July 15, 1952 D. A. NEWMAN 2,603,508

TRANSFER MATERIAL

Filed Oct. 1, 1948

Fig. 1

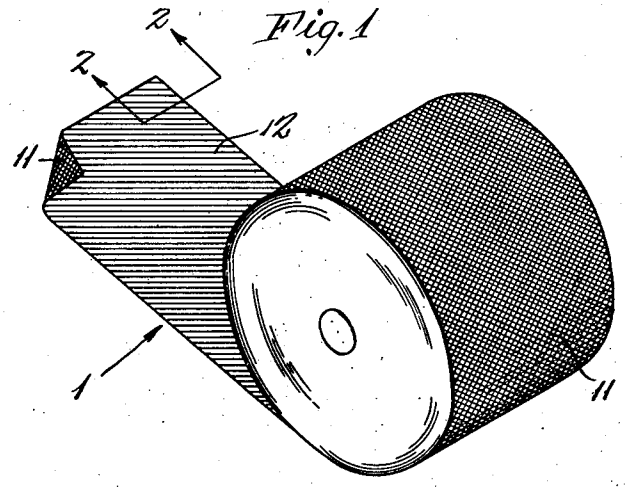


Fig. 2

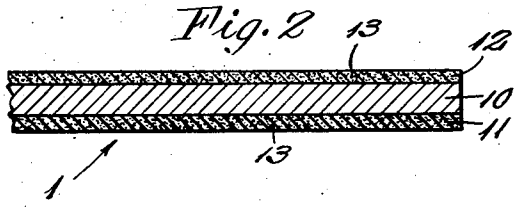


Fig. 4

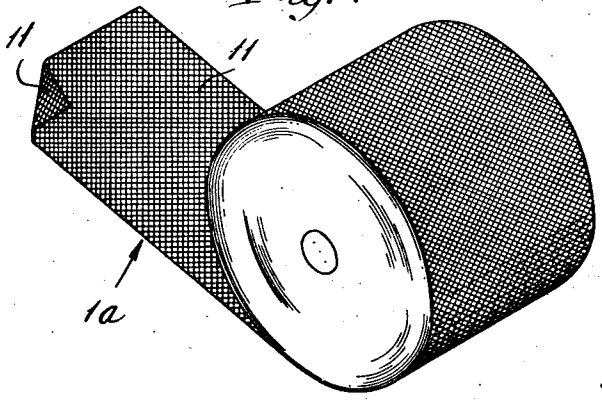


Fig. 3

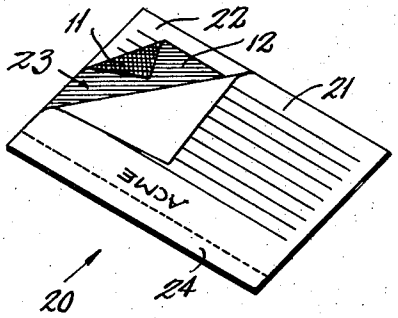


Fig. 5

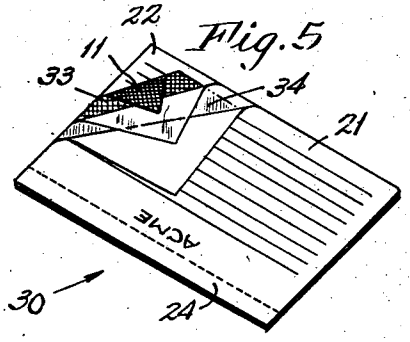


Fig. 6

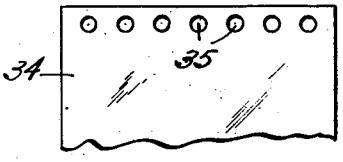
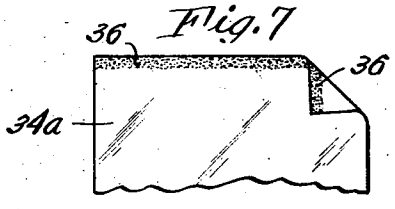


Fig. 7



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2,603,508

TRANSFER MATERIAL

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Application October 1, 1948, Serial No. 52,385

13 Claims. (Cl. 282—19)

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This invention relates to manifolding and particularly to an improved transfer or carbon strip for use in manufacturing manifolding sets formed of record sheets or strips collated with one or more transfer or carbon sheets or strips.

More particularly this invention relates to improvements in carbon strips of the general type having double faced thermo-responsive adhesive portions which make possible attachment of the strip to both adjacent record strips by the mere application of heat and pressure.

