

UNITED STATES PATENT OFFICE

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FOAM GENERATOR POWDER

Clifford B. White, Elmira, N. Y., assignor to American-La France-Foamite Corporation, Elmira, N. Y., a corporation of New York

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1 Claim. (Cl. 252—6.5)

This invention is an improved foam generating powder for fire extinguishing use. Such powder functions by being poured into a hopper from which it is drawn by venturi action into a high velocity water stream by which it is carried along through a pipe or hose, reacting in the meantime, so that the reacted mixture is delivered in the form of foam which floats on burning liquids and blankets out the fire. The hopper and its Venturi device are called a foam generator. Generator systems are well known and extensively relied on for fire protection.

All generator powder heretofore used is composed of powdered aluminum sulfate and sodium bicarbonate with some "stabilizer" substance added for enhancing the foaming propensity. Various kinds of stabilizers have been proposed and patented, but all generator powders heretofore used in actual practice, rely on aluminum sulfate and sodium bicarbonate as the reacting agents. Other reagents have been proposed but are not in use, that is to say, the alum-soda combination has become standard as the best. The very common and cheaper chemical, ferric sulfate, has long been recognized in patents and otherwise as a substitute, chemically speaking, for the aluminum sulfate because its reaction with the basic salt is known to release carbon dioxide and, like aluminum sulfate, to produce a slimy or viscous hydroxide, essential to the foam structure. It is, however, a substitute in theory only. Generator powder containing it, in any of the forms in which it has heretofore been available, is not satisfactory for a number of reasons, chief of which is that it does not yield the same abundant foam, accounting for its not being used despite its lower cost and availability.

I have found however that by carefully roasting crystalline ferric sulfate, in a proper particle size, and thereby driving off about half of its normal water of crystallization, all as below explained, and thereafter mixing it very thoroughly with the sodium bicarbonate and stabilizer, a generator powder is produced which gives results surprisingly and consistently superior to the standard generator powder in several important respects, thus providing a powder containing this heretofore discarded material, which is far more efficient than anything that has been known before. To be more explicit, this new generator powder has among its several advantages the fact that it is relatively less bulky than the standard powder, which means in practice that sixty pounds of it occupy the same space as fifty pounds of standard powder. In this connection it will

be understood that generator powder is supplied and handled in sealed cans or buckets from which it is poured, can by can, into the generator hopper, and that if each can holds ten pounds more than formerly this represents a twenty per cent. improvement, or, less cans to be opened and handled by the firemen for a given operation.

Further, each pound of such mixture produces approximately the same amount of foam as one pound of the standard powder. Moreover the foam is of noticeably closer and stronger texture (with the same stabilizer) and still further, under identical conditions as to generation and manner of discharge, it gives a longer range of foam stream as discharged from a nozzle at the end of the hose line. The improvement in range is between fifteen and twenty per cent. For example, in a test with the new powder, the average range was eighty feet, maximum ninety feet. This test was made with a generator delivering through 100 feet of two and one-half inch hose and one and three-quarter nozzle tip at one hundred pounds water pressure, 60° F. Under identical conditions standard generator powder developed a stream range averaging approximately seventy feet, maximum about 85 feet. The practical advantage of longer range needs no explanation, but as a corollary to the conditions producing this range improvement it is to be noted that the foam hose line can be extended by one additional hose length, fifty feet, and still produce about the same amount of foam per minute as the comparable powder manufactured with aluminum sulfate. With standard powder the recognized hose length is 100 feet of 2½" hose, longer lines resulting in "sloppy" foam and poor range, due to friction of the hose breaking down some of the bubble structure. Increased hose length is of course a gain in fire-fighting efficiency, rendering the whole set-up that much more flexible.

The generator powder possessing these practical advantages can be manufactured in exactly the same way as the standard powder, except that ferric sulfate treated as described is used in place of the aluminum sulfate, and in the same relative proportion. The additional cost of this operation is much out-weighed by the gain accomplished. Thus the preferred composition comprises ferric sulfate, treated as above, 42½ per cent., sodium bicarbonate 42½ per cent., clay 10 per cent., stabilizer 5%, by weight. The clay is added partly to avoid caking of the powder in the cans under long storage and partly to increase

the inorganic skeleton structure of the ultimate foam.

The treatment of the ferric sulfate is not difficult nor expensive, but should be carefully conducted to leave not less than 15 per cent., nor more than 19 per cent. of contained moisture in it, by weight, these limits being critical to the production of the effects above referred to. The treated material should have a particle size such that practically all of it will pass a screen of #8 mesh United States standard screen scale, and preferably the bulk of it should pass #20 mesh. The soda with which it is mixed can be the standard commodity and the stabilizer can be the dried secondary extract of licorice root familiar in the trade, or its equivalent.

The most interesting property of the new mixture is its more rapid movement or flow from the hopper into the generator throat, which is faster than the standard powder, as well as powder made from commercial grades of ferric sulfate. This is reflected in the production of more

gallons of foam in a given interval of time from a given generator-equipment at a given water pressure and temperature. It can be explained as partly due to the somewhat heavier specific gravity of the new powder referred to above, and partly to the more spheroidal shape of the sulfate crystal particles resulting from the roasting treatment, thus making the mixture more mobile. In any event the rate of flow is between 10 and 15% faster, all other conditions being equal and needless to say, from the fireman's viewpoint this is an added item in favor of the new composition.

I claim:

As a new composition of matter, foam generator powder consisting of a mixture of about equal portions of sodium bicarbonate and ferric sulfate, the latter consisting of particles which are finer than #8 U. S. standard screen scale and contain more than about fifteen and less than about eighteen per cent. moisture by weight, and a foam-stabilizing ingredient.

CLIFFORD B. WHITE.