

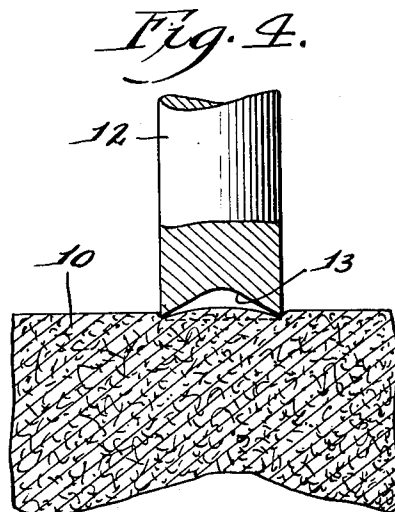
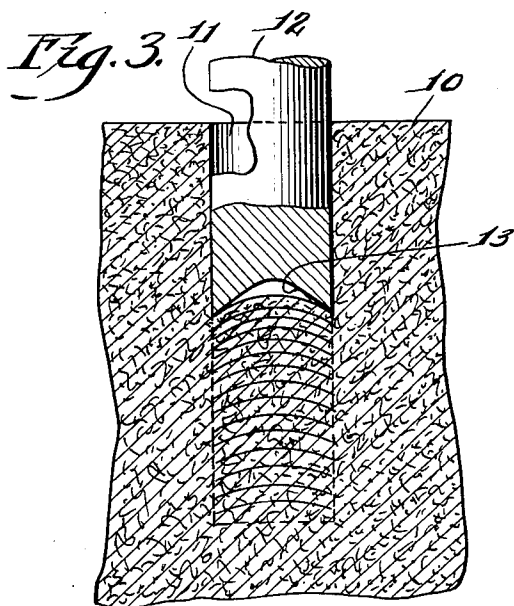
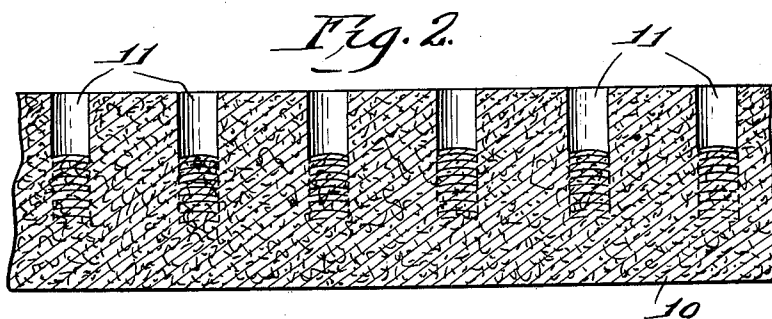
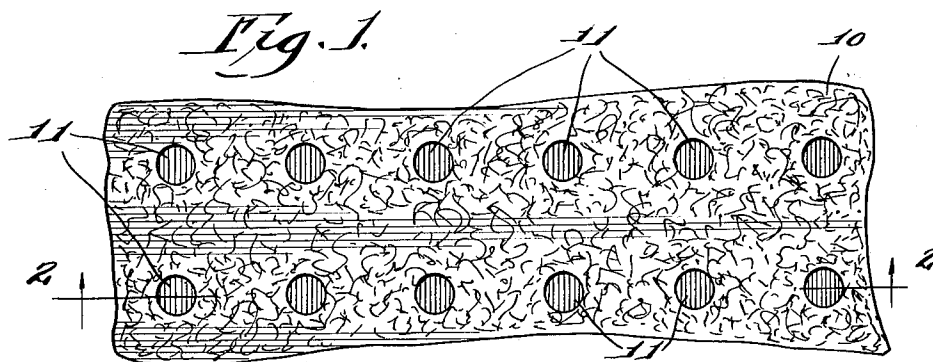
Feb. 2, 1954

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2,667,925

METHOD OF PROVIDING PERFORATIONS IN ACOUSTICAL TILES

Filed Dec. 23, 1948



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UNITED STATES PATENT OFFICE

2,667,925

METHOD OF PROVIDING PERFORATIONS
IN ACOUSTICAL TILES

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Application December 23, 1948, Serial No. 67,003

