

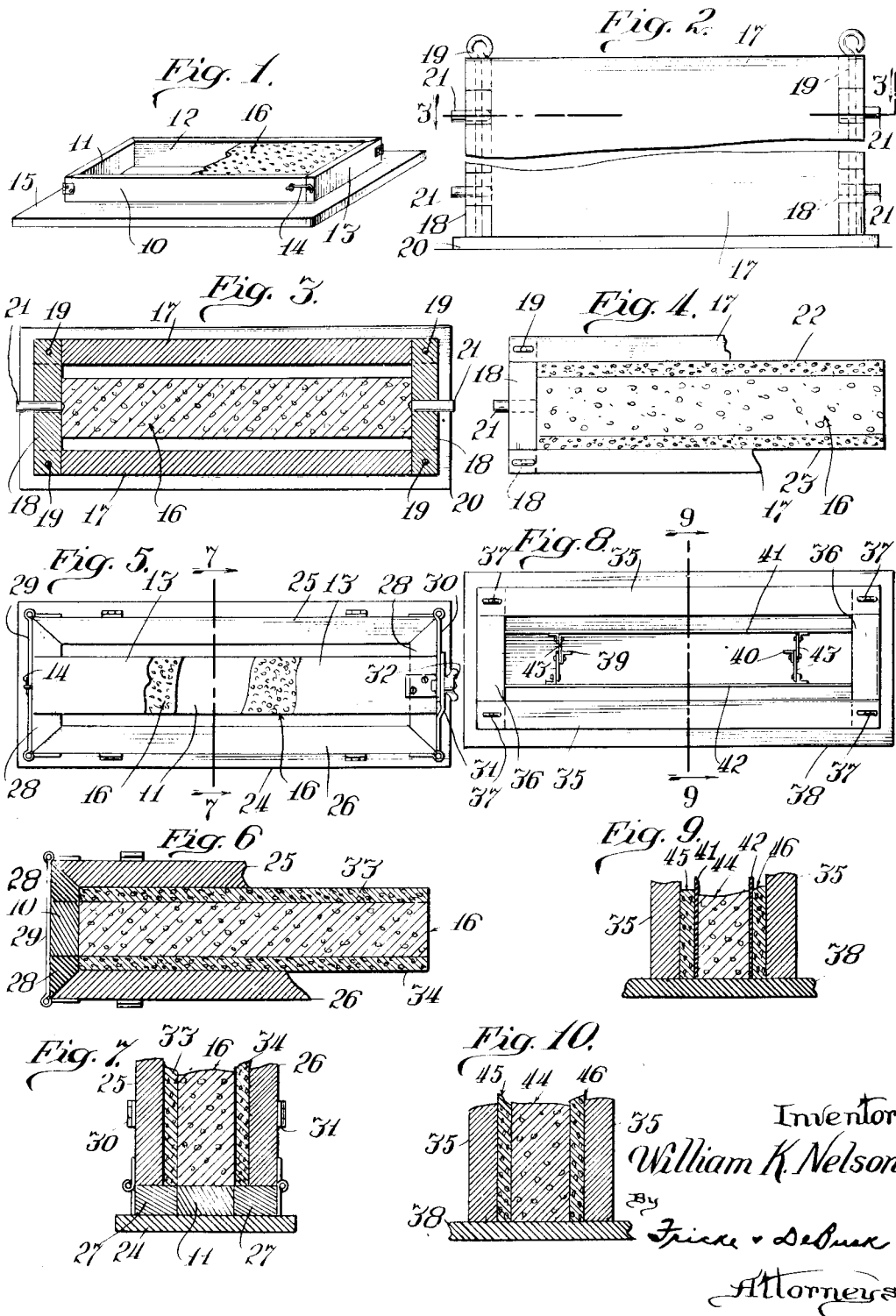
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INSULATING BLOCK

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INSULATING BLOCK

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My invention relates to heat and sound insulating blocks, and it has for its object the production of a novel form of block which shall have very high insulating qualities while at the same time having such strength as to enable it to stand up under normal conditions of handling and shipment without undue danger of breakage.

In the use of a material such as that described and claimed in Ashenhurst Reissue Patent No. 15,952 of November 25, 1924, relating to a mixture of calcined gypsum and other ingredients adapted when mixed with water to aerate or expand and set and harden in cellular form, if the lighter forms of the material be used exclusively for forming an insulating block, the block so produced is of very high insulating value but of insufficient strength to enable it to be shipped to advantage. Under such circumstances, a builder is practically limited to the formation of blocks on the job by the workmen there available and under whatever conditions may there exist as to weather, water supply, etc. Moreover, ordinarily under such circumstances it would be necessary to place the blocks immediately in position in the partition, floor, roof, or other wall being insulated, without waiting the necessary several days for satisfactory air drying and complete drying of the blocks prior to their use. When the fresh blocks or the only partially dried blocks are so used without due precautions for eliminating the surplus water held mechanically by the material of the blocks, such surplus water is likely to escape and cause warping, rusting or other deterioration of the adjacent building parts.

