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COMPOSITIONS FOR USE IN THE MANUFACTURE OF ELEMENTS IN REPRODUCTION

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This invention relates to a new composition for use in the preparation of imaging elements in spirit duplicating processes.

It is an object of this invention to produce compositions of the type described for use in the preparation of typewriter ribbons, transfer sheets and the like for the preparation of imaged masters used in the production of copy by hectograph or spirit duplicating technique.

Another object is to produce a composition of the type described which is substantially free of color, but which contains ingredients for the production of a dyestuff to produce copy by reaction in the copy sheets.

A further object is to produce a composition of the type described which is substantially free of a dye color so as to enable manufacture and use without requiring extensive precautions to prevent staining, contamination and the like.

A still further object is to produce a composition of the type described which is substantially free of a dye color but which contains components for the production of an insoluble azo dyestuff by reaction which takes place in the copy sheets to produce copy.

A still further object is to produce a composition for use in the preparation of imaging carbons and masters which compositions are substantially free of color but contain components in a water and alcohol soluble stage for the production of copy by existing spirit duplicating equipment wherein the copy is formed by reaction which takes place in the copy sheet between components of the treating composition and components supplied by the fluid or present in the copy sheets thereby, for the first time, to make available a completely clean spirit duplicating system.

Present spirit systems make use of a water soluble aniline dye, such as crystal violet, contained as an ingredient within a carrier for use in the manufacture of spirit carbons and the like. Because of the highly colloidal nature of the crystal violet type dyes, it has become practically impossible to avoid contamination of the atmosphere where the coating compositions are prepared and applied in the manufacture of the carbon sheets with the result that the entire building and surrounding atmosphere acquires a purplish tinge and the personnel engaged in the preparation and application of the coating composition must take extensive precautions, but even then staining of the person and one's clothing invariably occurs.

The objection to the present spirit duplicating system does not rest solely in the manufacture of the coating composition and transfer elements but are even more objectionable in the field where they are used to prepare imaged masters and subsequently to prepare copies therefrom. Because of the ready transferability of the dye composition upon contact or abrasion, staining also takes place in the assembly of the carbons into master sets and in the use of the master sets to prepare an imaged master and also in the use of the imaged master in standard duplicating equipment to prepare copy. In general,

though the spirit duplicating system has become one of the most popular methods for the production of copy because of its simplicity, it is also the dirtiest. For this reason, the process has become highly objectionable particularly in the manufacture of spirit carbons and more important in the use of the master sets to produce copy. This characteristic of constituting a dirty process poses one of the most serious threats to the continued use of this simple duplicating process.

A number of the leading manufacturers and suppliers in the art have attempted to clean up this process. In one line of investigation, represented by the Neidich Patent No. 2,146,976, the transfer elements were formed with a composition which, instead of the usual water soluble crystal violet dye, was formulated to contain the corresponding dye base which in itself is a dye but which is less soluble in water than crystal violet and, as a result, has less tendency to transfer color by reason of the solubility and moisture usually on the hands of the operator. Nevertheless, the dye base of Neidich actually constitutes a dye which is subject to objections heretofore described in staining the person and contaminating the atmosphere during the manufacture of the composition and the transfer elements. Staining also occurs in the use of the master set to produce the imaged master by reason of physical contact with the coating during stacking, making corrections and the like. Although excellent copy can be produced with the Neidich materials with the use of alcohol as the fluid without converting the dye base to the more water soluble dye, Neidich evidently found it desirable to make his system conform to the present system and provides for acidification of the dye base in the imaged master to produce a master having all of the characteristics of the objectionable spirit duplicating system previously described. In the final analysis, the entire process of Neidich from beginning to end continues to remain a relatively dirty process because of the presence at all times of a dye, though less water soluble initially in some of the elements in which it is used.

Holik, in Patent No. 2,554,909, makes use of some of the concepts of Neidich in the attempt to clean up the spirit carbon by reducing the dye in the surface portion of the dye coating on the transfer sheet into a colorless leuco base, but the objectionable feature of the manufacture of the spirit carbons still remains. In the imaged master, the reduced layer becomes the underside of the coating so that the exposed surface constitutes the objectionable water soluble crystal violet dye which, as before, is in position to cause staining as an incidence to its use in the production of copy.

