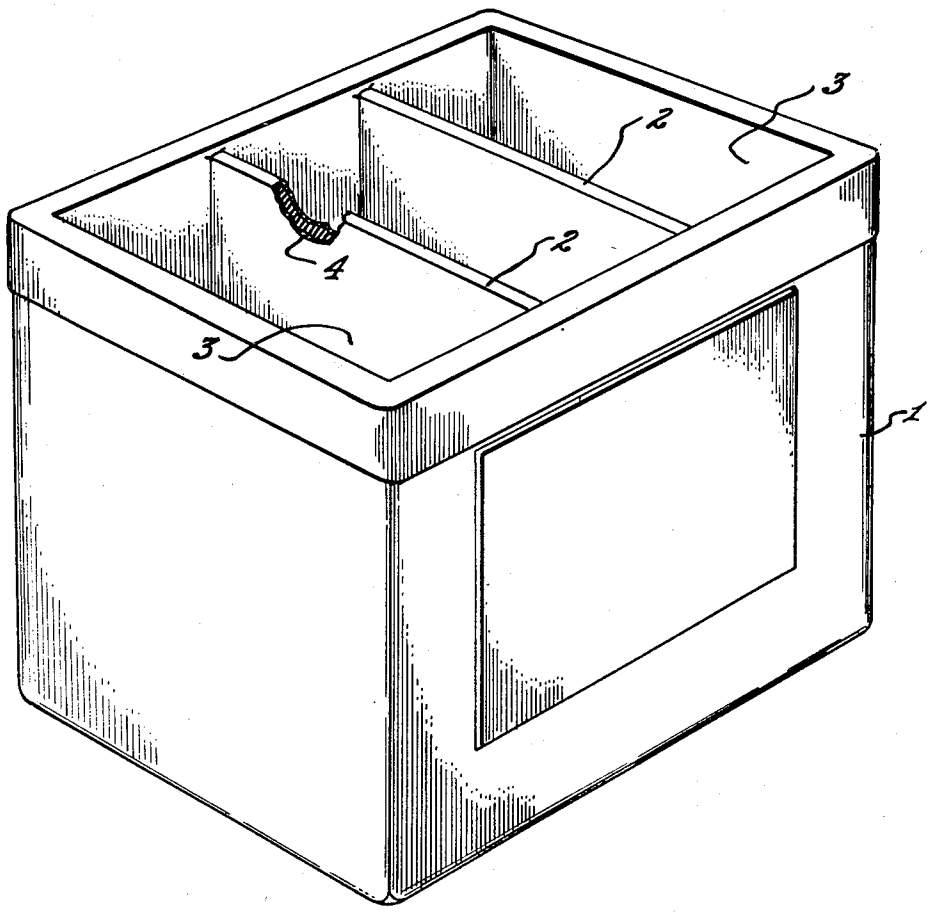
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STORAGE BATTERY CASE AND COMPOSITION FOR MOLDING THE SAME

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STORAGE BATTERY CASE AND COMPOSITION FOR MOLDING THE SAME

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My invention relates to composition storage battery cases or containers, which are molded with partitions therein forming cells in which the plates of the storage battery are housed together with liquid electrolyte, usually sulphuric acid solution.

In Letters Patent No. 1,752,917 to Alan R. Lukens, there is described a composition for forming storage battery containers in which organic fiber is employed and distributed in a special manner, the top percentage permissible being around 15% to avoid acid penetration of the composition. In addition acid resistant, finely divided, mineral matter is used.

For many years the composition of the Lukens patent has been employed for bituminous composition storage battery containers. In practice from 13 to 15% cotton linters has been the fibrous ingredient. At one time acid resistant asbestos, known as Blue African asbestos, was used as a fibrous ingredient for storage battery containers. This asbestos is not very plentiful and is quite expensive and hence the use of such a fibrous ingredient never attained great popularity. The many types of amphibole asbestos which would apparently be a fibrous ingredient that would withstand the attacks of battery acid, will not serve the purpose, because of lack of fiber strength, as well as relative scarcity.

The ordinary chrysotile asbestos of commerce has a strong fiber but is not acid resistant. Indeed it tends to swell when subject to storage battery electrolyte. There were early trials at making storage battery containers using this asbestos, but they failed, due to acid penetration and swelling arising from the use of this asbestos even though ostensibly protected by the bituminous binder.

