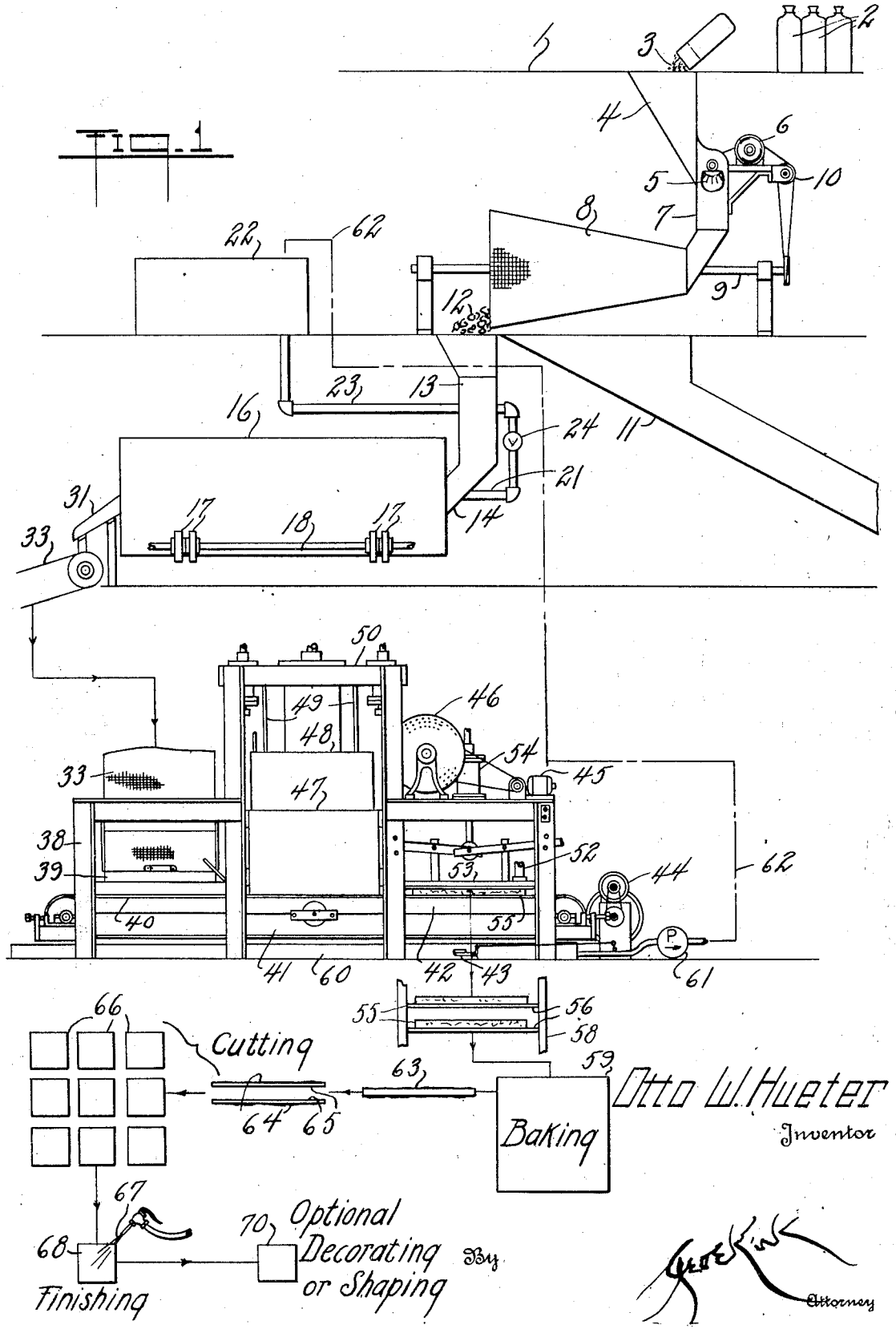
Jan. 11, 1944. O. W. HUETER 2,338,813

METHOD OF MANUFACTURING SOUND DEADENING MATERIAL

Filed March 25, 1940 2 Sheets-Sheet 1



Jan. 11, 1944. O. W. HUETER 2,338,813

METHOD OF MANUFACTURING SOUND DEADENING MATERIAL

Filed March 25, 1940 2 Sheets-Sheet 2

FIG. 2

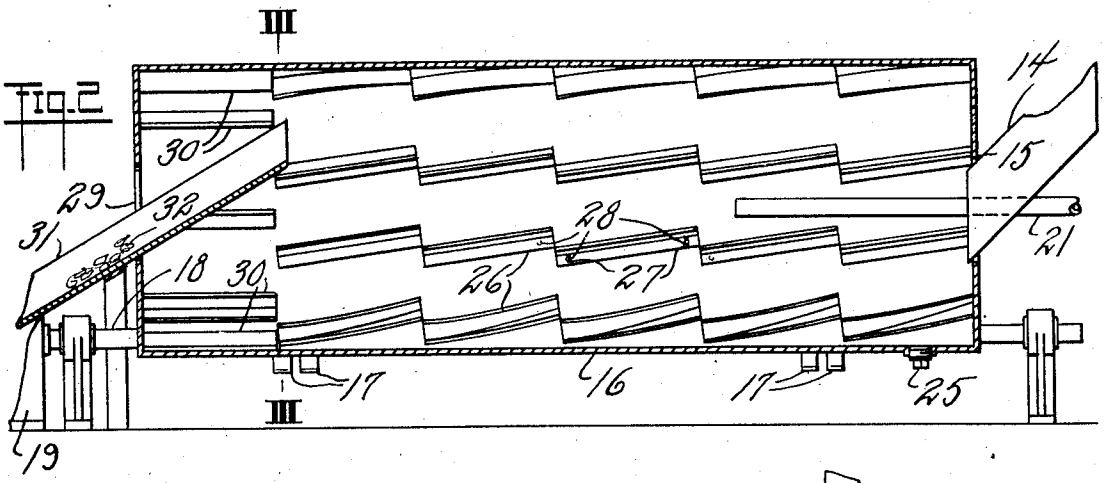


FIG. 3

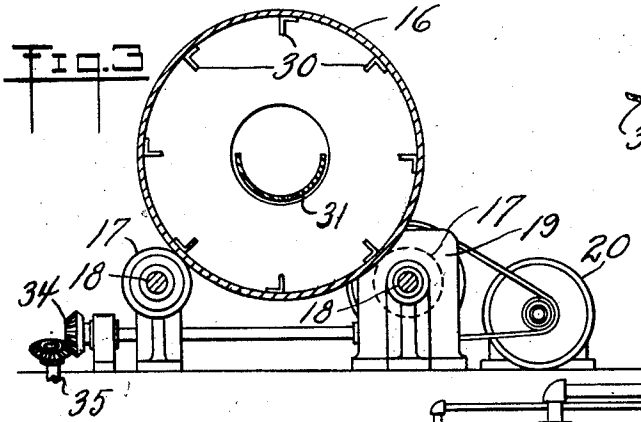


FIG. 5

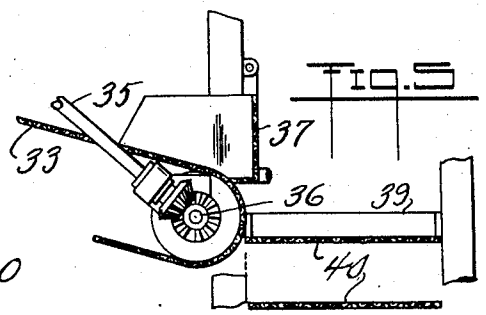
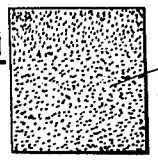


FIG. 6

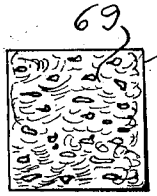


V

FIG. 4

V

FIG. 7



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METHOD OF MANUFACTURING SOUND DEADENING MATERIAL

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Application March 25, 1940, Serial No. 325,755

2 Claims. (Cl. 92—55)

This invention relates to promoting desirable audibility by quieting or absorbing undesirable noises by special material, and the production of the material therefor.

This invention has utility in working up fiber, preferably inorganic, into low specific gravity, merchantable shapes, bodies, or slabs of attractive appearance, even to effectively simulating travertine.

Referring to the drawings:

Fig. 1 is a diagrammatic view of an installation for carrying out the production herein;

Fig. 2 is a longitudinal view partly in section through the portion of the equipment to mix a binder and a mineral fiber such as rock wool or silica fiber stock;

Fig. 3 is a section on the line III—III, Fig. 2, showing the association of the discharge spout with the binder associating section, as well as the drive therefor;

Fig. 4 is a view in elevation of the press;

Fig. 5 is a section on the line V—V, Fig. 4;

Fig. 6 is a view of an untreated section of the product; and

Fig. 7 is a view of a treated section of the product.

