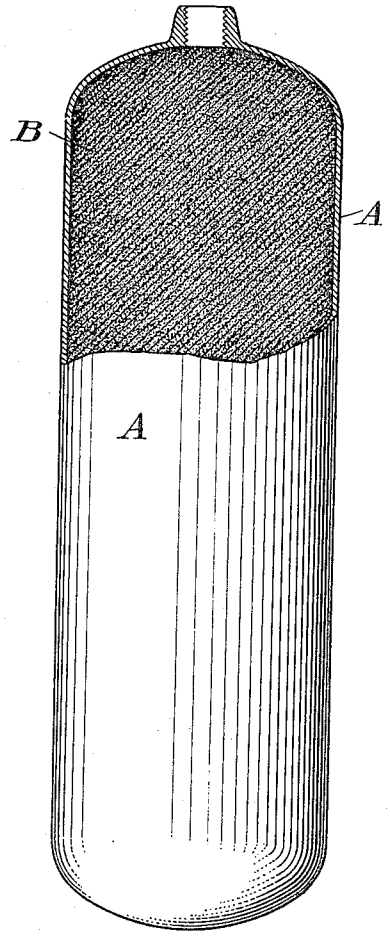
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PROCESS OF MAKING STORAGE MEANS FOR EXPLOSIVE FLUIDS.

APPLICATION FILED JULY 12, 1907.

1,175,607. Patented Mar. 14, 1916.



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Application filed July 12, 1907. Serial No. 383,414.

To all whom it may concern:

Be it known that I, CLYDE J. COLEMAN, a citizen of the United States, residing at the borough of Manhattan, city of New York, in the county of New York and State of New York, have invented a certain new and useful Improvement in Processes of Making Storage Means for Explosive Fluids, of which the following is a specification, reference being had therein to the accompanying drawings, forming a part thereof.

My invention relates to safety storage means for explosive fluids, particularly acetylene gas, and constitutes an improvement over my former patented invention covered by United States Letters Patent No. 822,826, of June 5, 1906, and has for its object to enhance the safety.

It is known in the art, as disclosed in my former patent above referred to, that a highly explosive fluid, such as acetylene gas, can be compressed and concentrated in an interstitial, porous, or cellular mass of dry or solid material, and that the explosive fluid can be safely conserved when thus concentrated, providing the pores, cells or spaces are not greater than a certain critical magnitude which is the limit of immunity to explosion for a corresponding given concentration or quantity of fluid stored. It is preferable, as also disclosed in the above-named patent, that the substance of the material itself should inherently exert an occluding or absorptive concentrative influence over the explosive fluid, as the use of a substance of this nature will greatly increase the safe storage capacity, and charcoal from the shell of the cocoanut is such a substance.

In my prior invention the interstitial fluid-containing mass is contained within a reservoir and is composed of disassociated or disintegrated solid particles which are compacted in the reservoir or container, the compacting being depended upon to maintain the fluid-containing interstices at non-explosive magnitudes.

In the present invention the fluid-containing interstitial mass is an integral solid, thus obviating all possibility of shifting or relative movement among its different parts or particles. The invention forming the subject of the present application comprehends a process and includes the forming of disassociated or disintegrated solid particles or granules into a solid integral mass having fluid-containing interstices of non-explosive magnitudes, and also includes the inclosure of such interstitial fluid-containing mass in a container.

My invention will be further explained by reference to the accompanying drawing, after which I shall point out my invention in claims.

The drawing shows, partly in section, a reservoir inclosing a solid integral interstitial mass. The reservoir or container A is formed of sheet metal and is preferably integral as shown. The filler B is a solid interstitial mass closely conformed to and completely filling the reservoir A. The filler B is composed of finely comminuted material or minute solid particles held together or integrated by a binder of adhesive material so as to constitute an integral solid mass having fluid containing interstices of non-explosive magnitude. Preferably the material of the minute particles is of a nature having an inherent absorptive influence on the explosive fluid.

