J. MAZER.

ACOUSTIC CONTROLLING APPARATUS.

APPLICATION FILED JULY 14, 1913.

1,172,379.

Patented Feb. 22, 1916.

3 SHEETS—SHEET 1.

FIG. 1

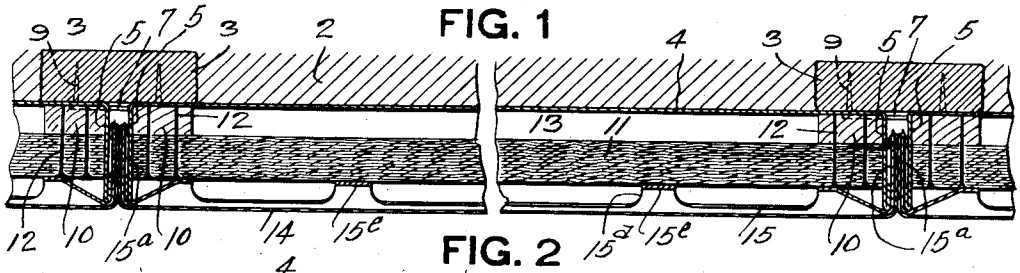


FIG. 2

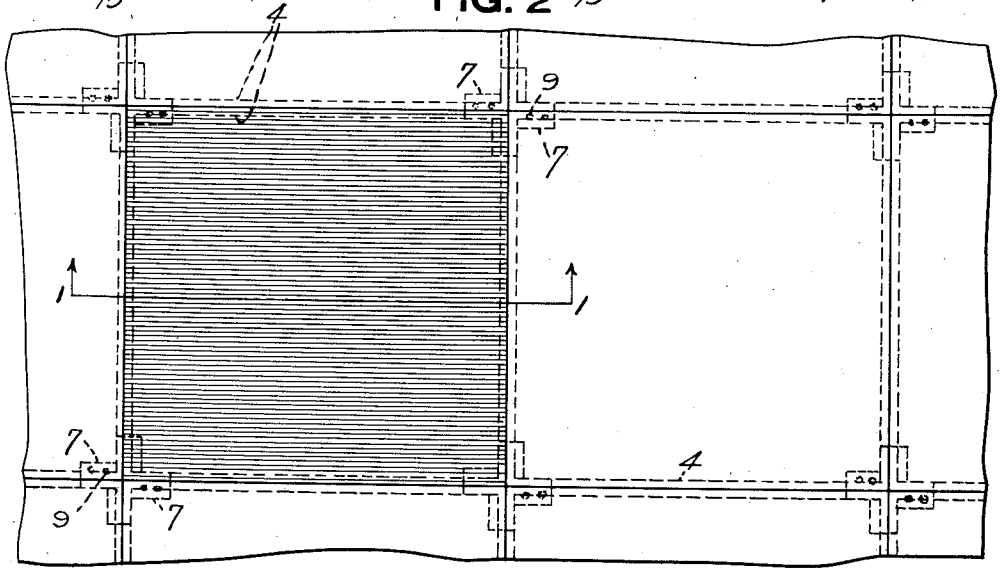


FIG. 3

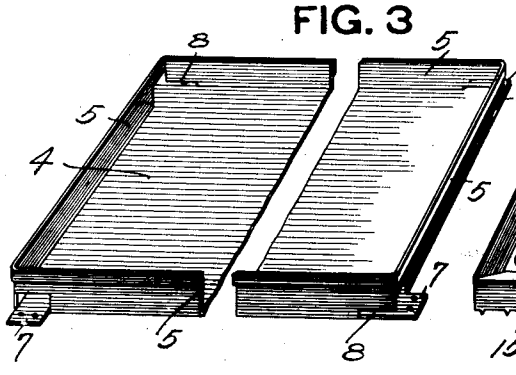
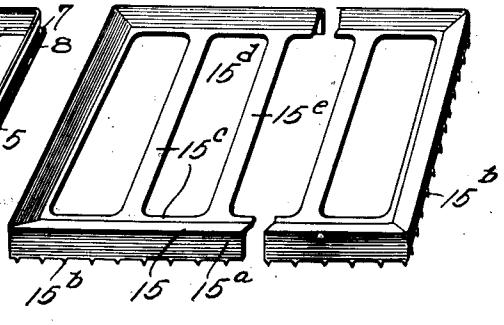


FIG. 4



WITNESSES.