The concepts of Holik have also been modified by treatment of conventional spirit carbons by application of a protective coating but with greatly increased expense and with substantially the same results.

It will be obvious that in the present spirit duplicating systems and in the modifications developed from extensive research in the attempt to clear up the process, the compositions for use in the preparation of the transfer elements still contain a dye, the spirit carbons or other transfer elements still contain a dye, and the imaged master contains a dye which is transferred as before by solution in water or alcohol. Essentially, the present processes for spirit duplication continue to embody practically all of the objectionable characteristics heretofore described.

In accordance with the practice of the present invention, a completely new spirit duplicating process which is substantially completely free of any possibility of staining or soiling is provided by the use of a composition in the manufacture of imaging elements which is substantially free of a color dye except for traces which might be used to permit the detection of errors in the preparation of an imaged master but which contains components

from which a colored azo die may be produced by reaction designed to take place only on the copy sheet where it is too late to cause soiling or dirtying. The tracing dye or pigment which might be used to produce readable copy can in this instance constitute a substantially completely insoluble dye component which would be incapable of transfer to cause staining or the like. Thus, for the first time, a duplicating process is provided which is substantially completely clean from the beginning with the preparation of the composition for use in the production of the imaging elements down through the imaging operation to the production of copy.

The essential features of this invention reside in the production of a composition for manufacture of the master imaging element which is free of any dye color but which contains an azo dye component soluble in aqueous medium of a gelatin or hectograph system or in spirit solvents for transfer from the imaged master to the copy sheets for reaction with another component necessary for the formation by reaction of an azo dyestuff. The compositions embodying features of this invention are compounded with a wax or oily carrier capable of forming a coating on a ribbon or on a transfer sheet which in response to impact or pressure transfers in the compressed surface of the master to form the image thereon.

In the preferred concept, the carrier is formulated to contain substantial amounts of a coupler and a diazo compound incapable of reaction with the coupler to form an azo dyestuff under the hydrogen ion concentrations existing in the composition but which upon adjustment of the hydrogen ion composition concentration in the copy sheets couples immediately to form the corresponding azo dyestuff.

The following are examples of compositions embodying features of this invention, which compositions may be used to prepare transfer sheets adapted for use in the production of imaged masters and which are free of any dye color but from which copy of good quality may be produced:

Example 1

5.0 percent by weight carnauba wax
20.0 percent by weight microcrystalline wax
15.0 percent by weight paraffin wax
20.0 percent by weight petrolatum
20.0 percent by weight para-diazo diethylaniline zinc chloride
20.0 percent by weight 8-amino, 1-naphthol, 3,6-disulfonic acid (monosodium salt)

Example 2

15.0 percent by weight microcrystalline wax
15.0 percent by weight paraffin wax
30.0 percent by weight petrolatum
30.0 percent by weight para-diazo diethylaniline zinc chloride
10.0 percent by weight 2,4-diamino toluene dihydrochloride

Example 3

12.0 percent by weight carnauba wax
17.0 percent by weight oxidized microcrystalline wax (Cardis 262)
14.5 percent by weight heavy mineral oil
13.0 percent by weight light mineral oil
1.5 percent by weight sodium oleate
17.0 percent by weight 2-amino-5-naphthol-7 sulfonic acid (J acid)
25.0 percent by weight 2,5 diethoxy-4 N benzoyl-aminophenyldiazonium potassium sulfonate

Example 4

12.0 percent by weight carnauba wax
17.0 percent by weight oxidized microcrystalline wax (Cardis 262)
14.5 percent by weight heavy mineral oil

13.0 percent by weight light mineral oil
1.5 percent by weight sodium oleate
17.0 percent by weight 2-amino-5-naphthol-7-sulfonic acid (J acid)
25.0 percent by weight p-diazodiphenylamine sulfate

Example 5

12.0 percent by weight carnauba wax
17.0 percent by weight oxidized microcrystalline wax (Cardis 262)
14.5 percent by weight heavy mineral oil
13.0 percent by weight light mineral oil
1.5 percent by weight sodium oleate
25.0 percent by weight stabilized diazo oxide (Andrews #67)
17.0 percent by weight 2-amino-5-naphthol-7-sulfonic acid

