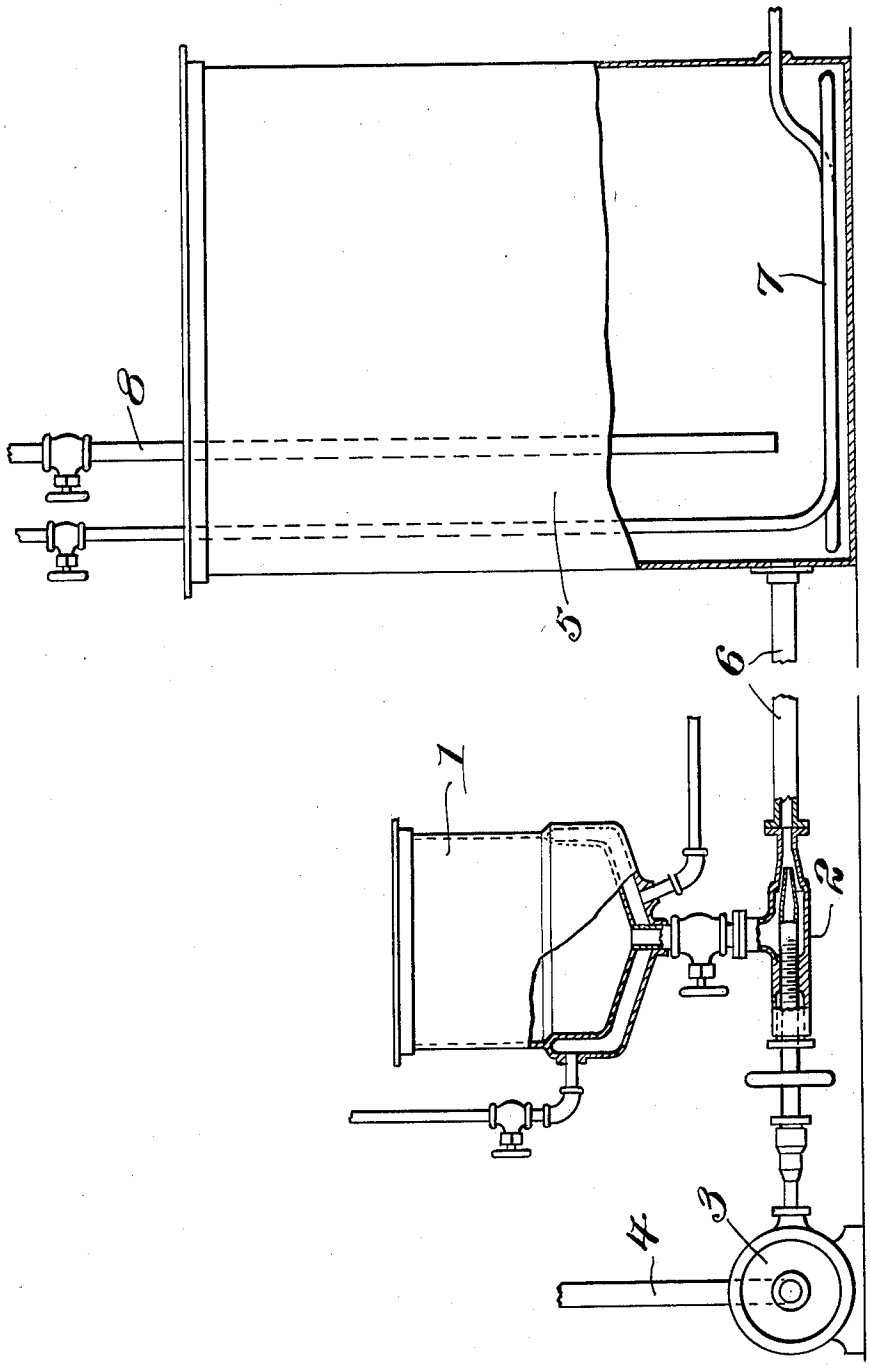
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METHOD OF MAKING ROSIN SIZE