As an alternative, the heavier forms of the material may be used exclusively in order to give the block the requisite strength for shipment and other handling necessary for building operations. This, however, cuts down very materially the insulating value of the block and increases very materially the weight of the block. Inasmuch as the weight of the insulating material is very often a controlling and limiting factor, it is often impossible to obtain the desired insulating value in this manner.

It is one of the objects of my invention to provide a block of this or other suitable cellular insulating material which shall have the desired insulating value uniformly throughout the length and breadth of the block, and which shall be protected by a layer or layers of such strength as to make the block suitable for shipment and other necessary handling, thus making possible the manufacture of the block at the factory under approved conditions and making easy the substantially complete drying of the block before its use in the wall.

It is one of the objects of my invention to form a block of any suitable cellular insulating material having a face or faces formed of a stronger material and bonded to the faces of the intermediate insulating material, the several layers of the different materials being evenly spread throughout the length and breadth of the block so that the block shall have uniform insulating value from end to end, whereby a wall formed of the blocks shall be of uniform insulating effect throughout when jointed with plastic material of the same or similar insulating character.

It is another object of my invention to improve blocks in sundry details hereinafter pointed out. The preferred means by which I have produced my improved blocks are disclosed in the drawing and are hereinafter specifically described. That which I believe to be new and desire to cover by Letters Patent is set forth in the claims.

In the drawing,—

Fig. 1 is a perspective view of a form of mold and showing therein a fragmentary portion of a block to be used as a part of an insulating block embodying my improvements.

Fig. 2 is a side view, partially broken away, showing the form of mold used for completion of the block formed initially in the mold of Fig. 1.

Fig. 3 is a horizontal sectional view through the mold in readiness for a casting operation, having been taken on the line 3—3 of Fig. 2.

Fig. 4 is a top plan view of the mold of

Fig. 3, partly broken away, showing a block in position as cast therein.

Fig. 5 is a top plan view of a modified form of molding apparatus comprising a mold of the form shown in Fig. 1, together with co-operating mold parts for forming the complete block, a portion of the intermediate mold and the block element formed therein being broken away at the middle.

Fig. 6 is a horizontal sectional view through the molding apparatus shown in Fig. 5 with the block completed therein, a portion of the mold being broken away at one end.

Fig. 7 is a fragmentary sectional view, being taken substantially at line 7—7 of Fig. 5.

Fig. 8 is a top plan view of a second modified form of molding apparatus for producing my improved block by a slightly different method.

Fig. 9 is a fragmentary sectional view through the molding apparatus of Fig. 8 after the pouring of the mold, being taken substantially at line 9—9 of Fig. 8; and

Fig. 10 is a view similar to Fig. 9 but showing the completed block.

Referring now particularly to Figs. 1 to 4 inclusive as illustrative of one means by the use of which my improved block may be produced, 10, 11, 12 and 13 indicate the bars of an open frame mold, such bars being hingedly connected together in series at their respective end portions and held releasably in the form of an open frame as shown by means of a hook 14. With such mold in position on a slab 15 formed of steel or other suitable material, a block 16 is cast therein, the surplus material, if any, being screeded from the top face flush with the edges of the bars.

In the form as shown in the drawing, the block 16 is designed to be 30 inches long, 12 inches wide, and two inches thick, and may be formed of the material described in the aforesaid patent to Ashenhurst, with the ingredients of such proportions as to form a porous cellular material of a weight of about 12 pounds per cubic foot. I have found that material of that weight can be produced by the use of the following ingredients and proportions,—100 pounds of calcined gypsum, 3½ ounces of commercial retarder, 6½ pounds of a suitable carbonate, such as calcium carbonate, and 12½ pounds of aluminum sulphate containing water of crystallization, all of such ingredients being finely ground and thoroughly mixed in a dry state and then added to a suitable quantity of water.