Example 6

12.0 percent by weight carnauba wax
17.0 percent by weight oxidized microcrystalline wax (Cardis 262)
14.5 percent by weight heavy mineral oil
13.0 percent by weight light mineral oil
1.5 percent by weight sodium oleate
17.0 percent by weight 2-amino-5-naphthol-7-sulfonic acid
25.0 percent by weight p-diazo N N diethylaniline fluoborate

Example 7

12.0 percent by weight carnauba wax
17.0 percent by weight oxidized microcrystalline wax (Cardis 262)
14.5 percent by weight heavy mineral oil
13.0 percent by weight light mineral oil
1.5 percent by weight sodium oleate
17.0 percent by weight 2-amino-5-naphthol-7-sulfonic acid
25.0 percent by weight Edwal Diazolith #1 (polymer of diazotized p-aminodiphenylamine sulfate and formaldehyde as practiced by Schmidt et al. Stabilized with $ZnCl_2$)

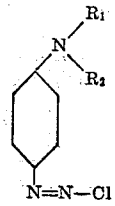
Compositions of the type described may be reduced to molten condition, as at temperatures of about 80–85° C., for application as a hot melt to form a transfer coating on a well filled paper base sheet. For the production of an imaging element, it has been found best to apply the composition to provide weights ranging from 10–20 pounds per 3,000 square feet of surface area.

While it is preferred to apply compositions of the type described as a hot melt, it is possible to dissolve the composition in suitable solvents, such as in toluene, benzene or other hydrocarbons for application as a solution preferably in concentrations ranging from 20–40 percent to form a coating or by impregnation to form a transfer ribbon or it is possible to disperse the ingredients in an aqueous medium for application as an emulsion in concentrations which may range up to 40–60 percent by weight solvents.

As for the particular ingredients, other waxes may be used as the base for the carrier. For example, use may be made in various combinations of carnauba wax, microcrystalline wax, paraffin wax, ozokerite, petroleum waxes and other natural, petroleum, coal tar, or vegetable waxes or synthetic waxes, alone or in combination with softening agents such as mineral oils, vegetable oils, fatty acids, fatty acid esters, hydogenated rosins and the like in various amounts depending on whether use is to be made thereof as a transfer coating or for impregnation of a typing ribbon or whether the coating is to be applied as a hot melt or from solvent solution or emulsion. Modification to improve the strength and the film forming characteristics of the base may include the addition of small amounts, such as up to 5 percent by weight, of such resinous materials as polyethylene, polybutene, or polymeric compounds compatible with the waxy or oily substances to form a stable composition. For use as a

hot melt, it is expedient to formulate the composition for reduction to molten conditions for coating at a temperature below 85° C. because of the limitations which higher temperatures would impose upon the selection of diazo compounds.

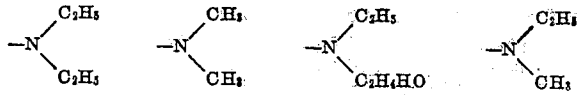
For the diazo component, it is preferred to make use of a group of alcohol and water soluble diazo compounds which have been classified as active compounds stable in neutral or acid medium but which show the reaction of diazo ions upon solution in water. These may be classified as (1) the diazo compounds which are stable as the corresponding diazonium sulphates or chlorides, such as p-diazo diphenylamine sulphate, (2) diazo compounds which are stabilized as the corresponding zinc chloride or other metallic chloride salt complexes, or (3) diazo compounds which are stabilized as salts of sulfonic acids or aryl sulfonic acids. The following structural formulae are representative of the general types of diazo compounds which may be used:



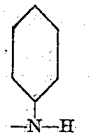
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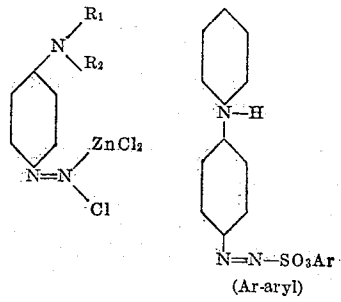
group comprises



and



The corresponding stabilized zinc chloride complexes or sulfonates of groups 2 and 3 above may be represented by the following typical formulae:



