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C. L. NEWPORT ET AL

2,150,338

PERFORATE WALL

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FIG. 1.

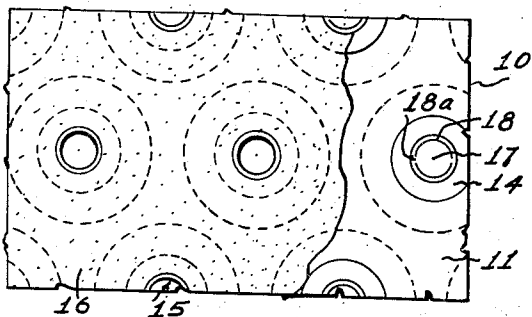


FIG. 3.

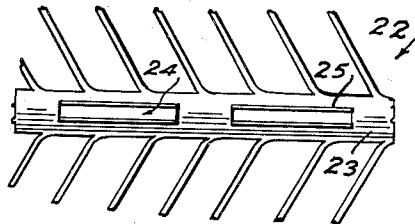


FIG. 2.

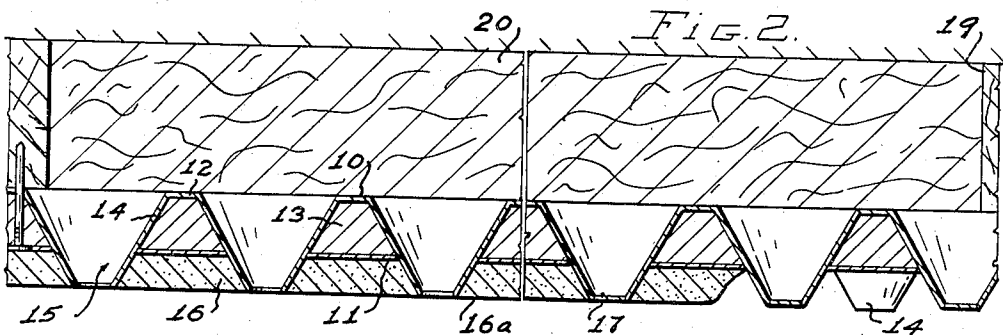


FIG. 4.

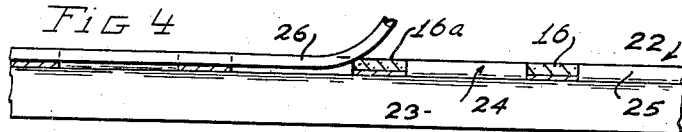
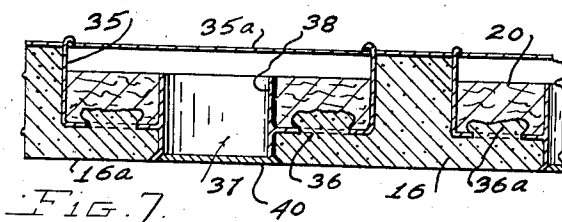
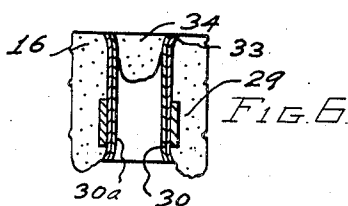
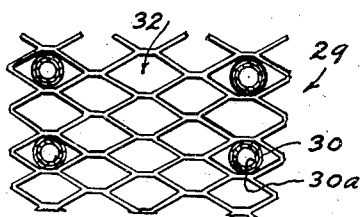


FIG. 5.



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2,150,338

PERFORATE WALL

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11 Claims. (Cl. 72-17)

Our invention relates to building construction and has for its main object the economical and practical provision of a perforate wall for the purposes where it is required that the walls of a room shall be provided with inconspicuous spaced perforations.

Another object of the invention is the provision of a sound absorbing treatment embodying a perforate wall securing and obscuring an underlying layer of sound absorbing material. While perforate coverings for sound absorbing material are by no means new it is an object of this invention to provide a perforate covering in this art which will retain many of the advantageous characteristics of present relatively non-absorptive walls.

In fact it is a specific object of the invention to provide for a plasterer of ordinary skill being enabled without appreciable added effort to produce an otherwise continuous or monolithic wall, built up of standard materials at usual costs, and by usual methods, which wall when complete will contain either distinct perforations, or, areas which by a simple step may become perforations extending entirely thru an otherwise conventional surface and which openings are each lined with a dense protecting tube.