In carrying out the invention herein, upon upper floor 1 may be stored bags 2, say of rock or mineral wool or silica fiber stock. These bags 2 may be opened by an operator on such floor and the contents 3 say of mineral wool dumped into hopper 4 to flow down to picker 5 as driven by motor 6. This picker pulls the fiber of this mineral wool from the hopper 4 to flow into down spout 7 to be delivered to flaring screen 8 rotated on shaft 9 as driven by transmission 10 from the motor 6. In this rotation of the tapered screen 8, glass-like globules, say from rock or mineral wool, termed buttons, shot, or seeds, may pass through this screen 8 and be discharged by chute 11.

In this rotation, the fibrous matter tends to accumulate in bolls or small clusters 12, possibly to the size or a little larger than a cotton boll. These bolls 12 from this de-seeder 8 pass by down spout 13 into chute 14 extending into intake opening 15 (Fig. 2) of tubular section or drum 16. This drum 16 is sustained by a plurality of rubber tired rollers 17 (Fig. 3) on parallel horizontal shafts 18 having speed reduction 19 from motor 20. In practice, this tubular section or drum 16 may be rotated from 5 to 6 R. P. M. in handling a charge of say 70 pounds or two sacks 2 of mineral wool 3.

Into this container or rotary shell 16 there may be supplied by pipe 21 liquid binding material. This binding material for 70 pounds of rock wool may be made up to slightly over 500 pounds of water. In such volume of water, there may be mixed up to 8 pounds of ordinary laundry starch of corn starch. This pre-mixing before flowing into the pipe 21 may occur in vat 22 (Fig. 1) in which by heating the starch is dispersed in the water to form a thin gel. The flow of this liquid binder from the vat 22 may be by duct 23 past valve 24 to the pipe 21 as a control for the rate of this flow, to the end that the liquid in the drum 16 may be to a level of not to exceed 6 to 8 inches, with the drum or chamber 36 inches in diameter and some 9 feet long.

When operation is completed, drain plug 25 (Fig. 2) may be opened to take the liquid out of this horizontal drum 16. This drum 16 has attached to the inner wall thereof vanes or flights 26 which are arranged in annular adjusted pitch series and have slotted portions 27 to be engaged by rivets 28 in determining the angle of pitch to be taken thereby in this rotation of the shell or drum 16. These flights 26 are in staggered relation in successive sections, in the particular instance shown there being five of such series in progress from the intake opening 15 toward discharge outlet 29. The inner side of this rotated shell adjacent this outlet 29 has flights 30 desirably of straight form, instead of pitched as are the flights 26. The rate of feed and the holding is desirably such that in this rotation these flights 30 may lift the fiber bolls 12 as now saturated with binder from the vat 22, and as such are lifted and come near the top of this tubular drum 16, they may fall on downwardly inclined discharge chute 31 as binder-associated fiber clusters or bolls 32. The inclination of this chute 31 is such that these liquid containing bolls may slide freely down therefrom to land on less steep conveyor screen 33. This screen may be of rust-proof wire cloth, say of the mesh of mosquito netting, twelve to the inch.

From the motor 19 (Fig. 3) there is transmission connection 34 to shaft 35 (Fig. 5) to effect driving of shaft 36 and accordingly synchronizing the travel of this screen 33 from the chute 31 with the operation of this drum 16 as associating the binder with the fiber against pulling or breaking such fiber. The fibrous mixture in the clusters 32 from the conveyor 33 normally tumble into hopper 37. This means that in normal functioning an operator at station 38 (Fig. 1) spreads these clusters 32 in tray 39 as the

hopper 37 is clear of the porous or mesh conveyor 33. This tray 39 is on mesh belt 40. This mesh belt 40 extends from the charging station 36 to press station 41 and delivery station 42. At this delivery station 42 is treadle 43 to control drive 44 as a step for progressing a charge of these clusters 32 from the tray 39 at the station 38 out of such tray to the station 41. During this interval of operation the hopper 37 may be closed. The operator at this station 38, in practice, may by hand spread this accumulation of clusters 32 to have such approximate a level say of 4 or 4½ inches when the tray may be 5 inches deep. In the transit therefrom, such may be to the press station 41, generally that of Russell and Savidge Patent No. 1,806,024, of May 19, 1931.

As to this press control, motor 45 may operate timing device 46 in the valve control for such sequence that with box 47 and press 48 in clearance of the conveyor belt 40, a charge from this tray 39 of the accumulation of clusters 32 thus is brought under the press 48. Form 47 descends to close the bounds for this section at this station 41. Then in sequence press 48 descends. In practice, this descent is to limit position as determined (Fig. 4) by rods 49 from frame 50 having stop connections 51 limiting the descent of this press 48. This descent limit may be to 1¾ to 2 inches clearance from the endless porous supported belt 40. This has effected a further removal of moisture or liquid of the binder from the fibrous material as associated therewith and to an extent that the grouped mass has a rather definite form.

