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LIGHT POLARIZING BODIES AND METHOD OF PRODUCING SAME

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This invention relates to the manufacture of light polarizing elements comprising transparent media in which light polarizing particles are dispersed in uniform orientation.

The invention particularly deals with the production of light polarizing foils in which the light polarizing particles dispersed in the transparent medium are oriented under the influence of mechanical, electric or magnetic forces.

Light polarizing elements of this type have been produced up to now by dissolving the transparent media, as for instance, cellulose derivatives in which the polarizing particles are to be retained in suitable solvents. The light polarizing particles, as for instance, herapathite, or other double fraction and dichroitic substances, were dispersed in these solutions and the liquid compounds produced in this manner were poured by suitable pouring devices upon bases of the required type. Uniform orientation, required for the polarization of light, is then brought about by causing mechanical, electrical or magnetic forces to act on the polarizing particles in these liquid compounds, and finally the liquid compounds thus treated are converted into solid light polarizing elements by evaporating the solvents.

In carrying out the process as outlined above, it has been found that owing to the evaporation of the solvents during the complete stage of orientation, strata or areal portions of a viscosity different from that of the remainder of the liquid may be produced within the very liquid compounds containing the polarizing particles. These conditions are encountered particularly when solvents of high volatility are employed.

The presence of layers or films of differential viscosity exerts an influence upon the orientation of the particles owing to the creation of shearing forces within the liquid. It may even lead to the production of areas filled with non-oriented particles in the polarizing bodies. Such areas containing non-oriented polarizing particles, occur especially whenever pieces of these surface films tear off and drop directly upon the pouring base.

The light polarizing elements produced while proper orientation of the particles was impeded through the formation of strata or films of differential viscosity are of poorer quality and lower commercial value.

It has been discovered that the formation of these films or the formation of surface layers of differential viscosity in the liquid carrier mass of light polarizing particles may be avoided during the stage of orientation, thereby also enhancing the commercial value of the product, by causing the orientation of the light polarizing particles to take place in an atmosphere which has been enriched or is permeated by vapors of the solvents contained in the liquid carrier or of one or more of the ingredients of the same,—in which case then a formation of films on the surface of the liquid does not occur and areas of differential viscosity are not formed.

The invention, therefore, deals with the production of light polarizing elements from carrier solutions of transparent media containing light polarizing particles in dispersion and in which the said light polarizing particles oriented by mechanical, electric or magnetic forces, the production taking place in an atmosphere which has been enriched or permeated by the solvents contained in the liquid carrier, or by one or more ingredients of said solvents, in such manner that the formation of surface layers or films of differential viscosity is prevented during the orientation.

The invention also includes the light polarizing elements themselves, particularly light polarizing foils produced by the method referred to.

This method of production, according to the invention, furnishes uniform, contiguous or self-contained light polarizing elements, particularly foils of excellent quality. The method can be performed in different ways. It is not subject to the employment of any particular apparatus.

For instance, the pouring machine of any well known or desired construction may be provided, at those points at which the mechanical, electrical or magnetic forces causing orientation, become effective, with open chambers or with closed chambers surrounding the transparent liquid carrier mass in which the polarizing particles are dispersed. These chambers may be provided with means for inducing evaporation of the solvents. Loose bulk material of large surface extent, as cotton batting, cellulose, kieselguhr and the like, or even chunks or blocks of higher porous material may be positioned in these chambers so as to be accessible to penetration by the liquid carrier. These materials are then saturated with the solvents or with its more readily volatile ingredients respectively. Care must be taken, however, that the solvents or ingredients which evaporate are continuously renewed by suitable devices.

A further example of carrying out the process includes the steps of conveying gases, as air, nitrogen, carbon dioxide and the like, charged with the solvent vapors over the fluids while the ori-

entation of the light polarizing particles within these liquid carriers takes place. The conveyance of these gases over the fluid masses advisably takes place at the temperature of the latter.

While the described process is applicable to the production of various light polarizing bodies, particularly foils it has been proven to be of especial value in making light polarizing bodies by pouring the liquid transparent carrier of polarizing particles upon a base, and causing the mass leaving the pouring slot not to be applied directly to the pouring base, but maintaining the poured liquid in free suspension over a relatively great drop between the pouring point and the base, before applying it to the base.

The invention is not restricted to the examples indicated solely for the purpose of illustration. It includes all methods by which the light polarizing bodies are produced from transparent solutions of media containing light polarizing particles within an atmosphere which has been charged or even saturated with the solvents contained in the carrier or with one or more of the ingredients of said solvents respectively, the entire process being carried out in such manner that the formation of layers or films of differential viscosity is prevented on the surface during the orientation process.

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