United States Patent

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[33] **Switzerland**
[31] **15610/69**

[54] **SOUND-ABSORBING FENCE**
8 Claims, 2 Drawing Figs.

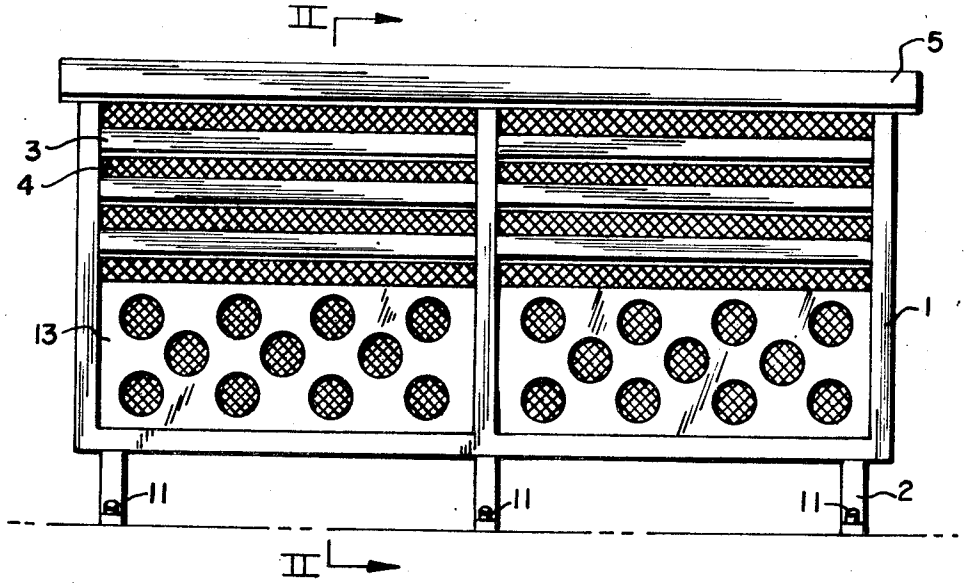
[52] **U.S. Cl.** ..... **181/33 G,** 181/33 HE
[51] **Int. Cl.** **E01f 7/00,** E04b 1/74
[50] **Field of Search** 181/30, 33, 33.1, 33.12, 33.223

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ABSTRACT: Sideline noise generated by airplanes on a runway, and noise generated by vehicles on a road may be contained by a fence essentially consisting of a supporting framework, a solid upright backing panel on the framework, and a layer of sound-absorbing foamed urea-formaldehyde or other plastic foam retained on the face of the plate directed toward the source of the noise by a screen of fabric, plastic, or metal practically transparent to the sound. A roof upwardly closes the space between the backing panel and the screen which is practically completely filled with the plastic foam.



