

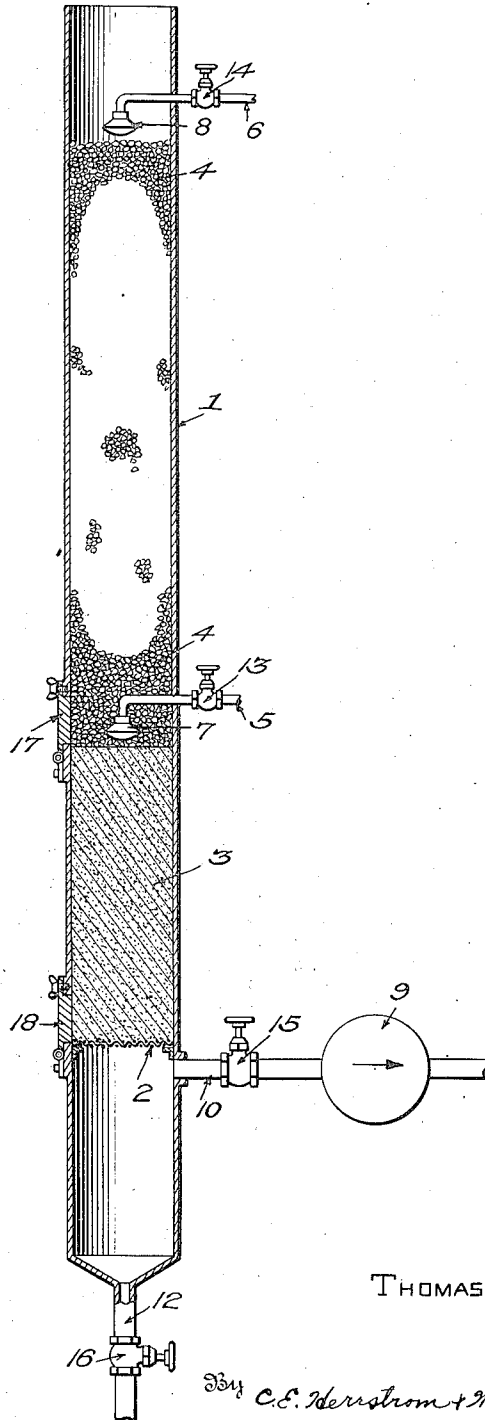
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2,373,100

DRYING PERMEABLE SOLIDS

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DRYING PERMEABLE SOLIDS

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1 Claim. (Cl. 34-9)

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The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

This invention relates to a method of reducing the liquid content of permeable materials and is particularly concerned with the reduction of the liquid content of high explosives.

In the processing of permeable material, i. e., materials that are crystalline in character and which have interstitial voids therein, it is frequently desirable to reduce the liquid content or to reduce the liquid content to a low and definitely known concentration. In arriving at such a condition, it has been the practice of the prior art to allow the material to stand for a period of time. This practice slows down the production rate of any such material, requires a large storage space for storing the material while draining and does not produce a material that is of the low liquid content desired in all cases.

Permeable materials have had their liquid content lowered by applying a suction to such material but even in this case as in the above method of drying a larger quantity of fluid is retained in the lower portion of the material than in the upper part of the material. The stratification of the liquid in the lower part of the permeable material is due to boundary conditions occasioned by the capillary structure of the granular aggregate and as above noted the total fluid content of the material is not as low as is perhaps desirable and the fluid content is not uniform throughout the material. If the fluid content is not uniform the determination of the fluid content of the material is difficult and inaccurate.

By the practice of the present invention the fluid content of a permeable material can be reduced and the stratification of the residual liquid content of a solid can be prevented.

In the practice of the present invention the permeable material is given a preliminary drying, preferably by applying a suction to the solid material, and then the solid to be dried is contacted at the foot of a column of said material or placed on a bed of material of greater capillarity than the material to be dried. Material having the greater capillarity may be formed of many materials and an example of such material is paper pulp, cotton, unglazed porcelain, granular fuller's earth and diatomaceous earth. The length of the column or thickness of the bed of material having the greater capillarity will be so controlled in reference to the size of the capillary tubes or spaces that capillary force will draw the liquid into the

remote part of the material having the greater capillarity and away from the material to be dried. To secure the drying in the shortest possible time, the bed of material should have such thickness and volume that the liquid absorbed will not substantially approach the saturation point of the material having the greater capillarity.

The material having the greater capillarity may have a washing fluid applied thereto during the absorption of the fluid from the material to be dried or after the drying has taken place. In washing the material having the greater capillarity it is advantageous to apply suction to the same in order to assist in the ready removal of the washing fluid from the material and to increase the rate of circulation of the same through the material having the greater capillarity.

The accompanying drawing illustrates, in longitudinal section, apparatus in which the process may be practiced. A columnar chamber 1 contains a suitable foraminous support 2 for the bed 3 of material of greater capillarity than the column of material 4 to be dried. Alternate inlet pipes 5 and 6, respectively, having distributors 7 and 8, are provided for the introduction of washing fluids into columnar chamber 1. A suction pump 9 is connected by a pipe 10 to the part of the columnar chamber 1 below the support 2. An outlet pipe 12 is connected at the base of the columnar chamber 1 to remove liquids accumulating therein. Valves 13, 14, 15 and 16 are provided to regulate the flow respectively in pipes 5, 6, 10 and 12. Numerals 17 and 18 indicate openings and closures therefor through which the dried material and material constituting the bed 3 may be removed from the columnar chamber 1. When material 4, containing in its interstices a proportion of liquid which is small in comparison with the volume of said material, is arranged in the form of a column above the bed 3 of material of greater capillarity than material 4 to be dried, liquid which wets material 4 tends to accumulate in greater proportion in the lower part of said column than in parts above this position, but not in sufficient amount or head to drain out of its own accord in the absence of the said bed 3. The liquid which accumulates in the lower portion of the column of material 4 descends into the said bed 3, and the liquid so descending moves to parts of said bed remote from the boundary between the said bed 3 and the column of material 4 being dried, namely, towards the bottom of said bed and away from the material being dried. In effect, therefore, the wetness at the base of the column

of material 4 being dried becomes transferred to said bed 3 and becomes distributed therein in more or less the same manner as it was previously distributed in the column of material 4. Thus, the process sets up a condition of low concentration of liquid in the bed 3 near the boundary between the bed and the column of material 4 treated, and a condition of higher concentration of liquid in the column of material 4 treated near the said boundary, whereby the liquid moves from the material 4 into the bed 3, and descends into the latter, under the combined influences of gravity and the greater capillarity of the material of bed 3.

I claim:

Process for removing liquid from discrete solid explosive material having interstices between discrete portions thereof and having liquid in said interstices in a proportion which is small in comparison with the volume of said discrete material, the said process comprising placing a column of said discrete material upon and vertically above a bed of material of greater capillarity than said discrete material and of sufficient thickness that liquid drawn from said column into said bed by capillary action can pass to parts of said bed which are remote from said discrete material.

THOMAS S. CHAPMAN.