In carrying out the process a granular material, for instance, granulated cocoanut-shell charcoal or, as another example, comminuted pumice stone, is moistened and thoroughly mixed with an adhesive solution which may be a solution containing from five to ten per centum of silicate of sodium, only sufficient adhesive solution being used to moisten the granules without filling the interstitial spaces between the granules. The moist mixture is then introduced into the container or reservoir and is tamped or otherwise compacted therein to produce a homogeneous mass throughout having fluid-containing interstices of non-explosive magnitudes. When the container has been thus completely filled with the damp mixture, heat is applied thereto to desiccate the mass and integrate the same to produce a solid integral block or single piece completely filling the container and precisely conformed thereto. The non-explosive magnitudes of the interstitial spaces in the solid mass will be permanently maintained by reason of the fact that any relative movement among the granules or particles is now rendered impossible. The application of heat may be conveniently accomplished by baking the filled container in an oven. The baking, besides thoroughly

drying and integrating the mass, causes it to expand and closely fill and tightly fit the container, such expansion probably being due to the effervescent effect of the evaporated escaping moisture. The final result is a container or reservoir filled with a dry homogeneous stone-like solid having fluid-containing pores or interstices of non-explosive magnitudes, such container and its filler constituting means for safely storing explosive fluids.

If desired the dry granular material may be placed in the container first and then moistened with the adhesive solution while within the container, but it is thought that it will usually be found most convenient to mix the adhesive solution with the granular material before introduction into the container.

It is also to be noted that the process of forming the filler itself does not necessarily involve the use of the container. A solid integral block of the filler mass could be formed by compressing or compacting in other ways than in the container. For example, it is within the process to form a solid filler block of suitable size and shape and then introduce it into a container or form a container around it.

It is also within the broader scope of my invention to employ a binder or cementing material which does not require the application of heat or baking to produce adhesion and unite the particles into an integral mass. For example, Portland cement might be employed and the moisture removed by subjecting the moist mass to a vacuum. Or, as another modification of the process, a dry adhesive material could be employed and the mass rendered integral by heavy pressure. In any case, only sufficient adhesive material is employed as will effect the integration or binding together of the granules or particles and not enough to fill or obstruct the interstitial spaces between the compacted granules.

When the solid particles of the solid integral mass are of fluid-absorptive and fluid-concentrative material, for example, charcoal of cocoanut-shell, the explosive fluid held in the minute pores of the material of the particles is in a much more highly concentrated state than that contained in the interstices or minute intercommunicating passages of non-explosive magnitudes formed between the integrated or cemented particles. For example, the explosive fluid absorbed into the minute pores by inherent concentrative influence of the material may be at two hundred or two hundred and twenty-five volumes of concentration when that contained in the interstitial spaces is at about sixty to seventy-five volumes of concentration. The increased concentration of explosive fluid within the pores is due to the inherent fluid-concentrative and absorptive effect of the material employed, and is possible with safety because of the extreme minuteness of the pores. Both the pores and the interstitial spaces are of non-explosive magnitudes for the fluid of the degree of concentration which they respectively contain. The sensible or outwardly communicated pressure is of course in both instances the same.

In carrying out my invention, the granules of filler material are compacted or tightly pressed together and then, while under compression caused to be set or fixed in this position by adhesion of each particle to its neighbors. The result is an integral interstitial mass in which the interstices have been reduced to the minimum permitted by the size of granules employed. Granules may be chosen of a size corresponding to the interstitial storage pressure desired. The manner in which the substantial uniformity of size is obtained is immaterial, but may be accomplished by screening out all particles exceeding or less than those of the desired size. It is of prime importance that the predetermined size limit should not be exceeded, as that would be dangerous, but the presence of smaller particles would only result in decreasing the total storage capacity.

When the filled container is to be used for the storage of fluid the mouth thereof or entrance thereto is provided with any usual or suitable closure, adapted for retaining the fluid in the container under the desired pressure and for permitting the charging of the container with fluid and the withdrawal of the fluid for use.

It is obvious that various modifications may be made in the process above particularly described within the principle and scope of my invention.

Claims:—

1. The process of making a filler for containers for storing explosive fluids, consisting in mixing a granular material having interstitial spaces with sufficient adhesive to bind together the granules while still leaving free interstitial spaces, tightly compacting the mixture to reduce all the interstitial spaces to non-explosive magnitudes for the degree of concentration of explosive fluid desired, and producing adhesion of the mixture while under compression to form an integral interstitial mass having fluid-containing interstitial spaces of non-explosive magnitudes and in which no relative shifting of the granules can occur, whereby the interstitial spaces will be permanently maintained at non-explosive magnitudes.

2. The process of making a filler for containers for storing explosive fluids, consisting in mixing a granular material of a pre-

determined size of granulation and forming interstitial spaces with sufficient adhesive to bind together the granules while still leaving free interstitial spaces, tightly compacting the mixture to reduce all the interstitial spaces to predetermined non-explosive magnitudes, and producing adhesion of the mixture while under compression to form an integral interstitial mass having fluid-containing interstices of predetermined non-explosive magnitudes in which the granules have to each other a fixed relation so that the interstitial spaces will be permanently maintained at the predetermined non-explosive magnitudes.

