PATENT SPECIFICATION 726,181

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Index at Acceptance :—Class 70, E6(A : G).

COMPLETE SPECIFICATION.

Improvements in the Drying of Natural Rubber Coagulum.

We, THE BRITISH RUBBER PRODUCERS' RESEARCH ASSOCIATION, a Body Corporate duly organised under the laws of Great Britain, of 19 Fenchurch Street, London, E.C.3 (a communication from MAURICE WOODALL PHILPOTT and ARTHUR WALKER, British Subjects, of The Rubber Research Institute of Malaya, Kuala Lumpur, Federation of Malaya), do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement :—

This invention relates to the drying of natural rubber coagulum and has more especial reference to the treatment of rubber latex to accelerate or facilitate drying.

In the preparation of sheet rubber, latex is first converted into a coagulum by the addition of acids or other coagulants. After pressing out much of the water and non-rubber constituents of the latex serum by mechanical pressing or rolling, the coagulum is hung in a drying chamber to dry.

The rate of drying depends mainly on the temperature and humidity of the atmosphere in the drying chamber. Loss of water is relatively rapid down to a water content of 10 per cent. Thereafter the rate diminishes because the drying process is then controlled by the rate at which water diffuses from the centre of the coagulum to the outer surface.

The transfer of moisture through a sheet of coagulum or wet rubber is believed to take place through a network composed of the nitrogenous and other non-rubber constituents associated with the rubber. It is well-known, for example, that coagulum obtained from latex which has been specially purified by the removal of proteins dries more slowly than does normal coagulum.

It has now been found that by adding to latex certain chemical agents before coagulation the rate of drying can be greatly accelerated. Since the agents which produce this effect are known also to be protein precipitants or tanning agents it seems probable that they act by altering the condition of the protein network of the coagulum, reducing its water-holding capacity.

Among the agents which, according to the present invention, have been found to accelerate the drying of coagulum are formaldehyde, salts of heavy metals such as lead, chromium and zinc, and urea or vegetable or synthetic tanning agents.

The agent is preferably added as a dilute solution to field latex prior to coagulation.

To illustrate the improved rate of drying obtained when these agents are employed, field latex (diluted to a rubber content of 15 parts dry rubber per 100 parts by dilute latex) was divided into several portions, and to each portion was added a solution of the chemical agent under test. The latices were then coagulated under identical conditions with formic acid, machined on the following day into sheets $\frac{1}{8}$" thick, and dried in (I) a warm air chamber at 50° C. or (II) a standard type smoke-drying house. The number of days for each sheet to dry completely is shown in the following table :—

[*Price 2s. 8d.*]

Price 3s. 0d.

Expt.	Addition.	Amount per cent based on dry rubber.	Time of drying days.
I	None	—	8
	Urea	0.25	5
	Lead acetate	0.25	5
	Zinc sulphate	0.25	5
II	None	—	4½
	Zinc sulphate	0.25	3
	Formaldehyde	0.10	3
	Formaldehyde	0.20	2½
	Zinc sulphate + ...	0.10 +	3
	Formaldehyde	0.10	

With normal coagulum blistering occurs if the drying temperature exceeds 55° to 60°, but with treated coagulum temperatures as high as 65° can be used without risk of blistering.

By accelerating the rate of drying the producer is enabled to dry a given crop in a smaller drying house, and his product is less liable to attack by mildews or mould. In continuous processes for converting latex into dry rubber it is also an advantage to cut down the drying time.

What we claim is :—

1. A process for the accelerated drying of natural rubber coagulum from latex consisting in adding to the latex prior to coagulation a small proportion of a protein precipitant or tanning agent as a dilute solution and, after coagulation of the rubber, drying the treated coagulum in warm air or smoke at 50—65° C.

2. A process according to the preceding claim wherein the protein precipitant or tanning agent consists of formaldehyde, or urea or salts of heavy metals such as lead, chromium and zinc, or vegetable or synthetic tanning agents.

3. A process for the accelerated drying of rubber coagulum substantially as described.

4. Rubber when treated and dried by the process substantially as described.

Dated this 3rd day of April, 1950.

O'DONNELL, LIVSEY & CO.,
Chartered Patent Agent,
47 Victoria Street, London, S.W.1.

PROVISIONAL SPECIFICATION.

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This invention relates to the drying of natural rubber coagulum and has more especial reference to the treatment of rubber latex to accelerate or facilitate drying.

In the preparation of sheet rubber, latex is first converted into a coagulum by the addition of acids or other coagulants. After pressing out much of the water and non-rubber constituents of the latex serum by mechanical pressing or rolling, the coagulum is hung in a drying chamber to dry.

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It has now been found that by adding to latex certain chemical agents before coagulation the rate of drying can be greatly accelerated. Since the agents which produce this effect are known also to be protein precipitants or tanning agents it seems probable that they act by altering the condition of the protein network of the coagulum, reducing its water-holding capacity.

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2. A process according to the preceding claim wherein the protein precipitant or tanning agent consists of formaldehyde, or urea or salts of heavy metals such as lead, chromium and zinc, or vegetable or synthetic tanning agents.

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Among the agents which, according to the present invention, have been found to accelerate the drying of coagulum are formaldehyde, salts of heavy metals such as

lead, chromium and zinc, and urea or vegetable or synthetic tanning agents.

The agent is preferably added as a dilute solution to field latex prior to coagulation.

To illustrate the improved rate of drying obtained when these agents are employed, field latex (diluted to a rubber content of 15 parts dry rubber per 100 parts of diluted latex) was divided into several portions, and to each portion was added a solution of the chemical agent under test. The latices were then coagulated under identical conditions with formic acid, machined on the following day into sheets $\frac{1}{8}$" thick, and dried in (I) a warm air chamber at 50° C. or (II) a standard type smoke-drying house. The number of days for each sheet to dry completely is shown in the following table :—

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	Lead acetate	0.25	5
	Zinc sulphate	0.25	5
II	None	—	$4\frac{1}{2}$
	Zinc sulphate	0.25	3
	Formaldehyde	0.10	3
	Formaldehyde	0.20	$2\frac{1}{2}$
	Zinc sulphate }	0.10 }	3
	Formaldehyde }	0.10 }	

An alternative method of applying the reagent is to soak ordinary machined coagulum in e.g. a solution of 2% formaldehyde or heavy metal salt, and a secondary effect of treating rubber coagulum with the protein reagents herein specified is to raise the maximum safe temperature of drying. With normal coagulum blistering occurs if the drying temperature exceeds 55° to 60° ; but with treated coagulum temperatures as high as 65° C. can be used without risk of blistering.

By accelerating the rate of drying the producer is enabled to dry a given crop in a smaller drying house, and his product is less liable to attack by mildews or mould. In continuous processes for converting latex into dry rubber it is also an advantage to cut down the drying time.

It will be appreciated that the invention comprehends any process involving the addition of a protein precipitant, denaturant or tanning agent to latex or rubber in such manner as to accelerate the drying of the coagulum.

Dated this 1st day of April, 1949.

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J.D.

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