(Ar-aryl)

Couplers adapted to be used for combination with the diazo compounds in the practice of this invention should be capable of removal of a hydrogen ion for combination with the chloride ion of the diazo for dye formation. Such compounds are preferably selected of the organic aromatic compounds in the form of aromatic amines such as aniline or substituted aniline such as dimethylaniline, phenolic compounds such as phenol, resorcinol, phloroglucinol, 2,3-dihydroxy naphthalene, 6-sulfonic acid and water soluble salts thereof; thio compounds such as thiobarbituric acid, or cyano compounds such as cyanoacetamide; pyrazolone or derivatives.

For the production of a maximum number of copies, it is desirable to incorporate as high a concentration of diazo and coupler as possible into the composition consistent with the ability of the composition to embody the characteristics necessary for the manufacture of suitable transfer elements. Generally it is desirable to have an amount of diazo at least equivalent to one-half the amount of coupler but it is preferred that the amount of diazo be in excess thereof such as in proportions greater than 2 or 3 to 1. While it would be desirable, if possible, to incorporate the diazo and coupler in amounts greater than 75 percent by weight of the composition, the ability of the waxy components to function as suitable carriers depreciates when less than 25 precent thereof is used and it has been found best to maintain the concentration of diazo and coupler in excess of 30 percent by weight of the composition.

Where such active diazo compounds, stable in neutral or acid medium are used in combination with the coupler, it is only necessary to take precautions to avoid the premature addition of alkali capable of adjusting the pH of the coating composition to about 7. In fact, it is more expedient to protect against premature coupling by intentionally providing for an acidic medium by the addition of such acids as boric acid, tartaric acid, citric acid or acid salts such as aluminum sulphate, zinc chloride and the like to adjust the pH of the composition to the acid side preferably within a range below 3.5 but seldom lower than 1.5.

In use, a transfer sheet is formed with the compositions of Examples 1 or 2 or of other compositions corresponding thereto in which one or the other of the stabilized diazo compounds or couplers named may be substituted. The transfer sheet thus formed contains a transfer coating which is free of any color except for that which is characteristic of the diazo compound or the waxy substances but no dye color corresponding to conventional carbons exists in the coating composition.

The formed carbon may be placed with the coated side in surface contact with the master sheet and the coating composition may be caused to transfer to the surface of the master sheet by the application of pressure or impact in specified areas to form the mirror image thereon. To this point, an imaged master is formed as in conventional processes except that instead of containing a water and alcohol soluble dye capable of staining or dirtying the operator as an incidence to use, the imaged master is clean and substantially free of any dye color.

To form copy, the surface of the copy sheet is wetted as in conventional spirit duplication systems but instead of wetting the surface with a spirit solvent, the copy sheets are dampened with a spirit solvent containing a base such as ammonia, sodium hydroxide, or the like, but preferably an organic base such as diethanolamine, triethanolamine, etc. The spirit solvent causes transfer of a portion of the image from the master to the surface of the copy sheet where the hydrogen ion is adjusted by the base to enable coupling immediately to take place between the coupler and diazo to form the image as an azo dyestuff solely by reaction in the copy sheets. Thus, the only time that dye is formed in use of compositions of the type described is in the copy sheet where it is beyond the point of handling and the formed dyestuff is generally less water soluble than the basic aniline dyes now used so that relatively permanent copy of better quality is formed as an ultimate product. It will be apparent also that copy in a greater variety of colors can be secured than is now possible by the use of conventional water soluble basic aniline dyes and black copy can now be made available by the spirit duplicating system.