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Inventor
Judson A. DeCew

By Spear Middleton Donaldson & Hall

ATTORNEY

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METHOD OF MAKING ROSIN SIZE

Judson A. De Cew, Mount Vernon, N. Y., assignor to Process Engineers, Inc., New York, N. Y., a corporation of New York

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The universal method for making rosin size for paper mills is to boil the rosin in a solution of sodium carbonate until a large portion of the rosin acids are formed into a rosin soap and the alkali is practically neutralized and the carbonic acid has been driven off in the boiling process. If this size is not soluble in cold water, it is generally dissolved by the use of some special emulsifying device by means of which it is put into dilute solution in water. Attempts have been made to saponify rosin by boiling it in a strong solution of caustic soda or potash, but when this is done the saponification generally results in a hydrolysis of the rosin soap so that it forms a gell like mass that is so stiff and viscous that it cannot be used to advantage.

A gelled size having a water content of 40 or 50% of water cannot be melted for packaging in drums and cannot be emulsified by the ordinary processes.

A rosin size made with rosin and caustic soda has certain advantages, however, owing to the solubility, and owing to the fact that such a size has more stability than one made with sodium carbonate.

Methods have been described in which the rosin has been partially saponified with a cold dilute solution of caustic soda circulated over lumps of rosin, and in this way the extreme reactions resulting from boiling with the caustic soda are avoided. Without heating, however, such reactions are not complete.

I have invented a new process of saponification which does not boil this rosin in the caustic alkali nor does it require the expensive installation or the length of time used in cold saponification. In fact, I find that the best temperatures for saponifying this alkali are below the boiling point and that the saponification should take place in a more dilute solution, the best concentration being between 4% and 10% rosin to the amount of water used. The principle of my process is that I first emulsify the rosin and then saponify it. The first function of the alkali is to act as an emulsifier, and the second step is to combine with the rosin acids. It is much easier to saponify in emulsion of rosin than it is a solid rosin. I now describe this process as follows in connection with the accompanying drawing in which the figure shows in conventional manner apparatus suitable for carrying out the process.

I first melt the rosin in any suitable container using either a jacketed tank 1, the jacket of which may be replaced by steam coils or other heating medium. The melted rosin is then allowed to flow through an emulsifying apparatus or injector 2, preferably such as shown in my Patent, 1,522,871, January 13, 1925, in which it comes into contact with a solution of caustic alkali supplied to the injector by pump 3 supplied by pipes 4 from any suitable source (not shown) which injector serves as an agitating means whereby the rosin and caustic alkali are thoroughly agitated and commingled and the rosin effectually emulsified, the caustic alkali being preferably heated by any suitable means (not shown). The hot liquid rosin is emulsified as it comes into contact with the stream of hot caustic solution and the emulsion is forced into a storage tank 5 through pipe 6. This emulsion may be heated in the storage tank, by means such as steam coil 7, or if hot enough, is allowed to stand until the free caustic in the emulsion has reacted with the rosin acids in the emulsion after which it may be cooled by further dilution. The time necessary for this saponification will depend upon the concentration and temperature of the emulsion and the completeness of the saponification desired.

By this method, I can make a rosin size with any desired percentage of free rosin from 15% of the total rosin to 80% of the total rosin. The character of the size made can be controlled within these limits by varying the amount of caustic alkali used and by controlling the concentration and temperature of the emulsion. If there is any jelling of the size after saponification, this will not reduce the fluidity sufficiently to affect the emulsions for the saponification will take place in a concentration of under 10% solids. After the size has reached the required amount of saponification, it may be further diluted to a concentration of 1 or 2% solids by the addition of cold water, through water supply pipe 8.

This process has an advantage over cold saponification as it makes it possible to reduce the free alkali in the emulsion to a minimum and it is not desirable to have over 1 or 2% of free alkali in the sizing emulsions. On the one hand, the rosin can be saponified without boiling and consequently a lighter colored solution can be made than would be made by using caustic soda at boiling temperatures.

