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FIRE EXTINGUISHING PROCESS AND METHOD
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13 Claims

ABSTRACT OF THE DISCLOSURE

The use of lignin sulfonates as a fire combating ingredient in dry fire extinguishing powders. The powders contain a lignin sulfonate, e.g., calcium lignin sulfonate, adjuvants for dry fire extinguishing powders, such as ingredients to make the powder water repellent and free flowing.

This invention generally relates to fire extinguishing and is particularly directed to a novel composition in dry powder form, suitable for extinguishing fires.

Fires are usually classified as to groups or classes. In the United States, class A, B, C and D fires are thus generally recognized, whereas class A refers to fires of paper, wood, textile and rubber, class B to fires of flammable liquids which have a tendency to ignite, class C relates to fires of electrical equipment, while class D indicates metallic fires. Similar classifications have been adopted in other countries. In Germany, for example, class A fires refer to glowing fires, i.e., fires developing red heat, while class B relates to liquid fires. Class C, in turn, indicates fires of gas under pressure, and class D has reference to metal fires including radiation fires. According to the German classification, class E refers to fires of electrical equipment.

The inventive fire extinguishing composition is suitable for combatting fires of all classes, and in doing so, one or several of the components of the composition may be correspondingly varied to increase the effectiveness of the fire extinguishing composition for a particular class of fire.

It has previously been suggested to combat metal fires with a fire extinguishing agent which essentially consists of an inert material such as sodium chloride and an organic substance which has a tendency to carbonize or char, as for example a mixture of hard or dry pitch and an easily flammable material as, for example, polyethylene or hard paraffin. In order to improve the flowability, trickling or pouring capacity of the material and to increase the water repelling characteristics, such prior art compositions have also been admixed with talcum powder, tricalcium-phosphate or stearates. These prior art fire extinguishing compositions have, however, several significant disadvantages. Hard pitch, polyethylene or hard paraffin are difficult to process into a fire extinguishing composition, their characteristics are greatly dependent on the prevailing heat conditions and, moreover, they have a pronounced tendency to adhere to each other. During grinding and mixing of these components, unavoidable temperature increases thus easily result in lump formation. The adhesion tendency of the powder particles of finely ground inorganic material leads oftentimes to lump formation. This tendency is, of course, significantly increased in respect to thermoplastic organic materials.

Accordingly, it is a primary object of this invention to overcome the disadvantages of the prior art fire extinguishing powders and to provide a fire extinguishing composition which has pronounced fire combatting properties, superior to those of the prior art compositions.

Another object of this invention is to provide for a fire extinguishing material in dry powder form, which is easily prepared and which has no pronounced tendency to form lumps but has superior flowability and may be stored for prolonged periods of time without deterioration.

It is an object of this invention to provide for an improved method of combating fires.

Briefly, and in accordance with this invention, the inventive fire extinguishing powder comprises a mixture of inert components such as, for example, sodium chloride and of a certain proportion of lignin sulfonate. The preferred lignin sulfonate is calcium lignin sulfonate which may be obtained in the form of powder or liquor residues. A suitable lignin sulfonate in the form of the calcium salt is particularly contained in cellulose or pulp powder from beech or pine wood. Such powder is available on the market and is a waste product of the pulp industry. It is available in large quantities. Since it has no other useful purpose, it is consequently very inexpensive.

Calcium lignin sulfonate has two chemical characteristics which make it eminently suitable as a component in a fire extinguishing composition. Calcium lignin sulfonate is thus particularly rich in respect to carbon and, on the other hand is particularly poor in respect to oxygen. This, of course, means that it has a strong tendency to carbonize. Further, the calcium sulfate remains in admixture with the carbon upon carbonization. In respect to metal fires, this mixture forms a crust on the metal or metal oxide which adheres to the surface of the burning material. This crust, in turn, prevents re-ignition until sufficient cooling has taken place. An additional advantage of the calcium lignin sulfonate is the expansion characteristic of the cellulose or pulp powder upon heating. The powder thus becomes inflated or swells to a considerable extent which, of course, significantly contributes to the fire combating. Moreover, the novel fire extinguishing powder is compatible with foam.

Experiments have been carried out with an inert powder which was admixed with 10 to 30% by weight of cellulose or pulp powder containing calcium lignin sulfonate. All these experiments resulted in a highly effective extinguishing of sodium, magnesium and aluminum fires. The same successful results were obtained in respect to electrical fires.