3 Claims. (Cl. 164—125)

1

This invention relates to an improved method of providing perforations in acoustical tiles, and particularly to the formation of such perforations in a tile formed of Fiberglas or other mineral fibers. As is set forth in the co-pending application of Randolph P. Copeland, Serial No. 51,273, filed September 25, 1948, it is highly advantageous in connection with an acoustical tile that it be provided with a great number of small shallow openings in its face, with such openings formed by a punching operation in which the material of the tile is pushed forwardly ahead of the punch so as to provide a substantially compressed face portion of the tile material at the bottom of the perforation, and in which the withdrawal of the punch from the opening is effected without the removal of any of the tile material.

It is one of the objects of this invention to provide improved punching means by the use of which clean-cut, sharply defined openings may be formed conforming accurately to the shape of the punch, whereby the perforations formed by a plurality of similar punches may be similar to each other to a high degree in their appearance and in their effectiveness for bringing about the absorption of sound by the tile.

To this end, it is one of the objects of this invention to provide an improved method of punching in which the initial contact of the punch with the face of the tile is confined to a sharpened edge portion having an outline corresponding to the size and shape of the punch, such effect being brought about preferably by the provision of a tapered depression in the end face of the punch whereby the required degree of sharpness of the cutting edge of the punch may be brought about for insuring the effective severing of the fibers for providing at least directly on the face of the tile a clean-cut opening of the desired predetermined shape, while at the same time the tapered opening in the end face of the punch is so shaped as to prevent the plug of tile material compressed ahead of the punch from becoming lodged in the tapered opening and thus to prevent such plug from being removed from the tile with the punch when the punch is withdrawn from the newly formed opening.

It is another object of this invention to improve the method of punching acoustical tiles in sundry details hereinafter pointed out. The preferred means by which the several objects have been attained are illustrated in the accompanying drawing, in which:

2

Fig. 1 is a face view of a fragmentary portion of a tile made by my improved method.

Fig. 2 is a cross-sectional view taken substantially at the line 2—2 of Fig. 1.

Fig. 3 is an enlarged detail view partly in section, showing my improved punch in position at the end of a punching operation; and

Fig. 4 is a view similar to Fig. 3 but showing the conditions at the start of a punching operation.

Referring now to the several figures of the drawing, in which corresponding parts are indicated by the same reference characters, 10 indicates an acoustical tile made of mineral fibers and preferably in the form of a Fiberglas panel three-fourths of an inch in thickness and of such size and shape as to be handled conveniently for installation and as to present the desired attractive appearance in accordance with a predetermined pattern.

As is shown in Fig. 1, the panel or tile 10 is provided in its display face with a plurality of perforations or openings 11 extending into the body of the tile, such openings 11 being preferably of comparatively small size and shallow depth.

In the arrangement illustrated, the openings 11 are circular in form, of a diameter of about five thirty-seconds of an inch and of a depth of about a quarter of an inch. The openings as shown are arranged in rows and cross rows, on about half inch centers in both directions.

In the operation of providing perforations in the faces of acoustical tiles as above specified for use on a wall, it is highly important that very great care be exercised in the formation of the perforations for insuring that the fibers directly at the face of the tile be severed accurately at the line of the pattern of the perforation so as to make the opening conform in size and shape with the predetermined design. This is of importance in view of the fact that even slight irregularities in the size or shape of the perforations, or slight departures from regularity in the face portions of the tile adjacent to the perforations, are likely to be detected readily by even a casual observer by reason of variations in the light and shade effects.