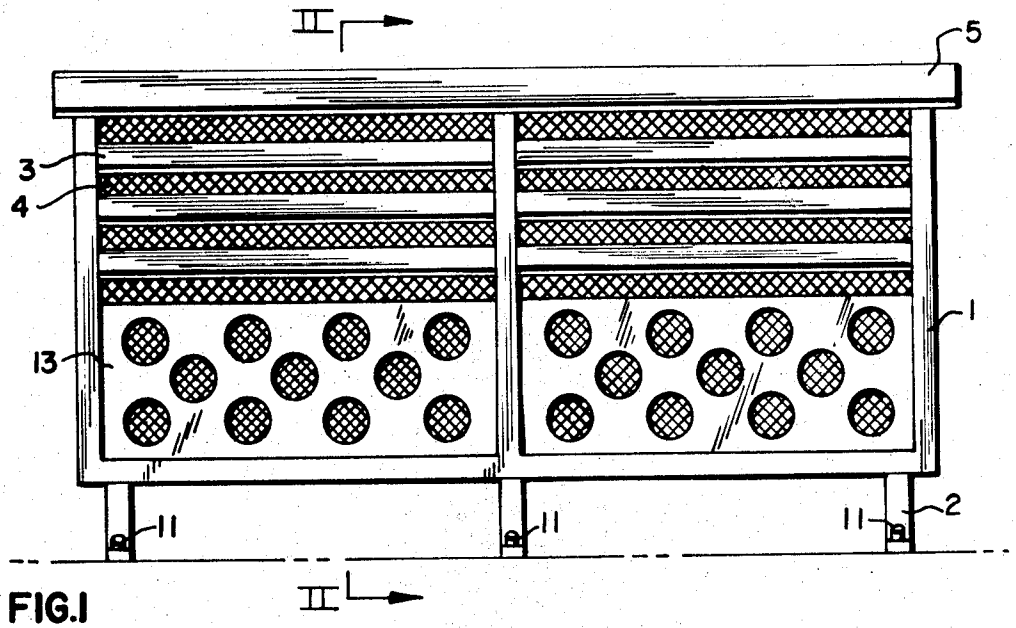


FIG.1

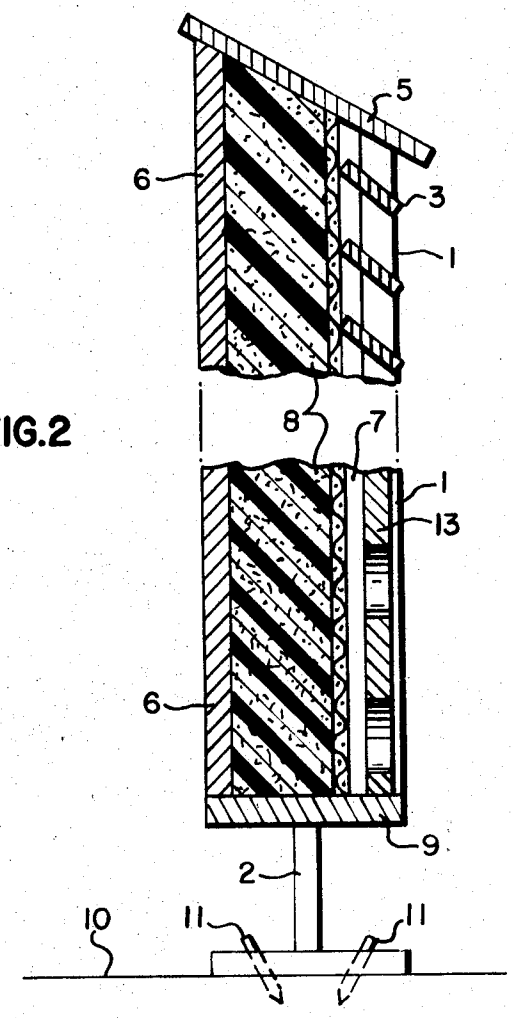


FIG.2

SOUND-ABSORBING FENCE

This invention relates to noise abatement, and particularly to a noise-absorbing fence to be interposed between a source of noise and humans.

Noise from motorcars and trucks on a heavily traveled road is a source of annoyance, and may even be a danger to the health of people occupying buildings along the road. Sideline noise from airplanes, that is, the noise generated by airplanes while accelerating on a runway during takeoff and transmitted mainly laterally of the runway, is another recognized nuisance or health hazard. While rows of trees or hedges may absorb such noise, they are not always permissible, practical, nor readily available on short notice.

The primary object of this invention is the provision of a noise-reducing fence which can be erected quickly and at low cost, and which does not endanger the vehicles generating the noise.

In its more specific aspects, the invention provides a support carrying a backing member. A face of the support is upright in the operative position of the support. A screen is mounted on the support and is substantially coextensive with the face of the backing member and spaced from the face so as to define a space therebetween which is substantially filled by sound-absorbing material, preferably plastic foam. The space is upwardly closed by a roof member which protects the sound-absorbing material against rain when the fence is arranged outdoors, as will usually be the case.

Other features, additional objects, and many of the attendant advantages of this invention will readily be appreciated as the same becomes better understood from the following detailed description of a preferred embodiment when considered in connection with the appended drawing in which:

FIG. 1 shows a sound-absorbing fence of the invention in front elevation; and

FIG. 2 illustrates the fence of FIG. 1 on a larger scale in fragmentary section on the line II—II.

Referring now to the drawing in detail, and initially to FIG. 1, there is seen a fence whose supporting structure mainly consists of a horizontally elongated, rectangular frame 1 mounted in an upright position on several legs 2 spaced along the frame 1. Horizontally elongated slats 3 are mounted as louvers in a common vertical plane in the frame 1 and are spaced from each other in the common plane so as to occupy the upper portion of the frame 1. The lower frame portion is occupied by a perforated plate 13.

A screen 4 is mounted behind the slats 3 in the frame 1 and is largely obscured by the slats 3 and the perforated plate 13 in the view of FIG. 1. The frame 1 is surmounted by a narrow, obliquely sloping roof 5 which projects sufficiently beyond the common plane of the slats 3 and of the plate 13 to protect all elements mounted on the frame 1 from rain or snow.

As is better seen in FIG. 2, the frame 1 is closed rearwardly by a solid backing panel 6 impervious to moisture. The screen 4 is mounted on ribs 7 on the plate 13 and on the rear edges of the slats 3 which are obliquely inclined in a direction downward and outward of the space between the screen 4 and the backing plate 6.

The screen 4 is a loose fabric or net of interwoven filaments of textile fibers, plastic, and/or metal which is practically 100 percent permeable to sound. It retains a unitary body 8 of polyurethane foam or urea-formaldehyde foam which fills the space between the backing panel 6 and the screen 4 and extends into the openings in the screen so as to be interlocked with the filaments of the same. The foam body 8 is confined in a vertical direction between the bottom 9 of the frame 1 and the roof 5.