The difficulty with these earlier attempts at use of chrysotile asbestos arose from the fact that the asbestos was used in too large a quantity, and it was not appreciated that asbestos could be admixed with bitumen in quantities small enough not to be incompletely protected by the bituminous binder, and yet give the required strength for a storage battery container. For example, the 15% limitation given by Lukens in his patent, for the use of acid attackable fiber in a storage battery container, is not a safe criterion for chrysotile asbestos. My investigations have shown that no more than 12% to 13% of chrysotile asbestos may be used.

There is a further complication involved. Chrysotile asbestos has a fiber which has a surface condition similar to greasiness. Water will

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not break it down. Materials do not readily adhere to the surface nor penetrate the chrysotile fiber, as is the case with organic fiber. Thus the technique of mixing bitumen and chrysotile asbestos into bitumen so as to get the maximum strengthening action of the fiber, is not obvious.

The use of water during mixing chrysotile asbestos fiber with bitumen, aids the wetting action of the surface of the fibrous material with the bitumen. However, incidentally, water in too large amounts keeps down the temperature of the bitumen and this makes the bitumen stiff, with the result of breaking up the asbestos fiber into small lengths with the result of cutting down its power of reenforcing and strengthening of the final composition. Thus a technique of mixing which enables the asbestos fibers to be fully coated with the bitumen, and at the same time does not unduly break up the fiber, is quite important, since the possible maximum percentage usable is small.

The bitumen employed in my novel composition will be of the type used in making composition storage battery containers generally. For example, a blown asphalt blended with gilsonite to have a penetration of 16 (150° F., 5 seconds, 100 grams), and showing a penetration of 11 (115° F., 5 seconds, 50 grams) and 25 (185° F., 5 seconds, 200 grams) may be employed, this blend having a ball and ring melt point of 290° F. I also may employ an asphalt blown oil blend having a ball and ring melt point of 260° F., and a penetration of only 12 at 150° F., 5 seconds, 100 grams. Other asphalts are usable within the field of hard molding asphalts.

The mineral matter aside from the asbestos used in my composition may be an infusorial earth such as celite, or other pulverulent acid resisting mineral matter which need not have any reenforcing effect, the mineral matter being used basically to contribute hardness to the composition.

The asbestos used by me will be a good grade Canadian or other chrysotile asbestos such as Grade No. 5K (Canadian classification) of medium fiber length running up to ¾ inches in length, and averaging around $\frac{3}{16}$ inches in length. Very long length fiber is not required and simply presents greater mixing problems. A fiber length very much less would result in requiring more asbestos to be used than would be safe to avoid acid deterioration, which among other things, tends to swell the final composition when under acid conditions.

In making the mixture, various procedures may

be followed. The whole batch may be mixed at one time, or the mineral matter may be mixed with the asphaltic material and the asbestos mixed in subsequently. Or a mineral matter mix and an asbestos mix may both be made and the two then mixed together. My preferred practice is to start with the bitumen in fluid condition, i. e., above its ball and ring melt point, and then add and incorporate the mineral matter which will not be critical as to percentage, but should run to around 38%, since a better molding action is produced if the asphaltic ingredient constitutes around 50% of the entire batch.

The asbestos is then wetted with water, or may be added dry to the mixer and water added to the mixer or its equivalent of steam injected over a period of time. When wetting the asbestos, I have used with success water in the proportion of 25 pounds to 100 pounds of the asbestos. The lowest permissible moisture would be around 10% by weight and if equal parts asbestos and moisture were used, the proceeding would be unsatisfactory.

The result in either event is to bring the temperature of the bitumen down during the initial mixing of the asbestos into the batch. However, the water serves its purpose during the initial portion of the mixing and heat applied to the mixer will be used to bring the temperature therein above the boiling point of water and preferably considerably higher before the end of the operation. The heat does not injure the asbestos and the great fluidity of the binder prevents too much pulverizing of the asbestos. I have finished the initial mixing in a two stage process as hereinafter noted, at a temperature of 325° F. for the last 5 minutes.