With two opposite local adhesive applications made along one margin of the strip, as had been the known practice in the art, a substantial difference in thickness between the carbonized portion and adhesive-carrying portion of the web exists and winding the strip on a core to form a roll, for instance in collecting the product of the coating machine, is impractical because the hills and valleys formed on the roll by the uneven thickness, causes the web to crinkle or break, or both.

It is therefore an object of this invention to provide a carbon strip carrying double faced thermo-responsive adhesive portions having a construction such that it can be readily wound to form a substantially smooth roll having wrinkle-free convolutions throughout.

It has been found that the fusible coatings, usually containing wax, normally used in making carbon paper have a slight adhesive property when subjected to heat and pressure. This however is inadequate for the purpose of firmly connecting the elements of a manifolding set which must be reliably held in proper register through periods of reasonably severe handling prior to the time when the elements thereof are intentionally separated. I have discovered, however, that a coating, primarily of wax, such as is usually applied for transfer purposes, may be modified to serve both as a transfer coating and as a strong, normally inactive adhesive coating, and my invention has for a further object the provision of a transfer sheet carrying such a modified coating.

The difficulties mentioned above have been overcome by my invention in which the carbon strip is provided on each face with a coating of uniform thickness, each such coating also including as an admixed portion thereof an adhesive material which is thermo-responsive in character. Such a construction is feasible since the adhesive material, being thermo-responsive, is ineffective over the major portion of the area of the strip, but can be activated by heat and pressure in any desired locality, normally along one margin.

Other objects and advantages will hereinafter appear.

In the accompanying drawings—

Figure 1 is a perspective view of a rolled strip of carbon paper in accordance with my invention.

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Fig. 2 is an enlarged cross section of the strip shown in Fig. 1, taken on line 2—2 thereof.

Fig. 3 is a perspective view of a manifolding set which is made using the strip of Figs. 1 and 2.

Fig. 4 is a perspective view of a rolled strip of carbon paper illustrating a modification of the invention.

Fig. 5 is a perspective view of a manifolding set which is made using the strip of Fig. 4.

Fig. 6 is a fragmentary plan showing details of a record sheet used in constructing the set of Fig. 5.

Fig. 7 is a fragmentary plan similar to Fig. 6 and showing a modification of the record sheet.

The preferred form of the carbon strip of the present invention as shown in Figs. 1 and 2, is designated by numeral 1, and comprises a web 10 of paper having on one surface thereof a fusible coating 11, preferably of wax containing a pigment or dye for transfer purposes and having on the other surface thereof a coating 12 of wax in which the pigment, if any, is neutral in color with the result that the indicia transfer property is confined to one surface only of the web.

As illustrated on an enlarged scale in Fig. 2, each of the coatings 11 and 12 carries an adhesive composition distributed therethrough with substantial uniformity. In the illustrated form of my invention, which form is at present preferred, the adhesive material may consist of discrete particles 13 of a normally inactive thermo-responsive adhesive composition which particles are distributed throughout the coatings 11 and 12 with substantially uniform spacing. However, it will be understood that my invention is not limited in this respect and that a suitable coating mixture may be prepared by the admixture with the basic coating material of a normally inactive thermo-responsive adhesive composition in any desired fashion.

The particles 13 may be of any suitable thermo-responsive adhesive material, the requirements being that the handling temperatures of the coating mixture, approximately 180° F., be insufficient to soften the adhesive to such a degree that the particles will have a tendency to adhere to one another, and that the material of the adhesive be unaffected by the coating mixture which normally consists primarily of wax and mineral oil. Examples of adhesives which answer these requirements are the polyvinyl acetates and ethyl cellulose, both of which are thermo-plastic in character, and the phenolic resins, which have thermo-setting properties. In the case of polyvinyl acetates, only polymers of higher viscosity should be employed since those in the lower ranges have undesirably low softening temperatures.

The fusible coating may be prepared, for example, by providing the usual mixture of wax and mineral oil, and, for the transfer surface, pigment or dye material, which mixture is rendered fluid by subjection to appropriate temperatures in the neighborhood of 180° F. The adhesive particles may be prepared by reducing the selected adhesive material to a finely divided state in suitable comminuting apparatus, whereupon the particles are added to the heated mix and evenly distributed by proper agitation thereof. When such coatings, one having pigment or dye material included, and one in which the same has been omitted, are evenly distributed upon the surfaces of a paper web 10, and allowed to cool and set, a product as shown in Fig. 2 results.