The next step occurs as the timing device 46 has cleared the press 48 and the form 47 is from this fibrous mass at the station 41. To this end, the operator at the station 42, through the treadle 43, may effect the measured travel as operated by the device 44 in the bringing of this formed body from the station 41 to the station 42.

At this station 42, suction through flexible connection 52 (Fig. 4) may act on member 53 to such an extent that as cylinder 54 effects a lifting of this member 53, this rectangular section of approximately 2 inches in thickness and possibly 3 feet on a side, is, as mass block 55, lifted clear of this foraminous conveyor 40. An operator may then thrust pallet 56 under this block 55 over the conveyor 40. The operator at the station 42 then operates valve 57, the suction from the line 52 is broken, and the block 55 descends to the pallet 56 and may be shifted to carrier 58 as a multi-deck car, and then transferred to ovens 59 to experience a baking operation. This baking may be for a period of 18 to 72 hours. Its primary purpose is to fix the binder with the fibrous matter into a unit.

The free liquid has been largely drained therefrom by the conveyors 33, 40, and may be taken from sump 60 (Fig. 1) by pump 61 and driven through duct 62 back to the vat 22. This means there may be such economy in operation hereunder that as the material in the vat 22 is maintained of uniform character, this sequence of operations may be maintained to approximate continuity, instead of bath functioning, even at the press forming, wherein the sequence may be so timed that there is only slight interruption of the shiftings.

In the baking operation, the temperature may run up to 300° to 350° F. and the blocks 55 be superficially browned, notwithstanding the fiber as supplied may be of a nearly white or cream color, at least a lighter shade than the brown from the baking. This drying out or supplemental dehydration in fixing the binder with the fiber gives a body strength to the blocks.

From these ovens or baking station, blocks 63 may be taken, and say if the blocks be of 36 inch square form and approximately 2 inches thick, subdivision may occur in a desired or efficient sequence, including slicing or severing to reduce the thickness and leave baked backing 64 on opposite sides and intermediate, say band saw finished faces 65 for the half thickness sections from the major section 63. Either before or after this slicing to reduce the thickness, the blocks may be given a desired pattern or tile form by lateral trimmings, say likewise by band saw, to form squares 66 (Figs. 1, 6). These blocks 66 as acted upon by high speed saw at slicing, forming face 65, have such face 65 of rather symmetrical form and to an extent carrying fines or dust. Accordingly, air blast 67 (Fig. 1) against this face 65 results in finished fiber-lined tile-like product or slab 68 (Figs. 1, 7) having tufa-like or porous travertine face 69. This air blast 67 may be just of air supply or with tinting simultaneously therewith, thus to apply pigment. Accordingly, from this station for removal of the fines to produce travertine appearance face 69, there may be transit to station 70 (Fig. 1) for giving it other than rectangular form or bevel for pigment or other treatment in decorating or specially adapting for use.

The experience in practice has been that, with these sections 68 of approximately 1 inch thickness and 12 inches square, there is a product which can be nailed without fracture. It is of such light weight that per board foot it runs under 1½ pounds and as low as ¾ pound. It is substantial to hold its form. While one may press a thumb nail into it, it is of such firm body that thrusting a flat key into the medial portion of one edge, it may hold itself in horizontal position therefrom without fracture. Assembly of these sections in a wall or especially in the ceiling of auditoriums, class rooms, and clubs, gives this a great value. It has a superior property for suppressing echoes and undesirable noises as may tend to resound and render meeting places or even stores and eating places undesirable. It is quickly and easily applied without materially increasing the building load upon the wall where placed. It is susceptible of any range of decorative treatment. This means there is as wide a range of use as may meet the whims or tastes of one seeking advancement, even for heat insulation as against sound deadening values or even wall finish.

This baked backing or crust-like face 64 has a strength-imparting quality, even though in some instances it may not appear sightly. When located for the backing it is accordingly effective as a dam, especially against moisture penetration either way, notwithstanding the bulk or body portion of this product be so porous.

