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2,881,138

## DRY POWDER FIRE EXTINGUISHING MEDIUM

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No Drawing. Application May 23, 1955  
Serial No. 510,515

Claims priority, application Germany May 21, 1954

3 Claims. (Cl. 252-7)

The invention refers to a dry powder fire extinguishing medium which extinguishes fires of liquid and gaseous substances as well as fires of solid substances which give birth to glowing remnants when burning. There have already been made known dry powder fire extinguishing mediums of the most various compositions: almost all powder-like chemicals which are available for not too high prices have been proposed for this purpose. However, all these extinguishing mediums can be used only within a relatively narrow sphere, and they are practically suitable only for extinguishing fires of liquid and gaseous substances. As contrasted therewith, the object of the invention consists in to provide a dry powder fire extinguishing medium which is effective on all kinds of fires and which is able to extinguish, beside fires of liquid and gaseous substances, also fires of solid substances, i.e. in which glowing remnants are given birth to.

According to the invention, the dry powder extinguishing medium consists substantially of sulphuric salts of an alkaline metal with ammonium phosphate and bicarbonates. When using the new dry powder fire extinguishing medium, there takes place beside the mechanical extinguishing effect known with all dry powder extinguishing mediums also, due to the extinguishing medium's violently striking upon the seat of the fire under the action of the propelling agent, the following specific effect: above the seat of the fire a cloud of extinguishing gas smothering the fire springs up, and, in addition, when solid substances burn, the burning object is covered with a thick crust which prevents the respective object to be set again ablaze. This incrustation takes place above all because in the heat of the seat of the fire there is given birth to an easily flowing fluid of molten sodium metaphosphate ( $\text{NaPO}_3$ ) which is produced intermediately from the acidic sodium pyrophosphate



which has formed as an intermediate product, and some sodiumsilicate.

It is already known, it is true, that bicarbonates, such as sodium bicarbonate, give off on the seat of the fire gaseous carbonic acid which assists the extinguishing effect. It has also been proposed to use ammonium phosphate in aqueous solution for the production of coatings serving to check or stop the spread of the fire. As contrasted therewith, it is new in the present invention to use the abovenamed ingredients in the respective combination in powder-like state as a dry powder extinguishing medium, whereby now a dry powder extinguishing medium is available which can be used with fires of all kinds such as it has been striven for by the skilled in the art already for a long time and without any practical success.

The dry powder extinguishing medium may contain, for example, sodium sulphate or ammonium sulphate. It has been found that especially favourable effects can be obtained if the ammonium sulphate and the am-

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monium phosphate are added to the dry powder fire extinguishing medium in the form of a compound crystallisate. This compound crystallisate is produced in the following manner: Technical calcium phosphates (natural phosphorites) are opened by means of sulphuric acid and the precipitated slurry of gypsum is then filtrated. From the remaining solution of orthophosphoric acid there is produced a compound acid by further adding of concentrated sulphuric acid. Into this compound acid there is introduced gaseous ammonia or a mixture of gases containing ammonia until complete neutralisation. Hereafter, the solution of concentrated compound salts produced in this way is broken up finely to dry and fine crystalline powder by the oppositely directed flow of the rising warm air. It is also possible to dry at low temperature and to finely grind the compound crystallisate obtained directly from the solution.

The homogeneous mixture of ammonium phosphate and ammonium sulphate produced according to the abovesaid method is not hygroscopic and totally neutral. It does not contain even a trace of free acid groups. The extinguishing powder containing this compound crystallisate has, therefore, beside its surprising extinguishing effect, also an especially good flowing capacity and can be stored even for a very long time.

The following examples illustrate the invention:

### Example 1

24 to 72 parts by weight of a compound crystallisate of ammonium phosphate and ammonium sulphate are mixed with 76 to 28 parts by weight of a finely pulverized mixture which contains the following ingredients: sodium bicarbonate, ammonium bicarbonate, oxide of zinc, and precipitated colloidal silicic acid (silica gel). To the mixture there have been finally added small amounts of argentic chloride, stearic acid, and fuller's earth.