The following is representative of fluids which can be used for application to the copy sheets for the production of copy from masters imaged from compositions of the type described:

Example 8

3.0 percent by weight Cellosolve (ethylene glycol monoethyl ether)
8.0 percent by weight diethanolamine
10.0 percent by weight water
79.0 percent by weight methanol

Example 9

1.0 percent by weight sodium hydroxide
90.0 percent by weight methanol
9.0 percent by weight water

Example 10

2.0 percent by weight ammonium hydroxide
68.0 percent by weight methanol
30.0 percent by weight ethanol

A new and improved composition embodying features of this invention may also be formulated to contain only one of the azo dye forming components of the types described in the composition for producing the transfer element while the other component is contained with the base in the fluid for wetting the surface of the copy sheets. Reaction takes place as before between the component in the composition and the component in the fluid upon adjustment of the hydrogen ion concentration in the copy sheet to form the azo dyestuff upon transfer of the dye forming component from the imaged areas of the master. For example, compositions embodying features of this invention may be formulated to contain the stabilized diazo compound in combination with the wax carrier as represented by the following examples. In the absence of the coupler, any diazo stable under the heat and light conditions existing may be used, especially in neutral or acidic medium.

Example 11

8 percent by weight carnauba wax
11 percent by weight oxidized microcrystalline wax (Cardis 262)
3 percent by weight polybutene (Oronite 128)
6 percent by weight petrolatum
17 percent by weight mineral oil (100 seconds)
55 percent by weight p-diazo diethylaniline zinc chloride

Example 12

8.5 percent by weight carnauba wax
14.0 percent by weight oxidized microcrystalline wax
12.0 percent by weight dark petrolatum
15.5 percent by weight mineral oil (100 seconds viscosity)
50.0 percent by weight p-diazo-ethyl-hydroxy ethylaniline zinc chloride

Example 13

12.5 percent by weight carnauba wax
10.5 percent by weight microcrystalline wax
12.0 percent by weight petrolatum
15.0 percent by weight mineral oil
50.0 percent by weight p-diazo dimethylaniline zinc chloride

Example 14

19.0 percent by weight carnauba wax
25.0 percent by weight cetyl alcohol
14.0 percent by weight mineral oil
42.0 percent by weight p-diazo diethyl toluidine zinc chloride

Fluids which may be used in systems having imaging elements formed with the above compositions to form the image as an azo dyestuff by reaction in the copy sheets may be represented by the following:

Example 15

0.5 percent by weight phloroglucinol
5.0 percent by weight p-naphthol
2.0 percent by weight diethanolamine
92.5 percent by weight methanol

Example 16

5.0 percent by weight phenylmethyl pyrazolone
2.0 percent by weight diethanolamine
93.0 percent by weight methanol

Example 17

5.0 percent by weight 2,3-dihydroxy naphthalene, 6-sulfonic acid
8.0 percent by weight diethanolamine
10.0 percent by weight water
77.0 percent by weight methanol

Example 18

3.0 percent by weight phloroglucinol
2.0 percent by weight resorcinol
1.0 percent by weight sodium hydroxide
94.0 percent by weight ethyl alcohol

Example 19

5.0 percent by weight 2,3-dihydroxy naphthalene 6-sulfonic acid sodium salt
0.8 percent by weight sodium hydroxide
94.2 percent by weight methyl alcohol

With the composition of Example 11 the fluid of Example 15 will produce purple copy while the fluid of Example 16 will produce red copy and the fluid of Example 17 will produce blue copy.

Instead of compounding the composition to contain the diazo compound, the composition may be formulated to contain only the coupler with the diazo provided in the desired concentrations in the fluid as represented by the following compositions:

Example 20

8.5 percent by weight carnauba wax
14.0 percent by weight oxidized micro wax
12.0 percent by weight petrolatum
15.5 percent by weight mineral oil
50.0 percent by weight phloroglucinol

Example 21

5.0 percent by weight carnauba wax
20.0 percent by weight micro wax
15.0 percent by weight paraffin wax
15.0 percent by weight petrolatum
35.0 percent by weight phloroglucinol
10.0 percent by weight triethanolamine

The following is representative of fluids which can be used with the above compositions:

Example 22

2.0 percent by weight p-diazo diethylaniline zinc chloride
98.0 percent by weight methanol

By way of modification, compositions of the types described, instead of containing a diazo compound, may be formulated by containing passive materials which may be diazotized to form an active diazo capable of immediate coupling with a coupler embodied therewith or in the fluid system to form the azo dyestuff by reaction in the copy sheet. For example, instead of the stabilized diazo in systems of the type described, use may be made of an amine and a nitrite which upon acidification reacts to form an active diazo for immediate coupling to form the dyestuff. This may be illustrated by the following compositions:

