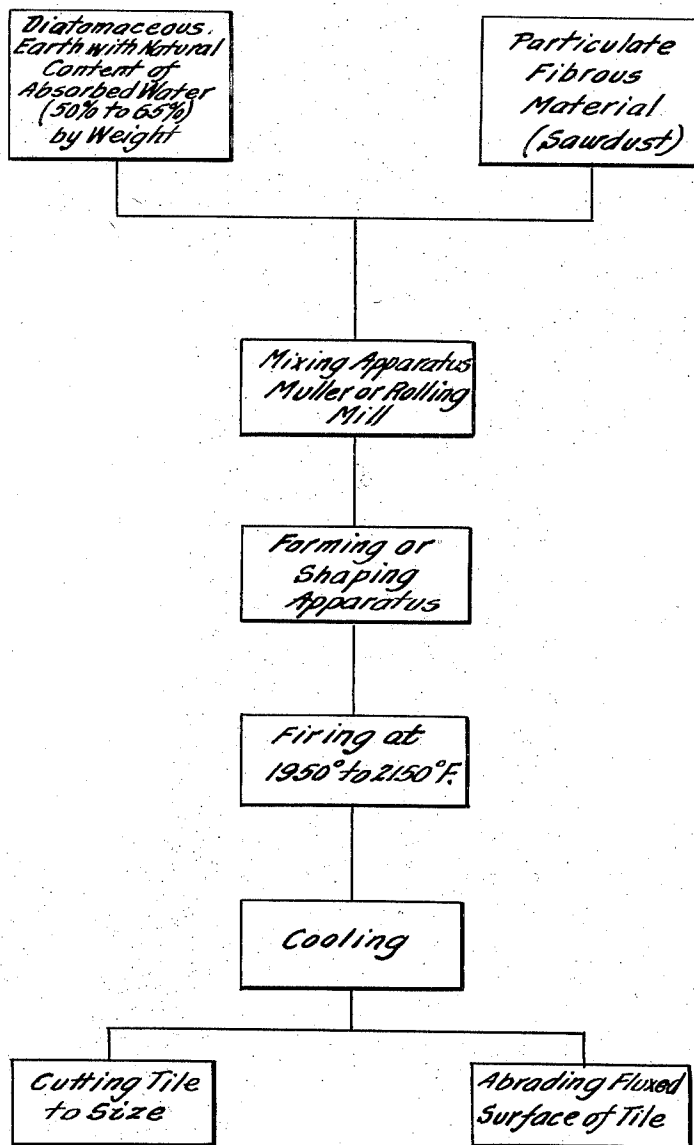


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ACOUSTICAL TILE COMPOSITION AND METHOD
OF MAKING ACOUSTICAL TILES
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ACOUSTICAL TILE COMPOSITION AND
METHOD OF MAKING ACOUSTICAL
TILES

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This invention is an acoustical tile designed particularly for use as a sound adsorption medium.

One object of the invention is to provide a tile of the character described which will function effectively as sound insulation and which at the same time possesses high fire resistance.

Another object of the invention is to provide a tile of the character described comprising diatomaceous earth and a carbonaceous material mixed in desired proportions and burned or fired to consume the carbonaceous material, thereby leaving voids, cavities, interstices, and the like distributed substantially uniformly throughout the body of the tile.

Another object of the invention is in so controlling the temperature applied to the tile during firing as to fuse only the exterior surfaces of the tile, leaving the interior surfaces thereof unfused.

Another object of the invention is to provide a method of making a tile of the character described whereby diatomaceous earth in its natural condition, namely the condition in which it is taken in its natural deposit or bed, is used without the addition of or the removal therefrom of any of its naturally absorbed water content.

Another object of the invention is to so mix the natural diatomaceous earth and the carbonaceous material that the latter is in effect impregnated with the diatomaceous earth so that when the carbonaceous material is removed by oxidation during the firing of the tile, the cavities or interstices within the body of the tile are characterized by filamentary, web-like, diatomaceous skeletal formations which greatly enhance the sound absorbing properties of the tile.

Another object of the invention is to prove a tile of the character described and having a base of diatomaceous earth, which by reason of the controlled firing, has high sound absorbing properties, high K factor heat insulation, and high resistance to fracture.