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3 SHEETS—SHEET 2.

FIG. 5

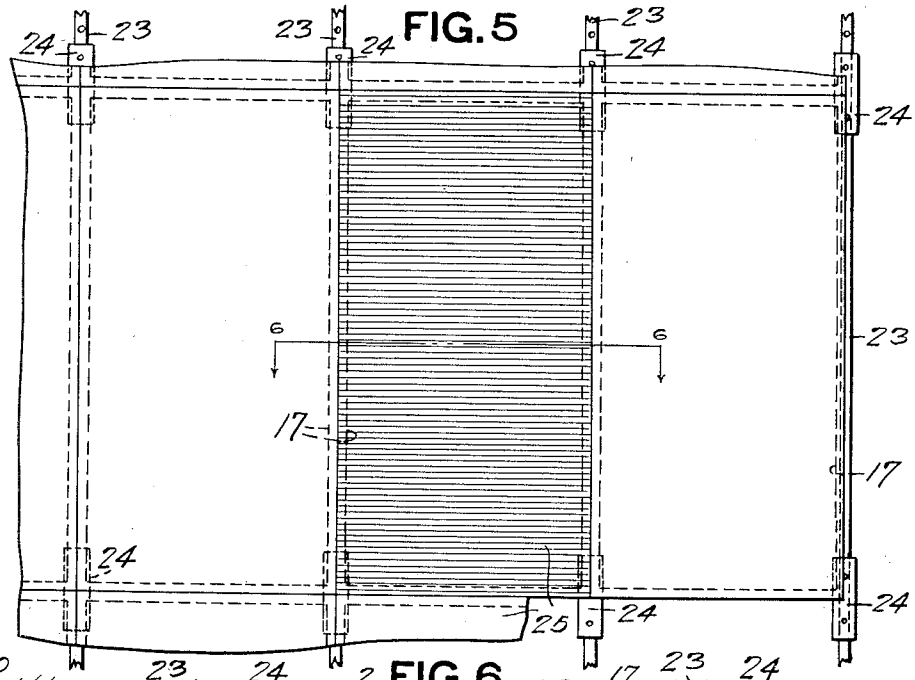


FIG. 6

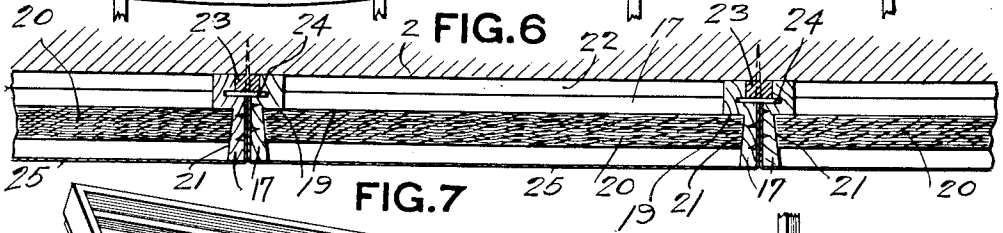


FIG. 7

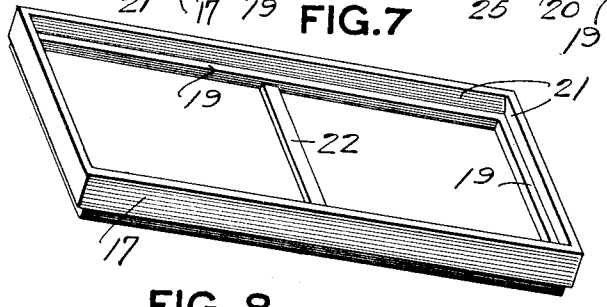
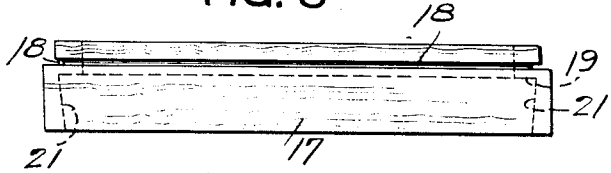


FIG. 8



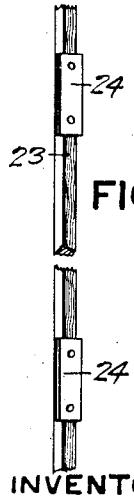


FIG. 9

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3 SHEETS—SHEET 3.