In lieu of or in addition to the steps for finishing which may go even to the introduction of pigment by spraying or brush applying, other steps may be taken. Upon the finished article this may be to a decorative degree as may be found to meet the purposes. In the body for the material, the fiber may not necessarily be all taken as white, but may be variegated or to the degree of common tone sought. Other factors of eye effect may be introduced with or due to the binder even as to color. Additional ingredi-

ents may be included even as to other than inorganic fiber and as to other filler than the binder, organic or inorganic. However, with the purpose uppermost for range of achievement as a sound deadening or absorption face, the retention of the properties from this fiber and binder are deemed important in retaining the fiber length for low specific gravity in a fireproof product.

In the carrying out of the invention herein, there is a range in the kind of fiber, but that which is more particularly adapted hereto is the silica fiber from blast furnace slag or so-called rock wool. The binder herein may have a range in the particular type of starch or other analogous agent. It is important, in the commingling of a fiber with this binder, to avoid disintegrating or breaking up of the fiber while efficiently dispersing the binder therein. As so sogging down with natural drainage therefrom, a degree of compactness at the station **38** may exist to vary the extent of filling or loading into the tray **39**. The action of the press at the station **41** for mechanically reducing the excess moisture may be in a range even somewhat less than reducing the volume by half. The purpose is that the material as reaching the station **42** may be sufficiently compacted to hold its shape and be of dimension for the subdividing with the single slicing for using the two outer large flat sides as backers. The thickness of such separate parts may be even in the range of ½ inch. In practice, this approximates usually from ¾ to ⅞ of an inch in thickness.

The fiber face **69** as cleaned has such fiber not only the factor for the voids but to some extent contributes to the outline or ornamental tracing portion at the face. In the event there be desired peculiar coloring beyond that adopted for or natural in the composition, various steps adopted may even be beyond that of spraying or brush applying, as stippling or dipping.

In the matter of assembly or finished placement, such is in accordance with building requirements and may be by adhesive, plastic, interfitting, or supplemental framing or mounting means or strips, whether concealed or decorative. In this connection, where it is important or desired to harmonize about irregularities, configurations herein may be adopted, even of the molding type.

In the adoption of special shape for working to dimension, this may be effected by face dressing the cast or press formed body or strip. This dressing is nicely effected by feeding the strip under a high speed abrasive wheel from the surface of which may be effected a curve, say ogee, or be merely to dress the dimension or bevel the corners for the ultimate block or tile section. Furthermore, in the instance there be in point a special thickness departing from that of the slicing or medial sawing, abrasive wheel or planer may work such to the size or dimension desired.

For this nice filling in or fitting between the sections as blocks or tile, it is important in the minimizing of culls that the edge and back dimensions be full to the point desired. Accordingly, in the stage between the removal from the press at the vacuum lift station **42**, the support may be one with definite bounds and the operator may fill in shortcomings of the freshly pressed block and even effect a supplemental squeeze thereat prior to inserting the block on the trucks for placing into the ovens or for baking.

It is important in the completed article hereunder as adopted for acoustical purposes to leave the back on the respective blocks or tiles. This dam or crust, besides the physical strength, has the non-breathing attribute contributing materially to the acoustical value and makes the tile a complete response in sound control.

Due to the lack of excessive hardness for frangibility and the inherent toughness, points analogous to those adopted by glaziers may protrude from the respective sections as supplemental interlock between these sections as laid together in completing an extent of surface. These points or attaching means are essentially for assembling in the building structure and may be initially inserted at the mounting either in the block or anchored on the surface and supplementally in the block or tile.

What is claimed and it is desired to secure by United States Letters Patent is:

1. In the manufacture of slabs from silica fiber stock in fiber clusters, maintaining such clusters as bolls in mingling with a liquid binder, lifting the bolls from the liquid, further draining excess liquid therefrom and reducing a quantity of the bolls to block form by pressing into flat sheets sufficiently for the bolls to merge into a surface of continuity, baking to supplement form holding and effect additional liquid removal therefrom, and thereafter slicing parallel to said surface to aid in developing tracings and to expose voids for a face of the slab, whereby said face presents the appearance of porous travertine.

2. In the manufacture of slabs from mineral wool clusters, maintaining such clusters as bolls in mingling with a liquid starch binder, lifting the bolls from the liquid, further draining excess liquid therefrom and reducing a quantity of the bolls to block form by pressing into flat sheets sufficiently for the bolls to merge into a surface of continuity, baking at a temperature of 300° to 350° F. to supplement form holding and effect additional liquid removal therefrom while imparting a crust-like face to the flat sheets, and thereafter slicing parallel to said surface to aid in developing tracings and expose voids for a face of the slab, whereby said face presents the appearance of porous travertine.

OTTO W. HUETER.