The transfer strip of Fig. 4 is designated by numeral 1*a* and is similar to that of Figs. 1 and 2, in so far as the manner of handling the adhesive is concerned. Fig. 4, however, illustrates the application of the invention to a double faced transfer sheet used in certain manifolding sets which include a transparent or translucent record sheet. In this form a base web 10 is provided and a coating 11 containing pigment and/or dye is applied to each face thereof.

Strips prepared in accordance with the foregoing description are readily accumulated by winding into the form of a roll since the coatings thereon are uniform in thickness and variations across the web which ordinarily result from the local adhesive coatings employed in the prior art have been eliminated.

An additional advantage to be derived from my invention is found in the convenient way in which carbon sheets or strips formed in the above-described manner facilitate the operation of assembling sheets or strips during the manufacture of manifolding sets. After the carbon sheets or strips have been collated with the appropriate original and duplicate record sheets or strips to provide sets, the sets are preferably stacked and clamped in order that a large number may be held in register to receive the adhering treatment of heat and pressure at the same time. There are, however, limitations on the height to which such sets may be stacked when previously known types of double adhesive carbon are used. The reason for this is that the added thickness along the adhesive margin causes the stack to become more and more irregular in shape as its height increases, so that stacks of a limited height only can be satisfactorily handled by the clamping means. When the uniformly coated carbon of my invention is substituted, the stack retains its regular outline regardless of height, and the amount which can be handled at one time is limited only by the physical dimensions of the clamping device or the effectiveness of the adhesive activating means.

A further advantage of the carbon strip of my invention is its all-over adhesive characteristic which enables the elements of a manifolding set to be adhered in any desired locality. The assembly operation is therefore rendered more flexible than when previously known types of double adhesive carbon are used, since registration of the adhesive activating means with a local adhesive application is unnecessary.

A further corrollary to the last-mentioned advantage of all-over adhesiveness of the strip is the important feature of production flexibility. When the transfer medium of this invention is

formed in a wide web and slit into individual strips according to the usual practice in the art, no correlation between the application of adhesive and the slitting of the strip is required. When strips of a given width are desired, they may be formed by merely slitting any wide web in stock without regard for the location of a particular adhesive application.

Certain of the uses to which the carbon strips of the present invention may be put are illustrated in Figs. 3 and 5. Fig. 3 shows a set 20 consisting of an original record sheet 21 and one or more duplicate record sheets 22. Between each pair of record sheets is inserted a carbon sheet 23 which is formed by chopping the appropriate length from a strip 1. The sheets are connected together by applying heat and pressure along the marginal portion 24 so that the stack of sheets is united to form a set by virtue of the adhesive on both faces of the interleaved carbons.

The set 30, illustrated in Fig. 5 is in most respects similar to the set 20, and where the reference characters applied thereto are the same as in Fig. 3, they have the same significance. The set of Fig. 5, however, is capable of producing two duplicates per carbon by reason of the double carbon surface on carbon sheets 33 which are made by chopping appropriate lengths from strip 1*a*. The usual opaque duplicate record sheet 22 appears below the carbon while an additional duplicate record sheet 34 which is transparent or translucent is placed in the set above the carbon, and receives its carbon markings in reverse on the back side thereof so that they may be readily interpreted by reading through the sheet. Since such a transparent duplicate sheet 34 has the effect of separating the adhesive of the carbon sheet 33 from the overlying opaque duplicate 22, openings 35 must be provided in the marginal portion thereof, as shown in Fig. 6, in order that the adhesive carried by the carbon may secure both of the two immediately overlying sheets thereto.

An alternative construction for the transparent or translucent duplicate sheet is shown in Fig. 7 wherein the sheet 34*a* is provided with an adhesive coating 36 on each surface thereof the adhesive material of which is similar in nature to the adhesive material used in making the carbon strips. While the use of sheets 34*a* may affect to some extent the set handling and clamping advantage of a uniformly coated carbon, the other advantages thereof remain unimpaired.

The set construction shown in Figs. 3 and 5 may be modified by extending the dimension parallel to the marginal portion 24 and repeating the forms printed on the record sheets, resulting in a manifolding set of the continuous type which can be constructed directly using the carbon strips of Figs. 1 and 4 together with continuous record strips and omitting the step of chopping the same to form sheets.

It will be seen, therefore, that my invention provides a strip of transfer material having adhesive properties on both faces, but which may also be successfully rolled and otherwise conveniently handled in large quantities due to the uniform thickness of the coatings. Furthermore, my invention results in a strip of transfer material which may be rendered adhesive over any portion of both faces but in which the transfer property remains unimpaired in those portions which are not adhered.