FIG. 10

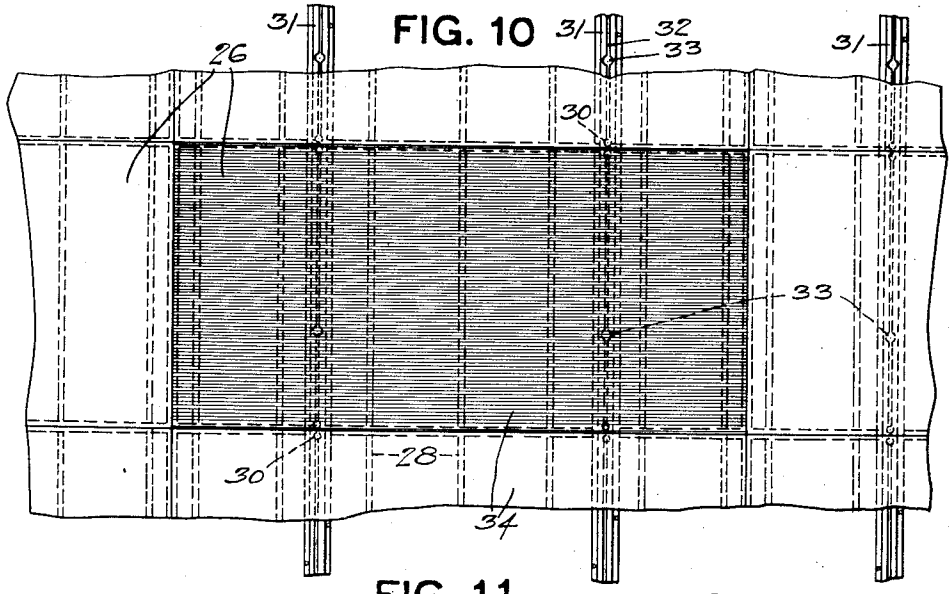


FIG. 11

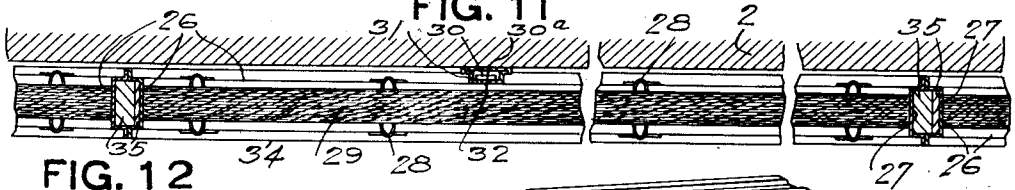


FIG. 12

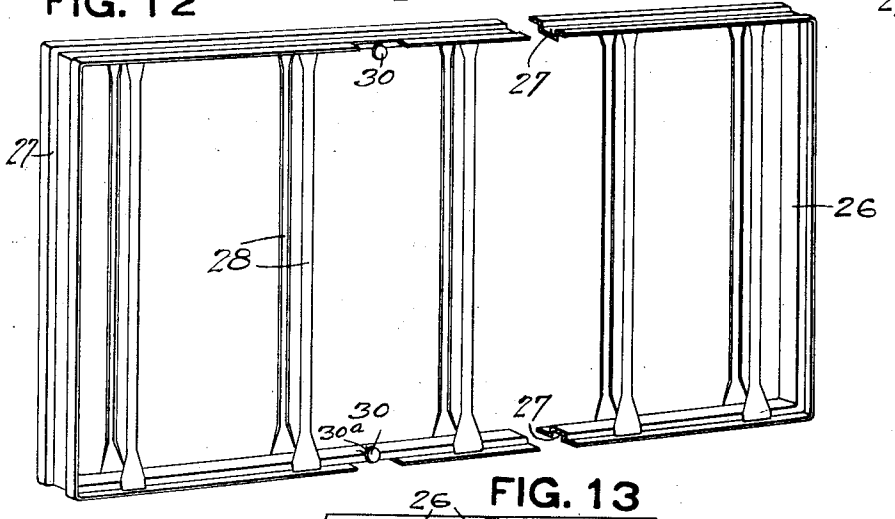
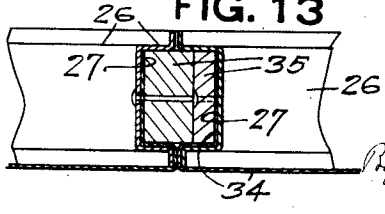


FIG. 13



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UNITED STATES PATENT OFFICE.