In further accord with the desire to follow standard practice and to use standard materials, it is another object of the invention to provide combined heat insulation and sound absorption, as well as certain sound deadening. It will be understood that common present day insulated wall treatment consists of rock-wood, or the like placed between the studding before lath and plaster are applied. It is an object of this invention to provide, for such walls, sound absorption characteristics without appreciably adding to the cost and in fact in such manner that a high co-efficient of absorption may be provided for walls which are surfaced with hard-wall plaster. In fact, the difficulty has been that for practical and ornamental considerations hard-wall plaster is preferred, whereas it is known that such plasters are highly reflective or non-absorptive and give rise to prolonged reverberation. The advantages of a perforate wall of the otherwise conventional construction become apparent.

It is one object of our invention to provide, in such plaster walls, properly lined or re-enforced perforations so that the plaster will not tend to crumble at the margins of the apertures. Also since any aperture in a plaster wall would otherwise tend to collect dust, and could not be properly painted or protected, it is another object to

provide apertures, the margins of which are smooth and dense and adapted to resist abrasion and to take a coat of paint or the like.

In carrying out our invention we provide the combination of a plaster base or lath and a plaster covering; thru which combination the perforations extend, and which are preferably lined with a dense material. Thus when felt or rock wool is placed behind the plaster base the combination provides a well recognised characteristic of absorbing high percentages of incident sound. Any type or composition of lath may be employed, as may an originally plastic covering.

Any means may be employed for providing the finished perforated plaster, since our invention is directed broadly to a monolithic plaster wall which is perforated and behind which is disposed a sound-absorbing material; the apertures or perforations being arranged to give results without being conspicuous and without exposing an appreciable total area; and the sound absorbing material being particularly difficult to see by reason of the apertures having relatively small diameter with respect to depth of aperture.

We have however found that we can provide an inexpensive plaster base or lath of such nature that upon being coated with plaster in the usual manner will act to provide areas at which the plaster is either totally absent or if present will be in such form that it will not tend to remain permanently and may be readily removed.

What we believe to be the simplest method for so doing is to provide a lath or plaster base with a plurality of projecting tubes all extending outwardly the distance to which plaster is to be built up. This base may be expanded metal lath, rib-lath, herringbone lath, wire and furring, common wood lath, plaster board or any other well known product, or it may be especially developed. The tubes may be of metal, wood, paper, composition, or of any other suitable material. The plaster is applied in any usual manner and is troweled or otherwise worked until it fills all spaces between the tubes and joins therewith and with the base and is screeded level with the tops or outer ends of the tubes.

To prevent plaster from entering or permanently lodging in the tubes; same may be originally provided with plugs, or the tubes may be of such dimension that plaster when partially set will either fall away or may be removed by any simple tool.

The plugs when used should extend to the top of the tube to prevent plaster from ever entering

and the various forms of removable plugs which we know to be usable are about as numerous as are the devices for stopping and unstopping bottles or other small-necked containers. The plugs may be secured just sufficiently to prevent accidental dislodgement while being removable in multiples by suitable gang-instruments, such for instance as the gang-spears used for unstopping a plurality of milk-bottles simultaneously. Again the plugs may be removed by suction. Again the plugs may be of a material, or may be cemented in place by a material of such melting point that the application of a hot blast of air will cause them to dislodge. We have also found that such plugs may be a friable composition of saw dust or wood shavings and plaster, which plugs are readily broken down in multiples by striking a stiff wire brush against the finished wall; which wall will resist the action of the brush except at the friable points. Also combustible or ignitable material may be used which can be quickly burned out with a torch or the like.

The plaster finding its way into the apertures or tubes, when they are not plugged, may become the removable plugs. In such case the tubes may be treated, as with wax or the like, so that when the small plaster plugs have hardened they will either fall out of themselves, or can be readily dislodged by any of a wide variety of means such as will suggest themselves to those practicing the art.

The tubes may be formed integrally with the plaster base, or separately and secured thereat afterward. Metal tubes may be drawn up integrally from metal lath; paper tubes, suitably water proofed may be formed integrally with the facings of paper-and-gypsum types of plaster board. Again tubes may be inserted in perforated plaster board, or metal tubes may be spot welded or enameled direct to expanded metal path. In all cases it is best that the tubes extend from points outwardly of the outer surface of the plaster base, entirely thru same to the back thereof, and that in the case of expanded metal lath provision be made to prevent plaster from entering the rear ends of the tubes.

The apertures may be small and circular and well spaced apart since it is known that by the phenomenon of diffraction a small total area of openings will pass a high percentage of the sound energy incident upon the total wall surface. We have found however that narrow elongated apertures provide excellent results and provide the maximum amount of inconspicuous opening with the minimum of tubes. We have also discovered that the minimum of plaster is used and the maximum of absorption for a given total area of opening is provided by having the tubes of increasing width inwardly.