When the block 16 has been formed and set sufficiently to hold its shape, the mold is removed from the block, this being accomplished by releasing the hook 14 and folding the bars successively away from the edges of the block. The block is then inserted in

centered position in the mold shown in Figs. 2 and 3, such mold comprising oppositely disposed plates 17 held in spaced relation by the plates 18, the several plates being releasably connected together by means of removably mounted pins 19 passing through the dove-tailed edge portions of the plates. The mold is supported on end upon a slab 20 which in effect forms a part of the mold. The block 16 is held in centered position between the plates 17 by means of pins 21 slidably mounted in the plates 18, such pins being adapted readily to penetrate the cellular block 16 sufficiently for steadying it in centered position.

In the construction shown, the plates 18 are of sufficient width to provide a distance of 3 inches between the inner faces of the plates 17, so that each of the faces of the block 16 is thus held half an inch away from the face of the adjacent plate of the mold. While the mold is placed on end in the construction shown so as to reach 30 inches above the slab 20, it will be understood that if desired a mold might be arranged of similar formation but resting on its side so as to reach 12 inches above the slab 20, the sides 18 being correspondingly shortened to suit such changed conditions.

With the parts in the position as shown in Fig. 3, a plastic material is poured into the mold on opposite faces of the block 16, such plastic material may also be formed of the material described in the patent mentioned above, with the ingredients of such proportions as to form a porous cellular material of a weight of about 30 pounds per cubic foot. I have found that material of that weight is produced by the use of the following ingredients and proportions,—100 pounds of calcined gypsum, 1 ounce of commercial retarder, 2 pounds of a suitable carbonate, such as calcium carbonate, and 5 pounds of aluminum sulphate containing water of crystallization, all of such ingredients being finely ground and thoroughly mixed in a dry state and then added to a suitable quantity of water.

When the plastic material forming the facing members 22 and 23 has set sufficiently to hold its shape in the form, the mold is removed by the withdrawal of the pins 19, leaving the block complete, ready for complete drying in any suitable manner. It will be understood of course that in drying the block care must be taken not to subject it to such temperatures as might calcine the gypsum, since this would tend to weaken the block.

The block as shown and described has been found to be very effective for its purpose. It is of comparatively light weight, weighing approximately 11¼ pounds. At a gradient temperature of 60° Fahrenheit between the temperatures of 45° Fahrenheit and 105° Fahrenheit, the B. T. U. transmission from

surface to surface through the 3 inch thickness of the block is approximately 3.94 per square foot per degree Fahrenheit per 24 hours. The block is thus seen to be of very satisfactory insulating value, and has been found to be of sufficient strength to stand up very satisfactorily in shipment and in the other handling for building operations. By reason of the fact that the layers making up the block are all of uniform thickness throughout the length and breadth of the block and are uniformly distributed throughout, the heat flow is uniform at all points and the block is devoid of anything like hot or cold areas.

In the construction shown in Figs. 5, 6 and 7, the mold as shown in Fig. 1 is employed without removing the block 16, being supported by the end bar 11 upon a slab 24. Opposite the faces of the block 16 in this position, I place plates 25 and 26, each of which has a strip 27 hingedly connected to its lower edge of a thickness corresponding to that of the bar 11 and of such a width as to space the plate 25 half an inch from the face of the block. Vertically disposed strips 28 are hingedly connected to each of the plates 25 and 26 at opposite edges thereof, such strips 28 being of a thickness corresponding to that of the bars 10 and 11 and of such width as to extend half an inch from the face of the plate for contact with the intermediate mold, as shown in Fig. 6.

For holding the plates 25 and 26 removably in position at opposite faces of the block 16 as described, I have formed the hinges for the two strips 28 at the left in Fig. 5 at both the top and the bottom of the mold integrally with each other, comprising cross bars 29. At the edge of the mold at the right in said Fig. 5, I have prolonged the hinges at both the top and bottom of the mold to provide cross bars 30 and 31 which are held releasably together by means of a turn button 32 carried by the bar 30 and extending through a suitable opening in the bar 31.

With the parts prepared as illustrated in Fig. 5, I pour a plastic material into the spaces on opposite faces of the block 16, so as to permit it to set to form the facing portions 33 and 34 for protecting the block 16. This plastic material for forming the facing portions 33 and 34 may be of the same type as that above described for forming the facing portions 22 and 23 of the block shown in Fig. 4, but it may be of any other approved or suitable material. For example, I may use stucco (neat calcined gypsum) or Portland cement for these facing portions for use under conditions where great strength is required and where there is sufficient strength of the supporting parts for carrying the necessary weight.

