67, for "inert" read --non-transferable--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 29th day of August, A. D. 1944.

Leslie Frazer

(Seal) Acting Commissioner of Patents.