Figure 1 of the accompanying drawing is a face view of a small section of wall built according to this invention by any one of many embodiments of plaster base built according to this invention. Figure 2 is a cross section thereof on larger scale than Figure 1. Figure 3 is a plan view of a small section of expanded metal lath embodying our invention. Figure 4 is a cross section thereof with the plaster applied. Figure 5 is a plan view of common metal lath or wire to which the invention is applied. Figure 6 is a cross section thereof with plaster applied. Figure 7 is a cross section of another embodiment.

In the form of the invention shown in Figure 1 we provide a plaster base or lath 10, which in many respects is similar to standard perforated

plaster bases and comprises the outer sheet 11, the inner sheet 12, and the originally plastic mineral filling 13. In our new plaster base we provide that the inner sheet be originally moulded or otherwise formed with integral tubes 14; one for and extending thru each perforation 15. These tubes are extended beyond the outer surface of the plaster base a distance equal to the depth to which the plaster 16 is to be applied.

In the form of the invention shown in Figure 1, the outer end of each tube is closed by the originally integral disc or plug 17 altho this plug is cut away as at 18, preferably at the time that the rear sheet is formed, so that the disc is connected to the tube only at a few spaced points such as indicated at 16A.

The plaster base 10 is shown as supported in the usual manner by spaced studding 19, between which is inserted felt, rock wool, or other sound absorbing, sound deadening, heat insulating or like material 20. The outer ends of the tubes form screeds or screeding limits so that when plaster is applied it may be screeded to the exact level of the tube ends. When plaster has taken set the usual wall surface 16A will be provided altho at each tube the disc 17 will either be fully apparent, or will at least be discernible and readily removable. When an entire wall surface has been plastered according to the invention as illustrated in Figure 1, the plugs are removed, preferably many at a time. While this may be done by any one of the numerous methods hereinbefore suggested, we propose to provide a gang of small sized spears such as are commonly employed to unstopper a case of milk bottles, and to thus expeditiously remove a great plurality of plugs at one stroke. In Figure 1 some of the tubes are shown as having had the plugs removed; others are shown as the product appears when first plastered and still other portions of the plaster base are shown as not yet plastered.

It will be noted that the increasing width of the tubes inwardly, makes it possible to readily form the tubes as by moulding or embossing, integrally with the inner sheet 12 when the latter is still wet, deformable, or plastic in one stage of its manufacture. The tubes also have an area of contact with the sound absorbing material greater than the exposed area of the open end of the tube.

In Figures 3 and 4 we have shown a common form of metal lath 22 provided with the usual stiffening ribs 23. These ribs, in accordance with our invention and contrary to usual practice are raised above the plane of the remainder of the lath a distance equal to that to which plaster is to be built up thereon. These ribs are also perforated with narrow elongated slots or apertures 24; the metal at each side of the aperture as at 25 being raised very slightly. In the particular embodiment being described the article of manufacture comprises the metal lath and the wires 26; one for each row of apertures and held in place along the top of each rib by being pressed in between the metal lips 25 so as to be removably held. When this type of lath is plastered in the usual manner and when the plaster has been screeded to the exact level of the wires 26, or the lips 25, the wires may be removed whereupon each wire will leave an elongated slot entirely unobstructed by plaster and the perforations or grooves so formed in the plaster will communicate with the hollow interior of the ribs and the resultant wall will be characterised by a plurality of spaced metal-walled tubes extending entirely thru the wall.

In Figures 5 and 6 we have shown common expanded metal lath to which are applied small diameter straight wall tubes 30; several tubes being formed suitably from a single strip of metal 31 which connects the tubes and provides against plaster entering the tubes at the rear. The tubes are extended thru corresponding of the openings 32 found in any wire mesh, expanded lath, or the like. In this form of the invention, by way of example, we show no plugs or the like and the tubes are provided with the outer ends slightly flared or belled as at 33 so that any plaster 34 which enters becomes choked in the belled neck and forms its own plug.

While these small plugs are readily broken down or dislodged by the act pressing a gang of spaced wires or nails against the finished and hardened wall, we propose to originally coat the inside of the tubes with a wax or other material which will prevent the plaster plug from adhering to the walls of the tubes and so that application of slight heat or suction will cause the plugs to be drawn out of the tubes accordingly.

In the form of the invention shown in Figure 7 we have shown that which may be termed a small sound-absorbing tile, 34, of small dimension and arranged in multiples in spaced arrangement on a suitable backing 35. The backing and the tiles jointly form a plaster base to which plaster is applied in accordance with this invention to completely cover the tile. Each tile has its walls provided with suitable narrow perforations or slots thru which the plaster may enter sufficiently to form keys 36.