3. The process of making means for storing explosive fluids, consisting in mixing granular material having interstitial spaces with sufficient adhesive to bind together the granules while still leaving free interstitial spaces, tightly compacting the mixture into a container to reduce all the interstitial spaces to non-explosive magnitudes for a predetermined degree of concentration of explosive fluid, and producing adhesion of the mixture while under compression and confined in the container to form an integral interstitial mass within the container having fluid-containing interstices of non-explosive magnitudes and in which the granules have a fixed relation to each other so that the interstitial spaces will be permanently maintained at non-explosive magnitudes.

4. The process of making a filler for containers for storing explosive fluids, consisting in moistening a granular material having interstitial spaces with a wet evaporative adhesive to bind together the granules while leaving free interstitial spaces, tightly compacting the mixture to reduce all the interstitial spaces to non-explosive magnitudes for a predetermined degree of concentration of explosive fluid, and drying the mixture while under compression to form an integral interstitial mass having fluid-containing interstices of non-explosive magnitudes and in which the granules have a fixed relation to each other so that the interstitial spaces will be maintained at non-explosive magnitudes.

5. The process of making a filler for containers for storing explosive fluids, consisting in moistening a granular material having interstitial spaces with a wet evaporative adhesive to bind together the granules while leaving free interstitial spaces, tightly compacting the mixture to reduce all the interstitial spaces to non-explosive magnitudes for a predetermined degree of concentration of explosive fluid, and applying heat to dry and integrate the mixture while under compression to form an integral interstitial mass having fluid-containing interstices of non-explosive magnitudes and in which the granules have a fixed relation to each other so that the interstitial spaces will be maintained at non-explosive magnitudes.

6. The process of making a filler for containers for storing explosive fluids, consisting in mixing porous granules providing interstitial spaces between the granules with sufficient adhesive to bind together the granules while still leaving free interstitial spaces, tightly compacting the mixture to reduce all the interstitial spaces to non-explosive magnitudes for a given degree of concentration of explosive fluid, and producing adhesion of the mixture while under compression to form an integral interstitial mass having smaller fluid-containing pores in the granules for a higher degree of concentration of explosive fluid within the granules and also having fluid-containing interstitial spaces between the granules for a lower degree of concentration of explosive fluid and in which the granules will have a fixed relation to each other so that the interstitial spaces between the granules will be permanently maintained at fixed non-explosive magnitudes for the desired lower degree of concentration of explosive fluid therein.

7. The process of making a filler for containers for storing explosive fluids, consisting in mixing porous granules composed of material having fluid-absorptive and fluid-concentrative influence on the explosive fluid and providing interstitial spaces between the granules with sufficient adhesive to bind together the granules while still leaving free interstitial spaces, tightly compacting the mixture to reduce all the interstitial spaces to non-explosive magnitudes for a given degree of concentration of explosive fluid, and producing adhesion of the mixture while under compression to form an integral interstitial mass having smaller fluid-containing pores in the fluid-absorptive and fluid-concentrative material of the granules for a higher degree of concentration of explosive fluid within the granules and also having fluid-containing interstitial spaces between the granules for a lower degree of concentration of explosive fluid and in which the granules will have a fixed relation to each other so that the interstitial spaces between the granules will be permanently maintained at fixed non-explosive magnitudes for the desired lower degree of concentration of explosive fluid therein.

8. The process of making a filler for storing explosive fluids, consisting in moistening granulated charcoal of cocoanut-shell having interstitial spaces between the granules with a wet evaporative adhesive to bind together the granules while leaving free interstitial spaces, tightly compacting the mixture to reduce all the interstitial spaces to non-explosive magnitudes for a given degree of concentration of explosive fluid, and ap-

plying heat to dry and integrate the mixture while under compression to form an integral interstitial mass having smaller fluid-containing pores in the granules themselves for a higher degree of concentration of explosive fluid within the granules by absorption and concentration in their pores and also having fluid-containing interstitial spaces between the granules for a lower degree of concentration of explosive fluid between the granules and in which the granules will have a fixed relation to each other so that the fluid-containing interstitial spaces between the granules will be permanently maintained at fixed non-explosive magnitudes for the desired lower degree of concentration of explosive fluid therein.

In testimony whereof I have affixed my signature in presence of two witnesses.

CLYDE J. COLEMAN.

Witneses:
WM. ASHLEY KELLY,
ALBERT V. T. DAY.