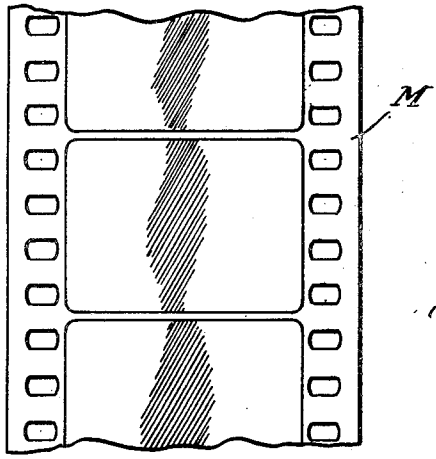
Oct. 24, 1950 J. R. CLARK, JR 2,526,995

IMBIBITION PRINTING

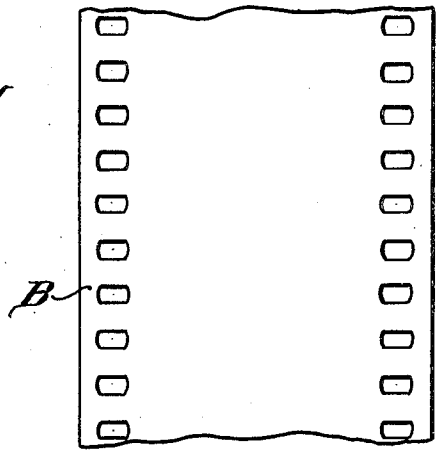
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Fig. 1



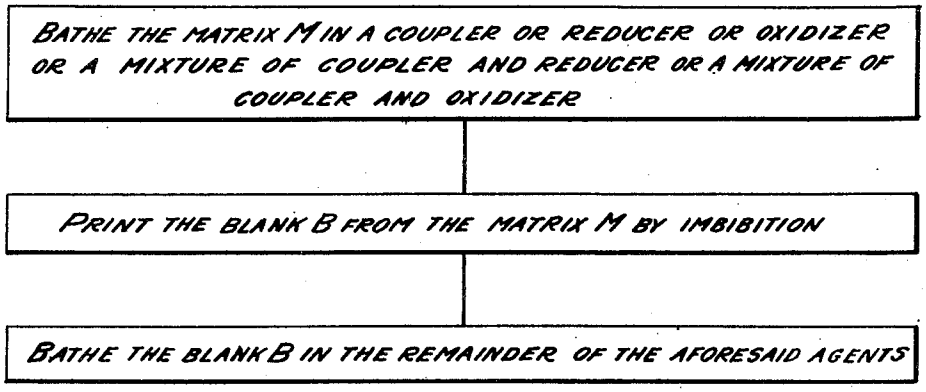
DIFFERENTIALLY ABSORPTIVE PRINTING MATRIX REPRESENTING ONE COLOR ASPECT OF THE SCENE

Fig. 2



ABSORPTIVE BLANK FILM

Fig. 3



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IMBIBITION PRINTING

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15 Claims. (Cl. 101—149.1)

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In the art of printing color pictures by imbibition it is often difficult to find suitable dyes. While dyes are available in an almost unlimited range of hues many of them are unsuitable for imbibition printing.

Objects of the present invention are to increase the range of hues available for imbibition printing and to provide a method of imbibition printing which permits the use of coloring agents other than the dyes heretofore used for the purpose.

The present invention utilizes the well-known principle of forming the coloring matter in the film by means of a color former or coupler, instead of introducing it into the film in the form of a dye, the coloring matter being formed in the film by reaction between the coupling agent and a reducing agent in the presence of an oxidizing agent.

According to the present invention one of the agents, or two of the agents mixed together, are printed on an absorptive film from a printing matrix having the one agent or the mixture of two agents distributed throughout its area in accordance with the lights and shadows of the picture, and then bathing the film with the remainder of the agents, that is with the remaining one of the agents in the case of printing a mixture of two agents by imbibition or with the other two of the agents in the case only one is printed by imbibition. In case two of the agents are applied by bathing the film may be bathed first in one and then the other or it may be bathed in a mixture of the two. The coupling agent must be present when the other two react; this can be accomplished in any one of the following ways:

1. Print the coupler by imbibition, then bathe with the reducer and then bathe with the oxidizer.

2. Print the coupler by imbibition, then bathe with the oxidizer and then bathe with the reducer.

3. Print by imbibition with a mixture of the coupler and reducer and then bathe with the oxidizer.

4. Print by imbibition with a mixture of the coupler and oxidizer and then bathe with the reducer.

5. Print the reducer by imbibition, then bathe with the coupler and then bathe with the oxidizer.

6. Print the reducer by imbibition and then bathe with a mixture of the coupler and oxidizer.

7. Print the oxidizer by imbibition, then bathe with the coupler and then bathe with the reducer.

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8. Print the oxidizer by imbibition and then bathe with a mixture of the coupler and reducer.