In the construction shown in Figs. 8, 9 and

10, I have employed a mold very similar to that shown in Fig. 3, comprising face plates 35 and edge plates 36 held releasably together by vertically extending pins 37, the mold resting on end upon a slab 38. Bars 39 and 40 are rigidly supported in position from above the mold for holding removably in position two slide plates 41 and 42, such slide plates being connected with the bars 39 and 40 by means of pivotally mounted links 43. The arrangement is such that when the bars 39 and 40 are moved downwardly to the limit of their movement, the slide plates 41 and 42 are supported in position at the desired distance from the inner faces of the mold plates 35 and that when the bars 39 and 40 are drawn upwardly the plates 41 and 42 are moved toward each other and then moved upwardly out of the mold. In the construction shown, the arrangement is such that the plates 41 and 42 are spaced half an inch from the faces of the plates 35, so as to make substantially the same form of block as heretofore described, but there is no necessity for any such uniformity of dimensions.

With the parts in position as shown in Fig. 8, plastic material is poured into the spaces between the slides and the outer walls of the mold. If the difference in weight between the facing portions and the body portion of the proposed block is comparatively great,—as in the block first described in which the face portions weigh 30 pounds per cubic foot and the body portion only 12 pounds per cubic foot,—the operator would wait until the material on the outer faces of the slides had almost acquired its initial set so as to hold its form before pouring the plastic material between the slides. Then immediately following the pouring of the material for the body of the block between the slides, the operator would withdraw the slides so as to permit the maximum strength of bond between the body and the facing portions. If the difference between the weight of the body and the weight of the facing portions were comparatively small, the operator would pour both plastic materials and immediately withdraw the slides.

In the construction shown in Figs. 9 and 10, the body of the block is indicated by the numeral 44 and the face portions by the numerals 45 and 46, Fig. 10 differing from Fig. 9 in that in said Fig. 10 the slides have been withdrawn so as to permit the body portion 44 to settle between the facing portions 45 and 46 in direct contact with such facing portions. As will be readily understood, when the plastic materials have set under the conditions illustrated in Fig. 10 sufficiently to hold their form, the mold is to be withdrawn from the block by the removal of the pins 37.

I desire to have it understood that my invention is not to be restricted to any par-

particular step or succession of steps, nor to the use of any particular type of apparatus for producing the block, nor to any particular form or dimensions of block nor to any particular combination of materials, except as the claims may be specifically so limited, since it is evident that changes might well be made in the block and the method of producing it without departing from the spirit of my invention.

I claim:

1. A heat and sound insulating block comprising, in combination, a light-weight, fragile body portion formed of aerated, plastic material the major ingredient of which is calcined gypsum and which is set and hardened in a highly cellular condition, and protective facing portions of comparatively much greater density and strength intimately bonded to the opposite sides of said body portion.

2. A heat and sound insulating block comprising, in combination, a light-weight, fragile body portion formed of aerated, plastic material the major ingredient of which is calcined gypsum and which is set and hardened in a highly cellular condition, and protective facing portions of comparatively much greater strength securely bonded to the opposite sides of said body portion, one of said facing portions being formed of a plastic material set and hardened in a relatively much denser state than said body portion.

3. A heat and sound insulating block comprising, in combination, a light-weight, fragile body portion formed of aerated, plastic material the major ingredient of which is calcined gypsum and which is set and hardened in a highly cellular condition, and facing portions intimately bonded to the opposite sides of said body portion, said facing portions being formed of a plastic material the major ingredient of which is calcined gypsum set and hardened in a comparatively much denser state than said body portion.

4. A heat and sound insulating block comprising, in combination, a light-weight, fragile body portion formed of aerated, plastic material the major ingredient of which is calcined gypsum and which is set and hardened in a highly cellular condition, and facing portions intimately bonded to the opposite sides of said body portion, said facing portions being formed of aerated, plastic material the major ingredient of which is calcined gypsum and which is set and hardened in cellular condition but in a comparatively much denser state than said body portion.

5. A heat and sound insulating block, comprising in combination a plurality of layers coextensive with each other and each of substantially uniform thickness and of substantially uniform character throughout, comprising a light-weight fragile intermediate body portion formed of aerated plastic ma-

terial of which the major ingredient is calcined gypsum and which is set and hardened in a highly cellular condition, and protective facing portions intimately bonded to the opposite faces of said body portion and being of comparatively much greater density and strength than that of the body portion.

6. A composition block comprising relatively thin masonry side walls, and a body of foamaceous material disposed between said side walls and bonded thereto to form an integral block, said foamaceous material forming a substantially uniform cellular structure.

7. A composition block comprising a relatively thin masonry wall and a body of foamaceous material on a side thereof and bonded thereto to form an integral block, said foamaceous material being of substantially uniform cellular structure the cells thereof being closed.

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