

[54] NOISE SHIELD PANELS AND METHOD OF FABRICATION

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[56] References Cited

UNITED STATES PATENTS

1,675,102	6/1928	Holland.....	181/33 GB
2,855,039	10/1958	Gross.....	181/33 GB
3,156,502	11/1964	Chisholm	181/33 GC

FOREIGN PATENTS OR APPLICATIONS

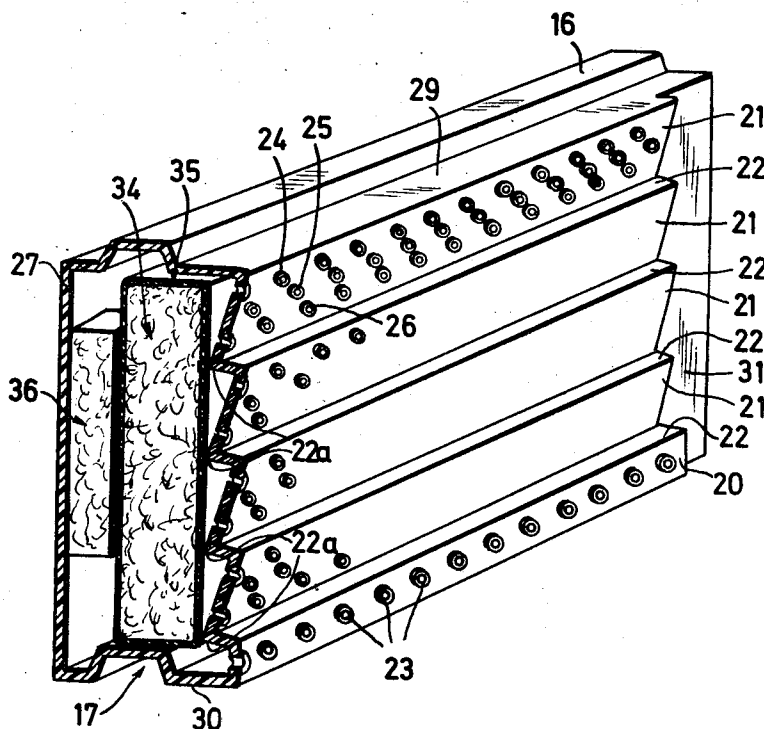
64,423	6/1955	France	181/33 GC
1,142,698	2/1969	Great Britain.....	181/33 GB

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[57] ABSTRACT

A hollow, rectangular plastic casing and a sheathed sound absorbing material batt forming a sound absorbing panel; as a panel casing noise source facing front wall, an echelon of four forwardly inclined integral step-like faces, each with three offset series of longitudinally spaced outwardly-flanged apertures, and a bottom straight margin with a single, like aperture series; a casing back wall with alternating raised and depressed regions; the batt spaced from the back by fibrous blocks or deeper back depressions; end closures and opposed vertical flats at the lateral ends of the front and back walls; and a longitudinal land and complementarily shaped groove in the top and bottom casing walls, whereby like panels are insertable with land and groove engagements and with panel ends engaged between the opposed flanges of respective spaced H-beam uprights optionally. A panel edge-surrounding impregnated sealing band, forming a seal concealed in the tongue-and-groove engagement of adjacent panels. A noise fence comprising spaced H-beams thus filled with interposed panels and capped by inverted U-channels. Casing fabrication in one piece by blow-molding from heated extruded thermoplastic tubular stock; or by vacuum forming, injection molding, centrifugal or rotational casing as front and back halves to be partially telescoped and welded or cemented together.