Variations and modifications may be made

within the scope of this invention and portions of the improvements may be used without others.

I claim:

1. As a new article of manufacture a transfer medium comprising a web of fabric having thereon a coating of transfer material, said coating carrying discrete particles of thermo-responsive adhesive material suspended therein, said particles being unaffected by and insoluble in said coating and capable of remaining in discrete particle form at the fusion temperature of said coating.

2. As a new article of manufacture a strip of transfer material each surface of which has a coating thereon substantially covering the same, at least one of said coatings being transferable from said strip to an adjacent surface by writing pressure, said coatings carrying discrete particles of thermo-responsive adhesive material suspended therein, said particles being unaffected by and insoluble in said coatings and capable of remaining in discrete particle form at the fusion temperature of said transferable coating.

3. As a new article of manufacture a strip of transfer material each surface of which has a fusible coating thereon substantially covering the same, at least one of said coatings being transferable from said strip to an adjacent surface by writing pressure, said coatings each including as an admixed portion thereof and distributed throughout the same, a thermo-responsive adhesive synthetic resin unaffected by and insoluble in said coatings and of such character that the thermal response of said material for adhesive purposes occurs at a temperature in excess of the fusion temperature of said coatings.

4. As a new article of manfacture a strip of transfer material each surface of which has a fusible coating thereon substantially covering the same, at least one of said coatings being transferable from said strip to an adjacent surface by writing pressure, said coatings having suspended therein discrete particles of thermo-responsive adhesive material of such character that the thermal response of said material for adhesive purposes occurs at a temperature in excess of the fusion temperature of said coatings.

5. As a new article of manufacture a strip of transfer material, one surface of which carries a coating having transfer properties, and the other surface of which carries a coating lacking in transfer properties, both of said coatings substantially covering their respective surfaces, being fusible and having suspended therein discrete particles of thermo-responsive adhesive material insoluble in and unaffected by said coatings and of such character that the thermo-response of said material for adhesive purposes occurs at a temperature in excess of the fusion temperature of said coatings.

6. As a new article of manufacture a strip of transfer material carrying a fusible coating at least part of which has transfer properties, all of said coating having suspended therein discrete particles of thermo-plastic adhesive synthetic resin the plasticizing temperature of which is higher than the fusion temperature of said coating.

7. As a new article of manufacture, a strip of transfer material carrying a fusible coating at least part of which has transfer properties, all of said coating having suspended therein discrete particles of normally inactive thermo-setting adhesive material which first softens and then sets in response to the application of heat thereto, the softening temperature of said adhesive being higher than the fusion temperature of said coating.

8. As a new article of manufacture a strip of carbon paper, one surface of which carries a carbon coating and the other surface of which carries an uncarbonized coating, each of said coatings substantially covering its respective surface, and discrete particles of thermo-responsive adhesive synthetic resin carried by said coatings, capable of remaining in discrete particle form at the fusion temperature of the coatings.

9. As a new article of manufacture a roll of transfer material comprising a strip having a coating thereon at least part of which has transfer properties, all of said coating having suspended therein discrete particles of thermo-responsive adhesive synthetic resin, said strip being wound to form a roll having substantially wrinkle-free convolutions throughout.

10. As a new article of manufacture a web of fabric having thereon a coating of transfer material, said coating extending over substantially the whole area of at least one surface of said web, and being of substantially uniform thickness, and discrete particles of thermo-responsive adhesive material suspended throughout said coating, capable of remaining in discrete particle form at the fusion temperature of the coating.

11. As a new article of manufacture a strip of transfer material, each surface of which has a uniform all-over coating thereon, at least one of said coatings being transferable from said strip to an adjacent surface by writing pressure, said coatings carrying discrete particles of a thermo-responsive adhesive synthetic resin suspended throughout said coatings.

12. As a new article of manufacture a sheet of transfer material for interleaving with individual record sheets, said transfer sheet comprising a uniform all-over coating on at least one surface thereof, which coating is transferable from said sheet to an adjacent surface by writing pressure, and discrete particles of a thermo-responsive adhesive synthetic resin suspended throughout said coating.

13. As a new article of manufacture, a sheet of transfer material for interleaving with individual record sheets, said transfer sheet comprising a uniform all-over coating on each surface thereof, one only of said coatings carrying pigment suitable for indicia transfer, and discrete particles of thermo-responsive adhesive material suspended throughout said coatings, capable of remaining in discrete particle form at the fusion temperature of the pigment coating.

DOUGLAS A. NEWMAN.

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