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ACOUSTIC-CONTROLLING APPARATUS.

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Application filed July 14, 1913. Serial No. 778,964.

To all whom it may concern:

Be it known that I, JACOB MAZER, a citizen of the United States, and resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Acoustic-Controlling Apparatus; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to acoustic controlling apparatus.

The object of my invention is to provide acoustic controlling apparatus for halls or auditoriums which may be readily installed without the employment of skilled labor, the whole being made up of independent units which are secured to the wall separately, each unit carrying its own section of felt or other sound absorbent material, so that the individual sections may be made up at the factory and shipped to the place where they are to be installed or may be made up on the ground thereby doing away with the labor and expense of building up a series of strips on the wall or ceiling from a scaffold and securing the felt thereto by nailing it to the strips so installed or by other means of fastening.

A further object of my invention is to provide a unit with definite acoustic controlling efficiency so that with a given area of wall space the number of units required may be accurately calculated or measured before application, and a definite system of standards of efficiency may be adopted with a set of units as a basis. Moreover, the efficiency of any one or more units may be altered to meet definite acoustical requirements without changing the general form, structure, or appearance of the unit.

Again, a further object is to provide units, which may be easily replaceable or repaired when damaged.

To these ends my invention comprises the novel features hereinafter set forth and claimed.

In the accompanying drawings, Figure 1 is a cross-section of a portion of a wall showing my improved acoustic controlling apparatus applied thereto. Fig. 2 is a face view of a portion of a wall covered with my acoustic controlling apparatus. Fig. 3 is a perspective view of one of the frames broken away; Fig. 4 is a perspective view of one of the facing material holders; Fig. 5 is a top view showing a modified form of my invention; Figs. 6, 7, 8 and 9 are details of same; and Figs. 10, 11, 12 and 13 another modified form thereof.

Referring to Sheet 1 of the drawings, the numeral 2 designates the wall of the auditorium or other building, and embedded in said wall are the nailing strips 3. A series of independent frames 4 are secured to the wall 2 and said frames may be made up in any suitable form, the frame illustrated in Figs. 1 to 3 being in the form of a sheet-metal pan-like frame with the sides and ends 5, the upper edges of the frame being turned over to form a beading to add stiffness to the frame. Portions of the sides and ends are cut and bent down to form the lugs 7. Slots 8 are also cut in the sides and ends of the frame to receive the lugs 7 of the adjoining frame as clearly illustrated in Figs. 1 and 3. In this way an interlocking connection is made between the frames and a very strong rigid structure is provided when they are thus interlocked and nails or screws 9 are driven into the nailing strips 3.

Secured within the frames 4 are the wooden strips 10 to which the felt or other sound absorbing material 11 is secured by the nails 12. By this construction an air space 13 is provided between the frame and the felt. The frames may be made up with the felt secured thereto at the factory and shipped to the place they are to be used, so that all that is required in installing is to secure the frame to the nailing strips in the manner illustrated. The amount of wall space to be covered may be carefully calculated and the frames made to suit and the proper number shipped so that all waste is avoided and the necessity of putting up a series of strips on the wall or ceiling from a scaffold and cutting the felt and fitting it into place is obviated. By shipping the frames in this form, the securing of them in place may be done by unskilled labor, and very rapidly, so that the expense and labor is greatly reduced. Moreover, the units may be constructed absolutely uniform as to structure and known acoustical efficiency so that when installed, exact acoustical results may be secured even though the installation is made by unskilled labor. Again, the absorbing power of the units may be measured with mathematical precision, and may be precisely altered before application to meet the conditions of any acoustical problem which may arise.