Example 23

45.0 percent by weight 1-amino,2-naphthol, 4-sulfonic acid
15.0 percent by weight sodium nitrite
5.0 percent by weight carnauba wax
10.0 percent by weight microcrystalline wax
25.0 percent by weight mineral oil

A fluid composition for use with the above to form an azo dyestuff in the copy sheets may be illustrated by the following:

Example 24

4.0 percent by weight methylphenyl pyrazolone
2.0 percent by weight lactic acid
94.0 percent by weight methyl alcohol

Further compositions for producing the transfer medium may include the following:

Example 25

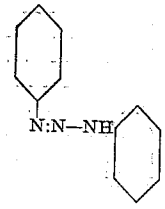
25.0 percent by weight 1-amino, 2-naphthol, 4-sulfonic acid
20.0 percent by weight phloroglucinol
15.0 percent by weight sodium nitrite
5.0 percent by weight carnauba wax
10.0 percent by weight microcrystalline wax
25.0 percent by weight mineral oil

A fluid for use in combination therewith may contain the following:

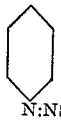
Example 26

3.0 percent by weight lactic acid
90.0 percent by weight methyl alcohol
7.0 percent by weight water

Use may be made of passive diazo compounds stable in neutral or alkaline solution and requiring an acid medium in order to regenerate the diazo compound which may include (1) metallic salts of the acid isomeric forms of the diazo compounds such as the isodiazotates or nitrosamines, (2) diazo amino and diazo imino compounds represented by the structural formula



or (3) diazo sulfonates such as



However, the stable diazo sulfonates from p-phenylene diamine and its derivatives are reactive enough to couple in the previously described and preferred alkaline system if the one nitrogen is alkylated.

The following examples embody passive diazo systems in a composition embodying features of this invention for use in preparing imaging elements:

Example 27

12.0 percent by weight carnauba wax
17.0 percent by weight oxidized microcrystalline wax (Cardis 262)
14.5 percent by weight heavy mineral oil
13.0 percent by weight light mineral oil
1.5 percent by weight sodium oleate
42.0 percent by weight Du Pont Diagen Black CM

Example 28

12.0 percent by weight carnauba wax
17.0 percent by weight oxidized microcrystalline wax (Cardis 262)
14.5 percent by weight heavy mineral oil
13.0 percent by weight light mineral oil
1.5 percent by weight sodium oleate
42.0 percent by weight Du Pont Diagen Blue MGD (tetrazo of dianisidine stabilized with glucosamine and containing o-phenetidine as the coupler)

Example 29

25.0 percent by weight p-diazochlorobenzene potassium sulfonate
17.0 percent by weight 2-amino-5-naphthol-7-sulfonic acid
14.5 percent by weight heavy mineral oil
13.0 percent by weight light mineral oil
1.5 percent by weight sodium oleate
12.0 percent by weight carnauba wax
17.0 percent by weight oxidized microcrystalline wax

The fluid medium with which the copy sheets are wet to enable the coupling reaction to take place to form the dyestuff in the copy sheets may have the following formulation:

Example 30

10 percent by weight lactic acid
90 percent by weight methanol

It will be apparent from this description that a new and improved composition for use in the manufacture of imaging elements in the production of a clean hectograph and spirit duplicating process has been provided. In the absence of any dye component in the treating composition, preparation and use thereof to form the imaging element presents none of the problems characteristic of prior processes. Until the dye is formed by reaction in the copy sheets the elements formed by the use of compositions of the type described and claimed herein remain completely clean and free of any possibilities of causing staining or contamination of persons or materials which might come in contact therewith as an incidence to normal use.

It will be understood that compositions of the type described and claimed may be used in the practice of hectographic duplicating systems as well as in the spirit systems described.

As used herein, the term "waxy" as used to define the carrier is meant to include mineral, vegetable, coal tar, petroleum and synthetic waxes used alone or in combination with oils, fatty acids or other plasticizers for adjustment to desired consistencies.

It will be further understood that changes may be made in the details of formulating the composition and application to form the desired imaging element without departing from the spirit of the invention, especially as defined in the following claims.

This application is a continuation-in-part of application Serial No. 287,616, filed May 13, 1952, now Patent No. 2,748,024, issued May 29, 1956.