In accordance with the salient features of this invention the tile are each provided with a relatively large central aperture 37 from which there projects an inwardly directed tube 38. These tubes however extend inwardly a distance equal only to about one-half the depth of the tile so that each tube opens at approximately the center of the space enclosed by each tile. Each such space is filled with a pad of sound absorbing material. Each tile has its single aperture closed by a thin metal plug 40. Each plug is tapered in such manner that while it cannot be forced in to the corresponding aperture, it can be readily removed. It is proposed to lightly cement this plug in place by a layer of a material which will weaken, soften or dissolve either under the application of heat or by reason of absorbing moisture from the newly applied plaster so that the plug will either fall away before the plaster has set, or will drop out as soon as heat is applied.

It will be apparent now that regardless of what form of the invention is practiced, the invention provides a plaster base which either contains or covers sound absorbing material; and that the plaster base even before application of plaster contains tubes having walls which of themselves are non-absorptive but which tubes convey the sound waves to the sound absorbing material; and that provision is made to prevent any plaster applied to the plaster base from becoming permanently lodged in the tubes.

Therefore the invention provides a plaster base for use in sound absorbing treatments, grille work, perforated walls and the like, which can be plastered in the usual manner and which without added skill or forethought on the part of the artisan will automatically provide a perforated wall. It will also be seen that each perforation is definitely lined with a suitably dense tube which will protect the edges and inner margins of the opening and which, in the case of

acoustical treatment, will convey sound to underlying sound absorbing material; which material is sufficiently protected by an otherwise conventional hard wall plaster or monolithic wall which lends itself to decoration and which provides the barrier to sight, sound, weather and fire, just as does any other plaster wall altho our invention acts to increase the resistance to heat, fire and sound and to very greatly increase the absorption of lath-and-plaster walls.

We claim:

1. As an article of manufacture a plaster base provided with spaced apertures each penetrating both faces thereof, and tubes, one for each perforation and each projecting from the corresponding aperture at one face of the plaster base all to a common screed level, and means in said tubes to prevent plaster from permanently lodging in said tubes.

2. The article as in claim 1 and in which said means comprises removable plugs one for each tube and closing the outer end thereof.

3. The article as in claim 1 and in which said means comprises plugs, one fitted in the outer end of each tube normally resisting dislodgment by applied plaster while being otherwise readily removable.

4. The article as in claim 1 and in which said means comprises a subsequently destructable lining in each tube acting to prevent adhesion of plaster to the walls of the tubes.

5. A plaster base comprising a rear sheet, a front sheet, a filler between said sheets and a multiplicity of spaced apertures each penetrating said filler and both sheets respectively; the rear sheet having tubular extensions one for each aperture and each extending thru the corresponding aperture to a common screed level, and originally integral removable plugs; one for and at the outer end of each tubular extension.

6. As an article of manufacture a plaster base comprising foraminous plaster-holding material and a multiplicity of open end tubes each connected permanently near the inner end to said material and each projecting beyond the plane of the material to a common screed level; said tubes being of such dimension and shape as to prevent plaster from permanently lodging therein.

7. A sound absorbing treatment for a wall comprising a plaster base supported in spaced relationship to said wall, and having a multiplicity of perforations extending entirely through said base, a monolithic coating of plaster over said base, sound absorbing material in the space between said wall and said base, and a multiplicity of spaced open end tubes one for and alined with each perforation and each extending through said coating all to the outer surface thereof and providing communication between the outer surface of said wall and said sound absorbing material.

8. The article as in claim 7 and in which each tube is composed of a dense, relatively non-absorptive material serving to protect the adjacent plaster.

9. In combination with a wall surface, a plaster base supported in spaced relationship to said wall, sound absorbing material between said wall and said base, a multiplicity of tubes spaced over the entire area of said base and all projecting outwardly therefrom to a common screed level, and plaster covering said base between said tubes and extending only to the screed level.

10. A sound absorbing wall comprising stud-

ding, sound absorbing material between the studding, a lath-and-plaster continuous wall over said material and supported by said studding, and dense relatively non-absorptive tubes normal to and each penetrating both surfaces of the lath-and-plaster wall.

11. As an article of manufacture, the combination of a perforated plaster base providing a

plurality of spaced apertures and adapted to receive and retain plaster at one face thereof, and indicating means, one for each aperture all projecting from said face to a common screed level, said indicating means permitting removal of applied plaster from over each aperture.

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