Before the mixing is completed, by one practice, I remove the material from the initial mixer and run it through an extrusion type of mixer, with additional heat applied, so as to extrude the material in a bar, permitting cutting off sections which when of a given length will have a definite weight suitable for a mold charge for molding a storage battery container therefrom.

The amount of asbestos to use will be not more than around 12 to 13%, and not less than around 7%, otherwise either the box will not stand up if the asbestos is more or will not be strong enough to satisfy requirements, if it is less. The lower percentage range will require an asbestos selected for quite long fiber length.

The molding operation is carried out in the normal manner for hot molding of storage battery composition containers and the result is to produce a box with a glossy and smooth exterior which is highly satisfactory as a storage battery container.

The individual asbestos fibers will be separated in the mixture by films of the asphaltic material, and surprisingly, the strength is fully equal to that required of the present day composition cases, which require 15% of cotton linters to impart this strength, the latter being a fiber of much superior knitting power as well as filamentary strength.

The container formed by molding will have a very high hot and cold cycle test, and will deflect less when subject to the heat deflection test. The composition seems to be freer of knit lines as a result of the molding operation which requires a long flow to form the battery partitions. Furthermore acid proof sprays such as are used in the organic fiber composition cases, e. g., acid resistant resins, are more effective as a sealer

of the surface of the container. Sealing is not a necessity, however, as tests on batteries in ordinary use, have shown no tendency to swell under influence of the electrolyte of the battery.

On a factory run using 48% storage battery case asphalt, 36% talc and 5% coal dust (as the bituminous and mineral ingredients), and 11% Canadian asbestos mixed in the presence of the amount of water above specified almost to completion and then given one pass through a Watson extrusion type mixer, gave a box upon molding which has a tensile strength of 1360 pounds per square inch, and an elongation of .91%. The pendulum crack test and acid absorption test on the finished product before spray coating ran about the same as the present day organic fiber asphalt composition cases of best standard. By using a vinylite resin spray, the acid absorption on two days' exposure of the asbestos case was cut down to .06%, as compared to an absorption of .17% in the standard composition case when sprayed alike and contemporaneously tested.

I have illustrated a storage battery container in the drawings in which the view shows the case 1 having partitions 2 to create cells 3 for reception of packs of battery plates. The depth of flow required to mold such a product is apparent from its shape. I have shown a portion broken out of one of the partitions to indicate the coating 4, which preferably covers the inside of the case throughout.

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

1. A storage battery container having a monolithic structure formed of hard asphaltic binder, finely divided acid resistant mineral matter, and chrysotile asbestos fiber in an amount of between around 7% to around 13% of the mass, the said finely divided acid resistant mineral matter and the said chrysotile asbestos fiber making up around 50% by weight of the mass.

2. A hot molding composition for the purpose described consisting of asphalt of the type employed for storage battery containers around 50% of the mass, chrysotile asbestos from around 7% to around 13%, and the balance finely divided mineral matter, the asbestos having a surface coating on the individual fiber of the type obtained by hot mixing in the presence of H_2O.

3. A storage battery container having a monolithic structure and formed by molding from a composition consisting of substantially 48% hard asphalt, substantially 36% talc, substantially 5% coal dust, and substantially 11% Canadian asbestos having an initial fiber length of substantially $\frac{1}{32}$ in. to $\frac{3}{4}$ in.

4. The method of making a storage battery box composition which consists in mixing asphaltic binder, mineral matter and from 7% to 13% chrysotile asbestos to make a hot molding composition, the admixing of the asbestos with the binder being carried on in the presence of an amount of water equal to between 10% and 50% of the weight of the asbestos.

5. The method of claim 4 in which the asbestos used has an initial fiber length of $\frac{1}{32}$ to $\frac{3}{4}$ inches.

6. A method of making a storage battery box composition which consists in raising the temperature of an asphaltic binder to bring it to a fluid condition, mixing substantially 48 parts of said binder and substantially 41 parts of a non-fibrous mineral filler while said binder is

liquid, adding substantially 11 parts of a non-acid-resistant asbestos having an initial fiber length of substantially 3/32 in. to 3/4 in., along with substantially 10% to 50% of water based on the weight of the asbestos, and mixing in the wetted asbestos as rapidly as possible under conditions to produce evaporation of the water, and finishing the mix at a temperature of substantially 325° F.

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