The legs 2 are of approximate inverted T-shape and extend downwardly from the frame bottom 9 in spaced alignment so that only one leg 2 is visible in FIG. 2, the downwardly directed faces of the several legs 2 engaging the ground in a support plane 10 which is normally approximately horizontal.

Aluminum is the preferred material of construction for the fence except as specifically described otherwise hereinabove,

and a fence section having a horizontal length of 20 feet or more can readily be carried from a truck to its intended location by two workmen. Because of the relatively large surface presented to the wind by the fence, it is preferred to secure the legs 2 by stakes 11 driven into the ground through openings in the legs 2.

The slats 3 and the perforated plate 13 provide a foraminous sound barrier which is effective in absorbing noise of low frequency, approximately 100 c.p.s. and less, when the spacing of the slats 3 and the openings in the perforated plate 13 are suitably dimensioned in a manner known in itself. Openings big enough to block low-frequency sound freely pass high-frequency sound, that is, sound of frequencies above 1,000 c.p.s. The plastic foams, which are the preferred sound-absorbing materials constituting the body 8, are particularly effective in absorbing such high-frequency noise, as well as noise in the intermediate range of 100 to 1,000 c.p.s.

The choice of the plastic material is determined by secondary considerations. Polyurethane foam is usually heavier than urea-formaldehyde foam, and has greater mechanical strength. It is very much more costly, and urea-formaldehyde foam is preferred where mechanical strength is not sufficiently important to warrant the cost of the polyurethane foam. Other plastic foams are similarly effective, but not practical at this time.

The body 8 is preferably foamed in place in a manner known in itself under a gas pressure sufficient to fill the space between the screen 4 and the backing panel 6 and to interlock the plastic foam with the filaments of the screen. The foam is introduced through a temporary opening in the frame 1, the panel 6, or the screen 4, and foam extruded through the screen 4 is sheared off after it has set.

The panel 6 does not materially contribute to the acoustic efficiency of the fence if the foam body 8 is thick enough. It need not be imperforate unless necessary for acoustical reasons, and the protection afforded to the sound-absorbing body 8 by the plate 6 in the illustrated embodiment may be afforded by a portion of the roof 5 overhanging the panel as shown relative to the front of the fence.

It is often advantageous to make the fence of the invention portable as shown, but it will be appreciated that the legs 2 may be permanently buried in the ground and may be modified to suit such a mode of installation. The bottom 9 of the frame 1 may be spaced from the ground 1 foot or even more without significantly impairing the acoustic efficiency of the fence, and such spacing facilitates maintenance and housekeeping operations, but is not necessary.

The overall height of the fence will be chosen to suit the intended application. A fence approximately 12 feet high may absorb as much as 90 percent of the noise generated by vehicles on a highway when positioned close to the flowing traffic. The light fence sections do not significantly endanger the occupants of vehicles which may crash into the fence, yet may sufficiently slow a vehicle, accidentally leaving the roadway, to reduce the probability of injury to the occupants.

When installed along runways to a height to clear the wings and engines of most large commercial planes, the fence of the invention materially reduces sideline noise without causing serious structural damage to an aircraft which may accidentally strike the fence.

It should be understood, of course, that the foregoing disclosure relates only to a preferred embodiment of the invention, and that it is intended to cover all changes and modifications of the example of the invention herein chosen for the purpose of the disclosure which do not constitute departures from the spirit and scope of the invention set forth in the appended claims.

What is claimed is:

1. A sound-absorbing fence comprising, in combination:

a. a support;

b. a backing member mounted on said support and having an upright face when said support is in the operative position;

c. a screen member mounted on said support and substantially coextensive with said face,

1. said screen member being spaced from said face to define a space therebetween;

d. sound-absorbing material substantially filling said space; and

e. a roof member upwardly closing said space and protecting said material against rain when said fence is arranged outdoors.

2. A fence as set forth in claim 1, a foraminous sound barrier mounted on said support and offset from said screen member in a direction away from said backing member, the openings in said sound barrier being dimensioned to absorb sounds of low frequency while passing high-frequency sound.

3. A fence as set forth in claim 2, wherein said sound barrier includes a plurality of slats arranged substantially in a common plane and spaced from each other in said plane.

4. A fence as set forth in claim 2, wherein said sound barrier includes a perforated plate member.

5. A fence as set forth in claim 1, wherein said screen member is permeable to sound and essentially consists of interwoven metallic, plastic, or textile filaments.

6. A fence as set forth in claim 1, wherein said sound-absorbing material is a foam whose solid component is polyurethane or urea-formaldehyde.

7. A fence as set forth in claim 6, wherein said sound-absorbing material is a unitary body extending into the openings of said screen member and interlocked with the same.

8. A fence as set forth in claim 1, wherein said support includes a plurality of foot members downwardly extending from said backing member and having respective downwardly directed faces defining a common, substantially horizontal plane of support.

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