I have found that the operation of forming the perforations in the face of a Fiberglas tile can be effected to very great advantage and with highly desirable results in the matter of producing a clean-cut sharply defined opening by the use of a solid punch hollowed out at its operative end so as to present a sharpened edge to the fibers of the tile. By the use of such a punch having a sharp-

ened edge conforming to the outline of the opening to be formed, pressure is applied to the fibers at the face of the tile directly at such outline. This brings about the severing of the fibers directly at the face of the tile accurately in accordance with the size and shape of the punch so as to insure that at least the mouth portion of the opening shall conform to the predetermined desired shape. The action of the punch upon the application of pressure upon the Fiberglas fibers through the sharpened cutting edge of the punch is more or less of a breaking or shearing operation, but conditions are such as to enable the punch at the point of initial pressure contact to provide a smooth sharply defined perforation. Upon continued movement of the punch into the body of the tile after the initial severing of the fibers at the face of the tile, the cut-out material is pushed ahead of the punch so as to be compressed, the pressure directly on the fibers to be severed; after such initial severing of the fibers at the face of the tile, being applied more and more through the medium of the compressed body material rather than by the punch itself. In this application of pressure through the medium of the compressed material, the tendency for the production of a sharply defined opening conforming to the shape of the punch is very greatly lessened or entirely eliminated, but this is of no great importance so long as the outer end portion of the opening is clean-cut and sharply defined.

For accomplishing the desired results as above set forth, I prefer to employ a round punch 12 having its operative end face hollowed out by the provision of a conical recess 13 therein produced preferably by a boring operation. In this way the punch is provided with a sharpened cutting edge of circular form corresponding to the size and shape of the punch and to the size and shape of the hole to be formed. With such cutting edge brought into engagement initially with the fibers of the tile as shown in Fig. 4, the fibers directly at the face of the tile are severed accurately at the line of the pattern of the opening whereby the punch produces a sharply defined circular opening, at least at the outer end portion of the opening. As the material becomes compressed ahead of the punch on the continued movement of the punch into the body of the tile, further pressure is applied on the fibers through such compressed material instead of directly by and through the cutting edge, with the result that the side face portions of the perforations may be comparatively uneven and rough in contrast with the smooth and regular formation of the mouth portions of the openings. The consistency of the tile material is such, however, that the regularity of the mouth portion of the opening is not disturbed or changed by the possible production of comparatively rougher face portions at points beyond the mouths of the openings.

In carrying out my improved process or method, I prefer to employ a plurality of the improved punches 12 arranged in the form of a battery adapted to be operated in unison for the produc-

tion of a great number of the openings 11 by a single operation, but my invention is not to be limited to such a procedure. I have found that a battery of four or five hundred of such punches can be pressed perpendicularly into the face of a Fiberglas tile of the type above described so as to produce the desired number of perforations without great difficulty, with the perforations highly effective for causing the absorption of sound, and with the outer end portions of the perforations formed accurately and true to the circular design sought.

I claim:

1. The method of providing perforations in the face of an acoustical tile, comprising applying pressure to the face of the tile principally upon a sharply defined outline corresponding to the pattern of the opening to be formed so as to effect initial severing of the tile material along such outline, then pressing the severed material into the body of the tile for effecting further severing of the tile material and serving to extend the opening inwardly and to compress the material at the bottom of the opening, and then withdrawing from the tile the means for applying pressure so as to leave the compressed tile material in position at the bottom of the opening.

2. The method of providing perforations in an acoustical tile comprising the step of severing the material of the tile by means of a hollow ended round punch with the initial pressure of the punch on the face of the tile confined to a circular outline corresponding to the size of the perforation to be made, then applying pressure on the tile material inside of said circular outline for compressing such material and pressing it forwardly ahead of the punch into the body of the tile to the predetermined selected depth, and then withdrawing the punch so as to leave the compressed material in position with a compressed face portion at the bottom of the perforation.

3. The method of providing perforations in an acoustical tile, comprising the step of pressing a punch into the tile with the initial pressure confined to a sharpened edge portion corresponding to the size and shape of the punch and serving as the punch advances to sever the tile material ahead of the punch from the adjacent tile material, then after the initial application of pressure forcing the material of the tile inside of said outline forwardly ahead of the punch, and then withdrawing the punch so as to leave a compressed face portion of the tile material at the bottom of the perforation.

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