It is found in practice that where a felt or other sound-absorbing material is applied to the walls in large sheets or sheets of considerable area, or where such sheets, large or small, are handled to any considerable degree, the sound-absorbing properties of these sheets per unit of area is very materially changed. Therefore, it is absolutely impossible where sheets of absorbent material are so applied directly to the wall to obtain accurate uniform results throughout the area treated. Moreover, the handling of sheets of absorbent material, in direct application to a ceiling, for example, is intensely disagreeable to the workmen, for the slightest jar of the sheets shakes down myriads of minute hairs or particles which get into the workmen's eyes or attach themselves to the skin so that in many instances workmen preferredly throw up the job rather than submit to such annoyance. This also increases greatly the cost of labor in attaching the absorbent material directly to the wall. Furthermore, the construction of the units is such that their exposed surfaces may be decorated as desired before the unit is installed. This is of vast importance because the nature of the decoration changes the absorbing power of the unit. In order to get definite results, we must know the efficiency of the units after decoration, and, as stated before, the absorbing power of the units may be measured with mathematical precision even after the decoration has been applied. This is impossible of attainment where the decoration is done on the wall:—first, because different decorators will vary the decoration in different parts of the wall; second, the same decorator will greatly vary in his own work in different parts of the wall; whereas, when we decorate the units before hand in the shop, the same can be done by mechanical means with absolute accuracy, and thus produce exact predetermined results in the finished units. Moreover, even after the decorating of the block in the shop is completed, the absorbing power of that block may be altered to closely approximate a certain value by altering the sound-absorbing filling in order to compensate for the effect produced by the decoration. Finally, the exact acoustical efficiency of the finished block may be decided and measured in the shop before the block is sent out for installation, and, in fact, the exact acoustical value of that block may be marked on the block.

At the time of securing the frames in place the outer facing 14 of tapestry or any other desired decorative material is secured in place and said material is stretched over the supplemental frame 15 which may be formed of metal with the flanges 15^a. Teeth 15^b are preferably formed on these flanges 15^a and the facing material is caught in said teeth and drawn or stretched over the frame and is held securely in place by said teeth or a fold of the metal. The frame 15 may have the depressed cover 15^c with the open space 15^d and the ribs 15^e which may engage the felt 11 when applied to the frame 4. When the facing material has been applied in this manner the holder 15 is slipped over the frame 4, the flanges 15^a fitting over the sides and ends 5 of said frame. The flanges 15^a are slightly sprung to fit over said sides and ends 5 so that when said holder is once adjusted on the frame it is securely held in place, and at the same time the facing material is held taut so as to give a neat appearance to the wall.

In Figs. 5, 6, 7, 8 and 9, I have shown a modified form of my invention in which the frame 17 which may be formed of wood plaster, cement or other suitable material is provided with the groove 18. The frame is provided on the inside with the ledge 19 which forms a support for the felt 20 and the inner walls of the sides and ends are inwardly flaring as at 21, so that when the felt is inserted therein it is locked as by the ordinary dove-tail connection and is thus prevented from falling outward. The cross-piece 22 acts as a further support for the felt 20. It is understood, of course, that outer covering frames are provided for these base frames on which the outer covering is stretched to a predetermined degree of tightness to produce the desired acoustical effect. These outer covering frames may be built up in any desired manner to secure the results sought for, but I have found in practice that if these outer frames are built and fitted directly on the foundation frame, and the fabric stretched over them while on the foundation or base frame, an exact fit of the outer frame is secured and an exact predetermined tightness of the fabric covering may be assured. It will be understood, of course, that after the outer frame and its tight-drawn covering have been fitted in position, said outer frame may be removed and the base frame with its absorbent filling properly arranged, regulated and secured, may then be fastened upon the wall and the outer fabric frame may then be slipped over it and secured in position. In so positioning the outer frame, it is necessary to place it in exactly the position occupied when it was originally fitted over the base frame so that exactly the same degree of distribution and tightness of the outer fabric may be secured. It is to be understood, of course, that this outer fabric is made of absorbent material and will have a known value in acoustical effect. Again, it will be seen that this acoustical effect will be determined after the outer fabric covering has received its decoration; and the total or aggregate acoustical value of the unit will be

determined by the combined acoustical effect of the two absorbent elements of the unit; namely, the absorbent filling and the absorbent covering.

Where the unit is constructed either of plaster or of metal, it will be understood that it may be fastened to the wall merely by means of a dab of plaster or other desired adhesive, which will securely hold it in position; or, again, the metal unit or plaster unit may be so constructed that it may be nailed up in position. In any event, it will be understood that this securing in position of the base or foundation member of the unit may take place before the outer covering unit is applied so that chances for soiling or marring or otherwise altering the character of the covering unit is entirely eliminated whereby the pure decorative character and the computed acoustical value is preserved.