These and other objects of the invention will become apparent from the following specification wherein the tile of the present invention is described together with a preferred method of making it.

The accompanying drawing diagrammatically illustrates the method of the present invention.

Attempts have heretofore been made to make acoustical tile from a mixture of diatomaceous earth and carbonaceous material, but the resulting tiles have been unsatisfactory either because of the difficulty in mixing the diatomaceous earth

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and carbonaceous material or by reason of the fact that the resulting tile, due to improper firing temperatures, was deficient in sound insulating properties or was so fragile as to render it entirely useless in commercial building operation. With these facts in mind, the present invention seeks to obviate these difficulties by utilizing diatomaceous earth as it occurs in a native bed. Generally speaking, diatomaceous earth deposits are characterized by a relatively high natural content of absorbed water. This naturally occurring water runs between 50% and 65% by weight of the deposit.

The present method provides for using the diatomaceous earth as it is taken from the bed without adding to or removing from it any of its natural water content. The diatomaceous earth so obtained is mixed with a desired percentage of fibrous or granular carbonaceous material such as sawdust, tobacco cuttings, or similar particulate vegetable fiber. Generally speaking the resulting sound absorbing property of the tile will bear a more or less direct relation to the percentage of carbonaceous material employed and it has been found that satisfactory tile can be made by employing as high as 65% by weight of carbonaceous material. The desired percentage of carbonaceous material and the diatomaceous earth containing its natural content of absorbed water are mixed by any suitable means to thoroughly impregnate the carbonaceous material with the earth and to uniformly distribute the same through the earth. Preferably, the mixing should be done by a muller or roller mill to thoroughly incorporate the diatomaceous earth and the carbonaceous material.

After the earth and carbonaceous material have been thoroughly and uniformly mixed and the fibers of the carbonaceous material have been impregnated by the earth, the mass of earth and fibers are shaped to desired size by any convenient means and the formed body is then placed in an oven or kiln and gradually brought to a temperature at which the exterior surfaces of the body are fluxed. It is important that the exterior surfaces only of the body be fluxed with the interior of the body remaining unfluxed. The temperature range in which this condition occurs has been found to fall within 1950° F. to 2150° F. The oven or kiln should therefore be provided with conventional controls whereby the temperature can be accurately regulated. After firing is completed, the body is quickly cooled to room temperature.

By subjecting the tile to the heating or firing

step previously described, the carbonaceous material distributed throughout the mass is oxidized, leaving the body of the tile containing pores, cavities, or interstices from which the carbonaceous material has been burned. By controlling the temperature as previously outlined, so that the interior of the tile is maintained below fluxing temperatures, the cavities thus formed are found to contain filamentary, web-like, diatom skeletal formations which greatly enhance the acoustical properties of the tile and increase its sound absorbing properties. Thus it has been found that a tile made in accordance with the foregoing method and having a thickness of approximately one inch has an efficiency of approximately 80% for sound vibrations within the range of 500 to 2500 cycles.

It has been found desirable in making tiles in accordance with the present invention to make a rather large column of the formed mixture of diatomaceous earth and carbonaceous material having cross section dimensions of the desired finished tile, and then, after firing and cooling the formed body in the manner hereinbefore described, sawing or otherwise cutting the column into tiles of desired thickness. However, if desired, the mixture of diatomaceous earth and carbonaceous material may be formed into individual tile bodies, and these bodies fired in the same manner. This procedure will, of course, result in one face of the tile, that exposed to the furnace temperature, being fused with the resulting loss of some of its sound insulating property, but this can be remedied by abrading the fused face of the tile to expose the cavities and interstices on that face which have been sealed by the fluxing or which have been covered by conventional handling methods employed in connection with the wet mixture of earth and carbonaceous material in forming the individual tile.

The tile resulting from the present method and particularly by reason of the controlled fluxing of the exterior surfaces thereof, is found to possess a high degree of resistance to fracture so that it may be readily handled by artisans in incorporating it into walls, partitions, ceilings, and the like. Also, the tile of the present invention is characterized by a sufficient hardness to inhibit objectionable dusting while providing a tile sufficiently soft in texture to give good sound absorption.

It is of course, to be understood that the tile may be made plain or may be provided with splines or tongues and grooves to facilitate mounting the same in accordance with conventional practice.

