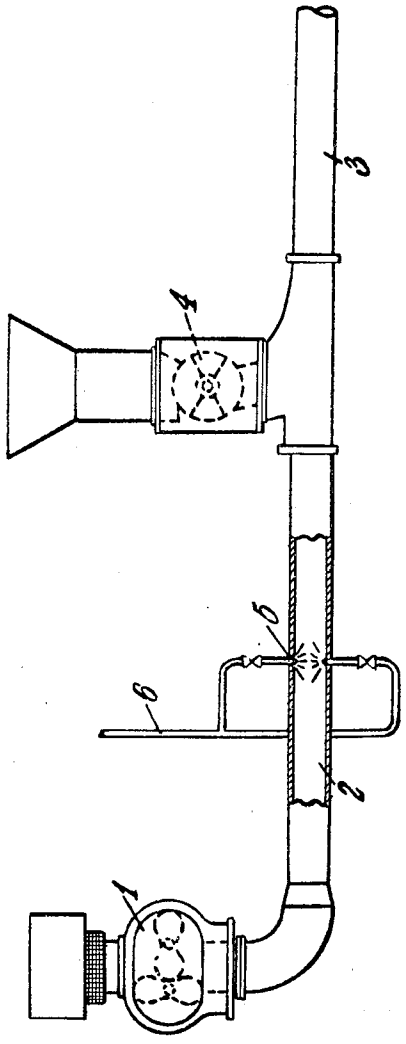
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METHOD FOR THE TREATING OF WOOD CHIPS

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METHOD FOR THE TREATING OF WOOD CHIPS

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ABSTRACT OF THE DISCLOSURE

A method of treating wood chips comprising transporting wood chips pneumatically and simultaneously treating the wood chips with a biocidal agent.

The present invention relates to a method for the treatment of wood chips in connection with the pneumatic transport, especially the treatment of freshly chipped wood chips, intended to be stored in piles, with solutions, suspensions or emulsions having, for instance, biocidal properties. The invention also relates to apparatus for the carrying out of the aforementioned treatment.

During storage of wood chips in piles, several changes and reactions occur in the wood material. After a short time, a considerable temperature rise can be observed in the pile, and at the same time a pronounced discoloration appears in the chips. In addition to these visible changes, a slow, continuous destruction of wood substance occurs, as well as a change in and loss of certain extractives.

The causes of the temperature rise, discolouration and different wood reactions have been the object of exhaustive investigations in different quarters; and several different hypotheses have been put forward to explain them. It has been assumed that the life-processes in the wood do not cease immediately after chipping, that autooxidation of wood constituents, especially extractives, continues, and that microbiological destruction of certain wood materials, possibly in combination with the earlier mentioned effects, could be the cause of the change. No reliable explanation of the factors of cause and effect does, however, exist at present.

It is, however, established that the loss of wood in the pile is directly proportional to the storage-time in the pile, and it may be assumed that this loss of yield, directly proportional to the storage-time, is caused by microorganism. This loss, which after 4 months storage-time amounts only about 3.5%, could be wholly or partly avoided, by conventional impregnation of the chips; however, the cost of impregnation would be far greater than the comparatively small gain due to a reduced loss of wood.

When considering the disclouration of pile-stored chips and the decrease in the brightness of the pulp produced from chips stored in this way, the situation is quite different, as it appears that by far the largest part of the discolouration has already occurred after two months. Since the discolouration follows quite another course than the loss of wood, the discolouration cannot be solely explained as the effect of microorganisms. Without being categorical as to the nature of the complicated and interdependent reactions which take place during pile-storage of chips, it may reasonably be assumed that the discolouration—and, consequently, the decrease in the brightness of the pulp—is caused by enzymatic reactions in the wood.

Surprisingly, it has now been found possible to obtain pulp from pile-stored chips having substantially the same brightness as that produced from freshly chipped chips, by treating the chips before pile-storage with a solution of pentachlorophenol, the said solution being applied through a nozzle injector into the compressed air stream used for pneumatically transporting the chips, whereby the air stream atomizes the solution at a point previously to intake of the chips. This effect on the brightness is apparent even when only 50% by weight of the chips have become completely coated with such a solution of pentachlorophenol as will give a concentration of 400 p.p.m. calculated on the basis of absolutely dry chips, this represents a considerable saving of pentachlorophenol in comparison to conventional methods of treatment.

It has also been shown that by using the method and apparatus of the present invention, a similar effect regarding the brightness of the produced pulp is obtained by use of minute amounts of other biocidal agents, which are known per se. Finally, it has been observed that chips, treated in the manner described herein, are not discoloured during pile-storage, that no temperature rise develops in the piles during storage and that, furthermore, the content of wood-substance and extractives is not changed or changed only by a very small amount.

The apparatus of the present invention is characterized in that at least one sprayer, preferably comprising a nozzle, for finely dispersing a biocidal solution, emulsion, or suspension, is fitted in a pipeline through which air is introduced to the chip-intake of a pneumatic transport pipeline from the chipper to the pile. By this means a very effective moistening and treatment of the chips is achieved since the solution, emulsion or suspension is dispersed as an artificial fog in the air which is used for the pneumatic transport of the chips.

The invention is illustrated in the attached drawing which schematically shows one form of apparatus according to the present invention.

A blower **1** is attached to a pipeline **2**, which supplies compressed air to a transport pipeline **3** for chips, whereby the chips are introduced into the transport pipeline through a feeder **4**, which may be, for instance a rotary vane feeder. The transport pipeline **3** leads to a pile (not shown) onto which the chips are blown out.