In further developing the invention, it has been ascertained that the beneficial properties of the inventive fire extinguishing powder may be further increased by admixing the powder with a protein hydrolysate in powder form. The protein hydrolysate admixture yields particularly favorable results in respect to incandescent fires or glowing fires developing red heat.

Furthermore, fluxing agents may be admixed with the inventive powders. Magnesia usata levissima is thus a very suitable fluxing agent for the inventive purpose. The small magnesia crystals possess a prong-like structure with a plurality of jags. They therefore position themselves on the surfaces of the larger organic powder particles. The mechanical adhesion which in fine powders has
The invention will now be described by several examples, it being understood, however, that these examples are given by way of illustration and not by way of limitation and that many changes may be effected without affecting in any way the scope and spirit of the invention as recited in the appended claims.

Example I

A fire extinguishing powder suitable for extinguishing fires of all classes has the following composition:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percent by weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium lignin sulfonate in powder form</td>
<td>16</td>
</tr>
<tr>
<td>Protein powder (ground or obtained by extraction for example keratin decomposed with lime and dried in an atomizer)</td>
<td>5</td>
</tr>
<tr>
<td>Magnesia usta levissima</td>
<td>1</td>
</tr>
<tr>
<td>Talcum powder</td>
<td>6</td>
</tr>
<tr>
<td>NaCl, KCl and/or BaCl₂ dry</td>
<td>20</td>
</tr>
<tr>
<td>Hydrophobing agent</td>
<td>2</td>
</tr>
</tbody>
</table>

Example II

The following composition proved to be particularly suitable for liquid fires:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percent by weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium lignin sulfonate in powder form</td>
<td>12</td>
</tr>
<tr>
<td>Protein powder (ground or obtained as extract powder for example keratin decomposed with lime dried in an atomizer)</td>
<td>5</td>
</tr>
<tr>
<td>Magnesia usta levissima</td>
<td>1</td>
</tr>
<tr>
<td>Talcum powder</td>
<td>6</td>
</tr>
<tr>
<td>Calcium hydrogen phosphate</td>
<td>16</td>
</tr>
<tr>
<td>Sodium bicarbonate</td>
<td>58</td>
</tr>
<tr>
<td>Hydrophobing agent</td>
<td>2</td>
</tr>
</tbody>
</table>

While specific embodiments of the invention have been shown and described in detail to illustrate the application of the inventive principles, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. In a fire extinguishing composition in dry powder form wherein alkali metal chloride is admixed with additives, the improvement which comprises that the composition contains an effective amount of lignin sulfonate in powder form to combat fire, said lignin sulfonate being a sulfite liquor residue and consisting predominantly of calcium lignin sulfonate.

2. The improvement as claimed in claim 1, wherein about between 1 to 40% by weight of said lignin sulfonate are contained in the composition.

3. The improvement as claimed in claim 1, wherein the composition additionally is admixed with a protein hydrolysate.

4. The improvement as claimed in claim 1, wherein the composition additionally contains a fluxing agent, said fluxing agent being magnesia usta levissima.

5. The improvement as claimed in claim 1, wherein the composition additionally contains a hydrophobing agent, said hydrophobing agent being a silicon dioxide in sub-microscopic fine form whose particles are enveloped with methyl groups or hydrocarbon groups which are chemically anchored on the surface.

6. The improvement as claimed in claim 1, wherein the alkali metal chloride is a chloride of sodium or potassium.

7. The improvement as claimed in claim 1, wherein the alkali metal chloride is a chloride of sodium, potassium and barium in eutectic mixture.

8. The improvement as claimed in claim 3, wherein the composition contains about between 1 to 60% by weight of said protein hydrolysate.

9. The improvement as claimed in claim 4, wherein the amount of said magnesia usta levissima is about 0.5 to 5% by weight.
10. A method of combating a fire which comprises spraying on the fire a dry powder containing alkali metal chloride and lignin sulfonate, said lignin sulfonate being a sulfite liquor residue and consisting predominantly of calcium lignin sulfonate.

11. A method as claimed in claim 10, wherein the powder is sprayed in the form of a fan-like jet.

12. A method as claimed in claim 10, wherein the powder which is sprayed onto the fire is converted into a viscous foam by water or foam added to the fire.

13. The improvement as claimed in claim 10, wherein the powder additionally contains carbonate or bicarbonate to improve the fire extinguishing action.