We claim:

1. A composition for use in the preparation of an imaging element in spirit and hectograph type duplicating processes comprising a wax based carrier, a water and alcohol soluble dye forming diazo which is substantially free of any dye color, and a coupler capable of reaction with the diazo to form an azo dyestuff upon adjustment of the hydrogen ion concentration.

2. A composition for use in the preparation of an imaging element in spirit and hectograph type duplicating processes comprising a wax based carrier, a water and alcohol soluble stabilized dye formng diazo substantially free of any dye color, a coupler capable of reaction with the diazo to form an azo dyestuff upon adjustment of the hydrogen ion concentration to the alkaline side, the composition having a hydrogen ion concentration which prevents coupling until transferred to the copy sheets during the duplicating process.

3. A composition for use in the preparation of an imaging element in spirit and hectograph type duplicating processes comprising a wax based carrier, a water and alcohol soluble stable dye forming diazo substantially free of any dye color, a water and alcohol soluble coupler capable of reaction with the diazo to form an azo dyestuff, and an acidic medium for adjusting the composition to the acid side so as to prevent coupling reaction between the diazo and coupler, the total amount

of diazo and coupler being present within the range of 30–75 percent by weight of the composition.

4. A composition as claimed in claim 3 in which the diazo is an active and stabilized diazo selected from the group consisting of diazonium sulphates, diazonium chlorides, diazo zinc chloride complexes and diazo salts of sulfonic and aryl sulfonic acids.

5. A composition for use in the preparation of an imaging element in spirit type duplicating processes comprising a wax base containing a water and alcohol soluble diazo and a water and alcohol soluble coupler capable of reaction with the diazo upon adjustment of the composition to the alkaline side to form an azo dyestuff, the coupler and diazo being present in the ratio of 1 part by weight coupler to ½–3 parts by weight diazo with the total amount of diazo and coupler being present within the range of 30–75 percent by weight of the composition.

6. A composition for use in the preparation of an imaging element in spirit and hectograph type processes comprising a wax based carrier containing a high concentration of a water and alcohol soluble component of an azo dyestuff which in itself does not constitute a dye and is substantially free of any dye color.

7. A composition for use in the preparation of an imaging element in spirit and hectograph type duplicating processes comprising a wax based carrier and from 30–75 percent by weight of a water and alcohol soluble component of an azo dyestuff which in itself does not constitute a dye but is capable of forming the azo dye by reaction with a coupler in copy sheets.

8. A composition for use in the preparation of an imaging element in spirit and hectograph type duplicating processes comprising a wax based carrier containing from 30–75 percent by weight of a water and alcohol soluble dye forming diazo substantially free of any dye color but capable of forming an azo dye by reaction with a coupler in copy sheets.

9. A composition for use in the preparation of an imaging element in spirit and hectograph type duplicating processes comprising a wax based carrier containing from 30–75 percent by weight of a water and alcohol soluble coupler substantially free of any dye color and capable of reaction with a diazo to form an azo dyestuff.

10. A composition for use in the preparation of an imaging element in spirit duplicating processes comprising wax as a base containing a passive dye forming diazo stable in alkaline medium and a coupler capable of reaction with the diazo upon adjustment of the composition to the acid side to form an azo dyestuff.

11. A composition for use in the preparation of an imaging element in spirit type duplicating processes comprising a base formed of wax containing a coupler capable of reaction with a diazo compound to form an azo dyestuff and a passive dye forming diazo compound soluble in a medium selected from the group consisting of water and alcohol and mixtures thereof and incapable of reaction with the coupler on the alkaline side but capable of reaction therewith to form an azo dyestuff upon adjustment of the pH to the acid side, the coupler and the diazo being present in the ratio of 1 part by weight coupler to ½–3 parts by weight diazo coupler.

12. A composition for use in the preparation of an imaging element in spirit type duplicating processes comprising wax as a base containing a passive dye forming diazo compound stable while on the alkaline side and capable of reaction with a coupler to form an azo dyestuff upon adjustment of the pH to the acid side, said diazo compound being soluble in a medium selected from the group consisting of water and alcohol and mixtures thereof.

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