As previously indicated, the resulting tile is fire proof to a remarkable extent, has a high K factor, will resist temperatures up to 2800° F. and has a marked sound absorbing property characterized by 80% efficiency through the range of 500 to 2500 cycles for a tile having a thickness of approximately one inch.

Having thus described the invention, it is apparent that the same provides a simple method employing native diatomaceous earth together with its natural absorbed content of water, and fibrous carbonaceous material fired to a temperature at which the exterior surfaces only of the body of tile are fluxed while the inside body portions of the tile remain unfluxed. This result is readily accomplished by following the herein described methods due to the natural-

ly high heat insulating properties of the diatomaceous earth.

In respect to the means which may be employed for forming and cutting the mass of diatomaceous earth and fibrous carbonaceous material to form slugs or to form individual tiles, the machinery now employed in the brick and tile industry for this purpose will be found adequate. Thus the mixture may be extruded through a die and the extruded material cut into slugs or individual tiles by a traveling cutting table as is common in the art. When the individual tiles are thus formed, the cutting of the extruded material tends to preclude the formation of voids opening into the face of the tile formed by such cutting operation due to the plastic nature of the material when cut, and it is for this reason that the fused faces of the individual tiles are abraded, as hereinbefore suggested, to improve their sound absorbing properties. The columns of extruded material when the finished tiles are made by cutting the fired block, may be any convenient length such as two to three feet in length and the final cutting of such fired blocks may be performed by conventional gang saw apparatus or the like. All of the apparatus herein referred to is old in the art, and forms no part of the present invention.

Having thus described the invention, what is claimed as new is:

1. The method of making an acoustical tile comprising mixing diatomaceous earth containing at least 50% by weight of naturally occurring absorbed water with particulate fibrous carbonaceous material until the latter is distributed substantially uniformly throughout said diatomaceous earth, forming the resulting mass into a body of desired form, and then gradually raising the temperature thereof sufficiently to flux the exterior surfaces only of said formed body while concurrently oxidizing said carbonaceous material therein to form voids within said formed body.

2. The method of making an acoustical tile comprising mixing diatomaceous earth containing at least 50% by weight of naturally occurring absorbed water with up to 65% by weight of particulate fibrous carbonaceous material until the latter is distributed substantially uniformly throughout said diatomaceous earth, forming the resulting mass into a body of desired form, and then gradually raising the temperature thereof sufficiently to flux the exterior surfaces only of said formed body while concurrently oxidizing said carbonaceous material therein to form voids within said formed body.

3. The method of making an acoustical tile comprising mulling diatomaceous earth containing between 50% to 65% by weight of naturally occurring absorbed water with particulate fibrous carbonaceous material until the latter is distributed substantially uniformly throughout said diatomaceous earth, forming the resulting mass into a body of desired form, and then gradually raising the temperature thereof sufficiently to flux the exterior surfaces only of said formed body while concurrently oxidizing said carbonaceous material therein to form voids within said formed body.

4. The method of making an acoustical tile comprising mixing diatomaceous earth containing between 50% and 65% by weight of naturally occurring absorbed water with particulate fibrous carbonaceous material until the latter is distributed substantially uniformly throughout said

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diatomaceous earth, forming the resulting mass into a body of desired form, and then gradually raising the temperature of the formed body to a temperature within the range of 1950° F. to 2150° F. to flux the exterior surfaces only of said formed body, while concurrently oxidizing said carbonaceous material therein to form voids within said body.

5. The method of making an acoustical tile comprising mixing diatomaceous earth containing between 50% to 65% by weight of naturally occurring absorbed water with particulate fibrous carbonaceous material until the latter is distributed substantially uniformly throughout said diatomaceous earth, forming the resulting mass into a body of desired form, placing the formed body in an oven and gradually raising the temperature thereof until the exterior surfaces thereof only are fluxed and concurrently oxidizing the carbonaceous material while retaining the interior portions of said formed body unfluxed.

6. A plastic mix for tile comprising diatomaceous earth having a naturally absorbed water content ranging between 50% and 65% by weight and particulate fibrous carbonaceous material ranging up to 65% by weight of the earth, said ingredients being intimately mixed, with the car-

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bonaceous material substantially uniformly distributed through the mass of diatomaceous earth.
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