The colloidal and finely subdivided silicic acid (silica gel) contained in an intimate mixture with the ammonium bicarbonate acts, due to an especially high and selective adsorptive capacity with respect to  $\text{CO}_2$  and  $\text{NH}_3$ , continually as a stabilizing substance and prevents the premature sublimation of the ammonium carbonate. At the same time, the sodium silicate which, beside the sodium phosphate, is given birth to on the seat of the fire by thermic effect constitutes a specific effective protection for the glowing remnants of the seat of the fire against their being set again ablaze. The small amounts of heavy metal salts ( $\text{AgCl}$ ) contained in the mixture have been recognized as a specific effective anti-catalyst in connection with the other ingredients of the mixture during the combustion process.

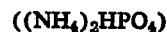
### Example 2

30-40 parts by weight of sodium sulphate ( $\text{Na}_2\text{SO}_4$ ), calcined, finely pulverized, 25-35 parts by weight di-ammonium phosphate, finely pulverized, and 45-25 parts by weight of a finely pulverized mixture consisting of ammonium bicarbonate, oxide of zinc, and silica gel.

To the abovenamed mixture there are added small amounts of argentic chloride, stearic acid, and fuller's earth.

### Example 3

100 kg. ammonium sulphate ( $(\text{NH}_4)_2\text{SO}_4$ ) of technical quality are mixed with 3 kg. tricalcium phosphate and ground in a sieveless pivot mill ("premixture sulphate"). 100 kg. diammoniumhydrogenphosphate



of technical quality are mixed with 3 kg. tricalcium phosphate and ground in a sieveless pivot mill ("premixture phosphate").

66 parts by weight of the "premixture sulphate,"  
17 parts by weight of the "premixture phosphate,"  
16 parts by weight sodium bicarbonate, and  
1 part by weight magnesium stearate

are mixed in a mixing apparatus for 15 minutes.

The starting materials for the "premixture sulphate" and the "premixture phosphate" have been dried at +45° C. for 24 hours previous to their being processed.

The foregoing description is directed solely towards the examples illustrated, but I desire it to be understood that I reserve the privilege of resorting to all changes to which the invention is susceptible, this latter being defined and limited only by the terms of the appended claims.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent is:

1. As a new composition of matter, a dry powder adapted to extinguish fires originating from solid, liquid and gaseous combustible materials, consisting essentially of an intimate mixture including as essential ingredients at least 30% by weight of salts belonging to the group consisting of alkali metal sulfates and ammonium sulfates, at least 16½% by weight of an ammonium phosphate, at least 16% by weight of a bicarbonate, said mixture being adapted to extinguish fires originating from solid, liquid and gaseous substances and, when applied to burning solid material to extinguish glowing portions thereof.

2. As a new composition of matter, a dry power adapted to extinguish fires originating from solid, liquid and gaseous combustible materials, consisting essentially

of an intimate mixture of between 30 and 40 parts by weight of sodium sulfate, between 25 and 35 parts by weight of diammonium phosphate, and between 45 and 25 parts by weight of ammonium bicarbonate, said mixture being adapted to extinguish fires originating from solid, liquid and gaseous substances and when applied to burning solid material to extinguish glowing portions thereof.

3. As a new composition of matter, a dry powder adapted to extinguish fires originating from solid, liquid and gaseous combustible materials, consisting essentially of an intimate mixture of approximately 64 parts by weight of ammonium sulfate, approximately 16.5 parts by weight of diammonium hydrogen phosphate, approximately 2.5 parts by weight of tri-calcium phosphate, approximately 16 parts by weight of sodium bicarbonate and approximately 1 part by weight of magnesium stearate, said mixture being adapted to extinguish fires originating from solid, liquid and gaseous substances and when applied to burning solid material to extinguish glowing portions thereof.

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