This invention relates to a process for the manufacture of noncurling films. All films which are cast upon the usual drum or band machines, after drying curl up more or less considerably. Since the evaporation of the solvent from the film when on the carrier can only take place through the air side and in addition the heating temperatures are obviously not uniform on the wheel side and the air side, the content of the film of solvents, swelling and softening agents, nonsolvents and so on on each side of the film is different and stresses occur in the film which cause the curling.

Attempts have already been made in various ways to remove these stresses. For example the film has been subjected uniformly on both sides to the action of solvents and the action interrupted before the film has become strongly attacked (French Patent No. 552,258). An attempt has also been made to avoid the curling in such a manner that the films have been dried on both sides at different temperatures by means of heated metal cylinders (English Patent No. 436,764). These processes have, however, had no uniformly successful result.

The subsequent action of solvents in liquid or vapour form is certainly suited in principle to the avoidance of stresses in the film, but the effect must be controlled. There is, in particular, the danger that the mechanical properties of the film may suffer on this treatment since the film becomes swollen to a considerable extent.

In the following a treatment according to the present invention is described which with complete preservation of the film allows of the removal of the stresses produced on casting and thereby also the curling of the film. For this purpose the film is treated on both sides with different solvents and indeed with solvents which only possess a limited solvent capacity for the film, the air side being more strongly swollen or dissolved. The selection of the solvent depends upon the conditions under which the film has been cast. If in the casting one side has been particularly strongly heated then also the solvent capacity of the solvent employed for the different sides must differ considerably. The adjustment of the solvent capacity of the solvent must therefore be carried out very carefully and is best attained by suitable combination of a solvent with a nonsolvent. For the case in which one of the two components is of low boiling point care must be taken that the solvent capacity of the solvent does not change due to fractional evaporation of one component. This can be attained for example in such a manner that the solvent mixture is maintained at as low a temperature as possible or that by circulation by pumping with the addition of the more rapidly evaporating constituent, it is maintained at the desired composition.

The wetting with the solvent can take place by dipping of one side of the film over rollers or also by rinsing. Thereupon the film can for example by means of warm air be uniformly dried on both sides.

In the case of such films as for photographic purposes for the purpose of the so-called substratum must have a gelatine intermediate layer, the above process can in practice be combined in one working operation with the coating with gelatine in such a manner that the gelatine with addition of small quantities of gelatine solvent is dissolved in a suitable solvent mixture.

The following examples illustrate the invention:

**Example 1.**

A cellulose triacetate film with a strong tendency to curl towards the wheel side is treated as follows: the wheel side is rinsed with a solvent mixture which contains 61 volumes per cent of methylene chloride and 39 volumes per cent of methanol, whereas the air side is treated with a mixture which contains 70.5 volumes per cent of methylene chloride and 29.5 volumes per cent of methanol. The temperature of the mixture is maintained at 15°C; the speed of running through of the film amounts to 5 metres per minute.

**Example 2.**

Gelatine is swelled in about 4 times the quantity of water, the swollen gelatine dissolved in glacial acetic acid and subsequently methyl alcohol added. A film of nitrocellulose is coated with this solution in such a manner that for the wheel side the solution contains 0.5% gelatine, 2% of water, 48% glacial acetic acid and 50% methyl alcohol and for the air side 0.5% gelatine, 2% water, 28% glacial acetic acid, 70% methyl alcohol.

By the term "swelling agents" as used herein it is intended to cover not only those agents the solvent power of which is insufficient to more than just cause swelling of the film, but the term also includes solvents of limited solvent capacity for the film, as well as mixtures of solvents with true swelling agents and mixtures of one or both with nonsolvents. It is important that the agents used be capable of affecting the film but inca...
pable of dissolving it under the conditions of the treatment.

What I claim is:

1. The method of treating films from cellulose triacetate for the purpose of rendering the same noncurling comprising treating the wheel side of the film with an about 6:4 mixture of methylene chloride and methanol and the air side of the film with an about 7:3 mixture of methylene chloride and methanol, followed by drying the film.

2. Method as claimed in claim 1 in which the film is treated continuously at the rate of about 5 metres per minute.

3. The method of treating a film of nitrocellulose comprising coating the same on the wheel side with a solution containing 0.5% gelatine, 2% water, 45% glacial acetic acid and 50% methyl alcohol and on the air side with a solution containing 0.5% gelatine, 2% water, 28% glacial acetic acid and 70% methyl alcohol, followed by drying the film.

4. A method of treating films obtained from high molecular weight film-forming cellulose esters for the purpose of rendering the same noncurling which comprises treating the air side of said film with a mixture of solvents and nonsolvents and also treating the wheel side thereof with a mixture of solvents and nonsolvents, the mixture applied to the air side having the greater solvent power, and thereafter drying said film.

5. A method of treating films obtained from high molecular weight film-forming cellulose triacetate for the purpose of rendering the same noncurling which comprises treating the air side of said film with a mixture of solvents and nonsolvents, the mixture applied to the air side having the greater solvent power, and thereafter drying said film.

6. A method of treating films obtained from high molecular weight film-forming cellulose triacetate for the purpose of rendering the same noncurling which comprises treating the air side of said film with a mixture of solvents and nonsolvents and also treating the wheel side thereof with a mixture of solvents and nonsolvents, the mixture applied to the air side having the greater solvent power, and thereafter drying said film.

7. A method of treating films obtained from high molecular weight film-forming cellulose triacetate for the purpose of rendering the same noncurling which comprises treating the air side of said film with a mixture of methylene chloride and methanol and also treating the wheel side thereof with a mixture of methylene chloride and methanol, the mixture applied to the air side having the greater solvent power, and thereafter drying said film.

8. A method of treating films obtained from high molecular weight film-forming cellulose esters for the purpose of rendering the same noncurling which comprises treating the air side of said film with a mixture of solvents and nonsolvents and also treating the wheel side thereof with a mixture of solvents and nonsolvents, the mixture applied to the air side having the greater solvent power, one of said mixtures containing gelatine dissolved therein to provide a gelatine layer on the emulsion side of said film, and thereafter drying said film.

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