Secured to the wall of the auditorium or other building are the strips 23 to which the locking plates 24 are secured. When the frames 17 are to be installed in place the grooves 18 are brought into engagement with the locking plates 24 as clearly shown in Fig. 6 and in this manner the frames are secured to the wall and rest one upon the other as shown in Fig. 5. The frames 17 may be shipped with the felt secured in place and the securing of them to the walls is done quickly and without the exercise of more than ordinary skill. The facing 25 is held between the sides and ends of adjoining frames as shown in Fig. 6.

In Figs. 10, 11, 12 and 13, I have shown a second modified form of my invention and in this case the frames 26 may be made up of metal and provided with the groove 27 completely surrounding the same. The cross-pieces 28 hold the felt 29 securely within the frame. The sides of the frame are provided with the buttons 30 which are adapted to engage the guide-strips 31 secured to the wall. These guide-strips are provided with the slots 32 and at intervals the enlarged openings 33 to receive the buttons 30. The buttons are inserted in the openings 33 and by sliding the frames in the guides the shanks 30^a of the buttons engage the slots 32 and the buttons hold the frames securely in place on the guide-strips 31. The outer face 34 as clearly indicated in Fig. 14 is secured in place by the strips 35 which fit within the grooves 27.

While I have herein described a particular embodiment of my invention, it is to be understood that the same may be altered in many details in relative arrangement of parts, in the manner and method of manipulating the acoustical elements of the units, and in the manner of applying and securing the same to the wall, within the scope of the appended claims.

What I claim is:-

1. In acoustical controlling apparatus, the combination with the wall, of an acoustical unit comprising an open-faced frame having a sound-absorbing element therein, said frame adapted to be secured to a wall, and a removable covering frame having a sound-absorbing material stretched thereover and adapted to be slipped into place over said foundation frame after the latter has been secured in position, said unit being so constructed that it may have a predetermined acoustical value due to the combined acoustical values of the foundation element and the covering element.

2. In acoustical controlling apparatus, an acoustical unit comprising an open-faced frame having a sound-absorbing element therein, said element being adapted to be altered in its acoustical value, and a separate covering frame having a sound-absorbing material stretched thereover and adapted to be slipped into place over said foundation frame after the latter has been secured in position.

3. In acoustical controlling apparatus, an acoustical unit comprising a foundation frame having therein a sound-absorbing element which may be of predetermined and of alterable acoustical value, said foundation frame with its sound-absorbing element being adapted to be secured to the wall in any desired manner while retaining its acoustical value, a removable covering frame having a sound-absorbing material stretched thereover and adapted to be slipped into place over said foundation frame after the latter has been secured in position whereby the acoustical value of the total unit will be the combined acoustical effects of the foundation element and of the covering element.

4. In acoustical controlling apparatus, an acoustical unit comprising a foundation frame having a sound-absorbing element secured therein, a removable covering frame having a sound-absorbing material stretched thereover, said material being susceptible of decoration before it is placed in final position on the foundation frame, means whereby said covering element may be secured in position over said foundation element whereby the acoustical value of the covering element will be secured without alteration when the latter is placed in final position.

5. In acoustical controlling apparatus, an acoustical unit comprising a foundation frame, a sound-absorbing element therein, and means for securing said element in place in said foundation frame, and means whereby said foundation element and its absorbent material may be secured to the wall without altering the acoustical value of said parts, and a finishing covering for said unit.

6. In acoustical controlling apparatus, an acoustical unit comprising a foundation

frame having a sound-absorbing element secured therein, and a removable covering frame having a sound-absorbing material stretched thereover whose acoustical value may be altered, said covering frame being adapted to be slipped into place over said foundation frame after the latter has been secured in position and without altering the acoustical value of said cover.

7. In acoustical controlling apparatus, an acoustical unit comprising a foundation element which may be built in one or more sections, having therein sound-absorbing material which may be predetermined and of alterable acoustical value, said foundation element with the sound-absorbing material being adapted to be secured to the wall in any desired manner while retaining its acoustical value, a removable covering frame having a sound-absorbing material stretched thereover, and adapted to be slipped into place over said foundation element after the latter has been secured in position, whereby the acoustical value of the total unit will be the combined acoustical effects of the foundation element and of the covering element.

In testimony whereof, I the said JACOB MAZER have hereunto set my hand.

JACOB MAZER.

Witnesses:
ROBERT C. TOTTEN,
JOHN F. WILL.