It is not necessary in the operation of this process to add anything to the rosin in order to emulsify it with the caustic alkali, although I may add such ingredients as oils, fats or waxes,

in order to modify the character of the finished product. I can make by this method either sizing emulsions or sizing solutions.

When sizing emulsions are desired, the amount of alkali used is less than that required to combine with the rosin acids present. When sizing solutions are desired, the amount of alkali is used which when combined with rosin acids, will dissolve all of the particles of rosin in suspension.

If a compound is used which consists of an unsaponified wax and rosin acids, then the rosin acts as an emulsifying material with the alkali and produces a wax emulsion, and the free alkali by continuous reaction with the free rosin acids maintains by saponification the stability of the emulsion.

This illustration is given to show the wide application of this process. Its difference from other processes is the fact that instead of saponifying a part of the rosin before emulsification or dissolving emulsifying agents in the rosin composition, the product is first emulsified by mechanical and chemical means and then when desired a saponification is brought about in the emulsion.

The caustic soda which I have described in this process may be replaced by either caustic potash, caustic ammonia, or silicate of soda. An alkaline carbonate might be used instead of caustic but this does not react as rapidly as a caustic alkali and requires higher temperatures and it would produce a frothing action in the saponification tanks. Sodium carbonate may be used for the emulsifying action and caustic alkali added to the emulsion to produce saponification.

The outstanding features of this process are that first the rosin is broken up into fine particles by the emulsions process and these particles stay in suspension so that saponification may take place quickly in the dilute solution with the application of heat because all of the fine particles are attacked at once and no agitation is necessary.

The size produced in this way is different from any other kind of size because in all other methods the saponification is progressive.

When rosin size is made in a concentrated solution, as is the general practice, so that the finished size will have from 50 to 30% of water, then the action takes place as follows: First a portion of the rosin is saponified and then the rest of the rosin dissolved in the concentrated soap, and is saponified later. It is a mixture in which some of the rosin has been saponified a much longer time than the rest. Over saponification produces coloring matter in the size.

If rosin is saponified by circulating cold caustic over some lumps then this saponification will also be progressive. My method of saponifying produces simultaneous reactions; first, the emulsified rosin is uniform and second, the saponified product is also uniform.

For special purposes, I may stop the process at the stage of emulsification and not add further heat than that already in the hot water in which case, I will have a small amount of rosin soap and mostly free rosin and some free alkali.

It is possible to operate this process by first emulsifying the rosin with a small amount of alkali and then add the caustic to the emulsion tank and saponify the rosin in the emulsion.

In my process as described in Patent No. 1,317,616, of September 30, 1919, I add alkali to free rosin emulsions, but the purpose of this is to stabilize the emulsions, and the emulsions are cooled instead of being heated so that saponification cannot take place. The step of heating the emulsions or keeping them hot, is a distinctive step in this invention. It would be possible to accomplish the result described in this specification if the rosin were emulsified by any apparatus such as a colloidal mill.

I claim:

1. A process of preparing rosin size which consists in the steps of melting rosin, then emulsifying the melted rosin in an aqueous medium in the presence of dilute alkaline solution under conditions unfavorable for saponification of rosin, and thereafter treating the said emulsion separately in a container without dilution at a temperature below the boiling temperature of the emulsion and under conditions favorable for saponification of rosin to produce a lighter colored product than that obtained by boiling the emulsion.

2. A process of preparing rosin size which consists in melting rosin, thoroughly agitating and commingling melted rosin with a dilute alkali solution to form an emulsion at a concentration of under 10% solids under conditions unfavorable for saponification of rosin, and thereafter heating the resulting emulsion before dilution of the said emulsion at a temperature below the boiling point of the emulsion to bring about rapid and uniform saponification of rosin with alkali in the emulsion.

3. A process of preparing rosin size which consists in melting rosin, thoroughly agitating and commingling melted rosin with a dilute alkali solution to form an emulsion under conditions unfavorable for saponification of rosin, and thereafter heating the resulting emulsion at a temperature below the boiling point of the emulsion to bring about rapid and uniform saponification of rosin with alkali in the emulsion.

JUDSON A. DE CEW.