In the pipeline **2**, between the blower **1** and the feeder **4**, is fitted at least one nozzle **5**, attached to a pipe **6**, through which pipe **6** and nozzle **5** a solution or suspension of, for instance, a biocidal preparation is added to the air coming from the blower, whereby the solution or suspension is dispersed in the air as a substantially homogeneous fog suspension.

Although only one embodiment of the invention has been described here, others are possible within the scope of the invention.

The mode of action of the invention is illustrated and elucidated by the following examples:

EXAMPLE 1

In a normal, untreated pile of pine chips, test bags of nylon netting, filled with pine chips, were placed at different levels and positions. A thermocouple was arranged in every test bag and the thermocouples were connected with a central recording apparatus.

Generation of heat could be observed one day after the completion of the pile, and after 12 days a maximum temperature of 57° C. was recorded. The pile was pulled down after 30 days, at which time the maximum temperature had decreased 4° C. and the minimum temperature recorded was 35° C.

A considerable discolouration of the chips could be observed on inspection, and this was confirmed by using

the wood for sodium sulphite pulp production. The brightness of the pulp produced was 9 SCAN-units lower than the brightness of pulp prepared in the corresponding way from freshly chipped wood.

Anaylsis of the extractives showed a substantial decrease in the amount of conjugated fatty acids. The total amount of extractives showed a 20% decrease.

No loss of wood substance was observed in this experiment.

EXAMPLE 2

In order to determine the loss of wood substance, a similar experiment to that in Example 1 was carried out. After storage during 4.5 months a lose of wood substance amounting to 5% was observed in untreated chips.

Chips treated with different biocidal preparations, as described below did not show any loss of wood substance.

EXAMPLE 3

In the same way as in Example 1, and during the same time of the year, a pile of pine chips was built up, the chips being treated by an apparatus according to the invention, with a solution of pentachlorophenol to such an extent that the concentration of pentachlorophenol was about 400 p.p.m., calculated on the basis of absolutely dry chips.

During the storage a maximum temperature of 32° C. was observed, and the temperature at the other registration points did not exceed 25° C. No discolouration of the chips, of sodium sulphite pulp produced from the stored chips, was observed. The extractives did not change during the storage.

EXAMPLE 4

In the same way as Example 1, an experiment was made with untreated spruce chips, whereby a maximum temperature of 56° was recorded. A lowering of the brightness amounting to 11 SCAN-units was observed in unbleached sulphite pulp produced from the chips, as well as a decrease in the amount of conjugated fatty acids.

EXAMPLE 5

An experiment was made with spruce chips, in the same way as in Example 3, but treating the chips with a solution of sodium pentachlorophenolate. The recorded maximum temperature was 34° C. after storage for 45 days; no discolouration of the chips occurred, nor any discolouration of calcium bisulphite pulp produced from the chips. No changes in the extractives was observed.

These examples show the extraordinary effect which is achieved by treatment with minute amounts of pentachlorophenol using the method according to the invention.

With a special experimentation technique, it has been shown that by using the method according to the invention, other biocidal preparations known per se may also be utilized to prevent a decrease in the brightness of pulp produced from pile-stored chips. In these experiments test bags containing chips, treated with different preparations, have been placed in a pile of untreated chips. Under these conditions the storage experiments have been carried out at an elevated temperature. A very good agreement has been found between these experiments and full scale experiments with pentachlorophenol, and since the conditions are somewhat more severe than during the full scale experiments, this is a fully realistic method for the testing of different preparations.

EXAMPLE 6

During the experiments described below test bags containing spruce and pine chips, treated with various amounts of different biocidal preparations, were placed in a pile of untreated pine chips on levels where the temperature was 25–60° C. At the same time, and at the same levels, bags were placed containing untreated chips. The following substances and groups of subtsances were tested at the given concentrations:

Chlorinated phenols 50–700 p.p.m., five different commercial organic mercury compounds 10–100 p p.m., three different organic tin compounds 50–1000 p.p.m., bis-(1,4-bromo-acetoxy)-2-butene 10–100 p.p.m., copper 8-oxyquinolinate 500–1000 p p.m., o-phenylphenol (sodium salt) 200–1000 p.p.m. The invention also contemplates the employment of O-phenylphenol as a biocidal agents.

All of the test bags treated with these biocidal compounds showed the same positive results as mentioned above. The lower p.p m.-limit mentioned in the example denotes a decrease in the brightness of 20%, while the upper p.p.m.-limit denotes the concentration needed to completely prevent a decrease in the brightness

From the examples, it is clear that according to the invention an effective treatment is achieved with minute amounts of biocidal preparations, preventing discolouration of chips during such storage times as are needed under practical and technical circumstances, as well as preventing a non-acceptable decrease in the brightness of pulp produced from such pile-storaged chips.

We claim:

1. A method of simultaneously transporting and treating wood chips, comprising the steps of finely dispensing a treating agent in a mass of air, said treating agent having biocidal properties, and using said mass to transport said chips in a pneumatic transport system.

2. A method of simultaneously transporting and treating wood chips, comprising the steps of finely dispensing a treating agent in a mass of air, said treating agent comprising pentachlorophenol, and using said mass to transport said chips in a pneumatic transport system.

3. A method of simultaneously transporting and treating wood chips, comprising the steps of finely dispensing a treating agent in a mass of air, said treating agent comprising a salt of pentachlorophenol, and using said mass to transport said chips in a pneumatic transport system.

4. A method of simultaneously transporting and treating wood chips, comprising the steps of finely dispensing a treating agent in a mass of air, said treating agent comprising a member selected from the group consisting of O-phenylphenol and salts thereof, and using said mass to transport said chips in a pneumatic transport system.

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