The third procedure is recommended.

For the purpose of illustration the procedure is indicated in the accompanying drawings in which

Fig. 1 indicates a differentially absorptive matrix M representing one color aspect of a scene;

Fig. 2 indicates the absorptive blank film; and

Fig. 3 indicates successive steps of the process.

The printing matrix may be rendered differentially absorptive in accordance with the lights and shadows of the picture in any one of the ways well-known in the art of imbibition printing. In printing a plurality of color aspects in superposition, as in a three-color process, the other color aspects may be printed in the same way or by ordinary imbibition printing technique or in any other known way. When only one color aspect is printed according to the present invention, it is preferably printed first and the other color aspects are then preferably printed by ordinary imbibition procedure. When more than one color aspect is printed according to the present invention the blank film should of course be thoroughly washed between successive printings so that the agents used in one printing will not affect a succeeding printing. In referring to a blank film it will of course be understood that the film need not be entirely blank. For example it may carry a key print in the form of a gray picture, or it may carry a sound-track, or it may carry both a key print and a sound-track.

While many coupling, reducing and oxidizing agents may be used in the process the following are a few typical examples:

1. Coupling agents:
   - *a.* Alpha naphthol
   - *b.* 2,4 dichloro-1-naphthol
   - *c.* Thymol
   - *d.* Ortho hydroxy diphenyl
   - *e.* 4,6-dibromorthocresol
2. Reducing agents:
   - *a.* 2-amino-5-diethyl amino toluene hydrochloride
   - *b.* Diethylparaphenylene diamine
   - *c.* Dimethylparaphenylene diamine
   - *d.* Paratoluylene diamine
3. Oxidizing agents:
   - *a.* Potassium permanganate
   - *b.* Sodium hypochlorite
   - *c.* Sodium hypobromite
   - *d.* Potassium ferricyanide

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims. For example the invention may be employed in printing sound-tracks as well as pictures.

I claim:

1. In the art of producing a color picture by reaction between a dye-producing coupling agent and a reducing agent consisting essentially of an aromatic amine, in the presence of an oxidizing agent, the method which comprises printing by imbibition on an absorptive film from a printing matrix having one or two of the agents distributed throughout its area in accordance with the lights and shadows of the picture, and then bathing the film with the remainder of the agents, so that said coupling agent first reacts with one of the other two agents and the other of said two agents then reacts with the reaction product of said coupling agent and said one of the other two agents, thereby forming the coloring matter in the printed film when the film is bathed.

2. In the art of producing a color picture by reaction between a dye-producing coupling agent and a reducing agent consisting essentially of an aromatic amine, in the presence of an oxidizing agent, the method which comprises printing by imbibition on an absorptive film from a printing matrix having one or two of the agents distributed throughout its area in accordance with the lights and shadows of the picture, and then bathing the film with the remainder of the agents, the coupling agent being applied to the film before the other two react together, thereby forming the coloring matter in the printed film when the film is bathed.

3. In the art of producing a color picture by reaction between a coupling agent and a reducing agent in the presence of an oxidizing agent, the method which comprises printing by imbibition on an absorptive film from a printing matrix having one or two of the agents distributed throughout its area in accordance with the lights and shadows of the picture, and then bathing the film with the remainder of the agents, the coupling agent being present when the second of the other two agents is applied to the film, thereby forming the coloring matter in the printed film when the film is bathed.

4. The method according to claim 1 further characterized in that both the coupling and the reducing agents are applied to the film before the oxidizing agent.

5. The method according to claim 2 further characterized in that both the coupling and the reducing agents are applied to the film before the oxidizing agent.

6. The method according to claim 3 further characterized in that both the coupling and the reducing agents are applied to the film before the oxidizing agent.

7. The method according to claim 1 further characterized in that the coupling and reducing agents are mixed together before being applied to the film.

8. The method according to claim 2 further characterized in that the coupling and reducing agents are mixed together before being applied to the film.

9. The method according to claim 3 further characterized in that the coupling and reducing agents are mixed together before being applied to the film.

10. The method according to claim 1 further characterized in that the coupling and oxidizing agents are mixed together before being applied to the film.

11. The method according to claim 2 further characterized in that the coupling and oxidizing agents are mixed together before being applied to the film.

12. The method according to claim 3 further characterized in that the coupling and oxidizing agents are mixed together before being applied to the film.

13. The method according to claim 1 further characterized in that each agent is applied to the film separately.

14. The method according to claim 2 further characterized in that each agent is applied to the film separately.

15. The method according to claim 3 further characterized in that each agent is applied to the film separately.

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