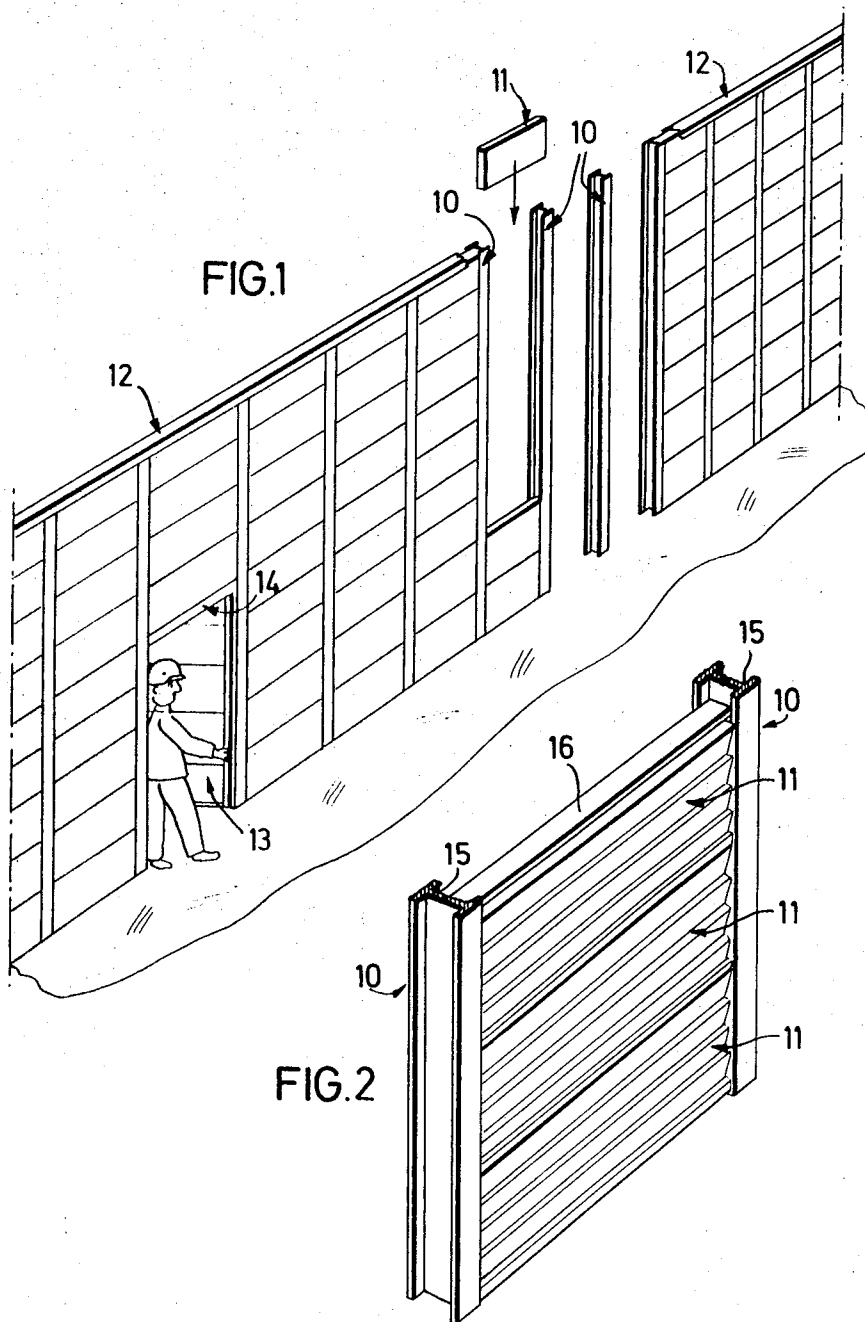
28 Claims, 6 Drawing Figures



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SHEET 1 OF 3



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FIG.5

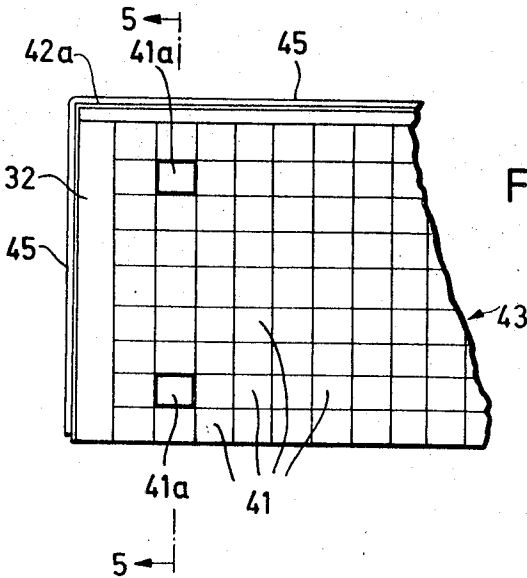
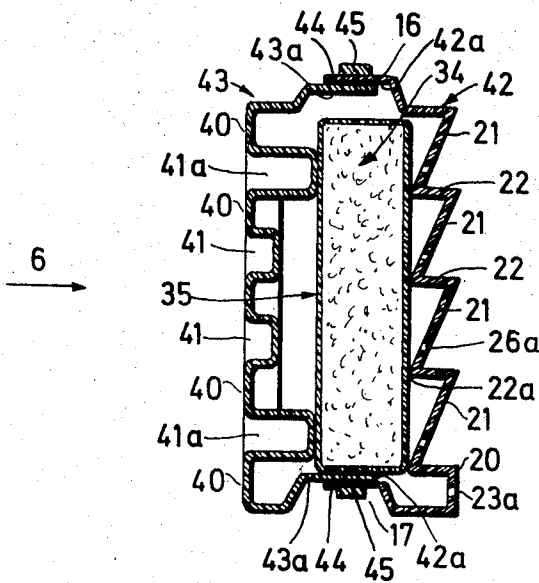


FIG.6

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NOISE SHIELD PANELS AND METHOD OF FABRICATION

Definitions: For convenience of description and brevity in the claims, the side of a structure or panel intended to face a source of noise or sound to be screened is herein considered as and termed the front or forward side or face, and the opposite side, the rear or back side or face; while the narrow top bottom and end faces or walls will at times be referred to as "edges" of the panels.

The present invention is concerned with a noise shield panel, especially useful in the construction of a shielding fence, for screening of noise sources; and more particularly, such a panel comprised of a sound absorbing batt enclosed in a plastic casing, which in its front side is provided with a multiplicity of acoustical energy admitting openings; to a noise screening structure embodying the panels; and further to a method for fabrication of such panels.

Many and various attempts have already been made to eliminate or abate the noise coming from highways and also at aircraft service areas at airports, or at engine test stands.

Hitherto these attempts and constructions have not produced satisfactory results. Particularly there have been proposed the disposition of concrete blocks or slabs arranged as in a lattice-like form, but such concrete elements are not only costly in fabrication, but also unsatisfactory in performance. Also there are known noise-absorbing materials, such as foamed synthetic plastics or pumice stone concrete; and walls built of such materials have already shown relatively good results in their sound shielding or noise abating effect.

The hereinafter described noise shield or screening panels are adapted for construction of noise screening or shielding fencing erected along highways and airports and in shops and work places for improvement of working conditions, at noisy industrial facilities and installations, or like noisy places where high intensity noise generation occurs which it is desirable to absorb or attenuate.

It is a general object of the present invention to provide a noise shielding panel useful for construction of a noise screen fence of any desired length and height, which in its noise absorption effect is better than comparable prior art panels for this purpose, and which nonetheless can be easily fabricated.

For the attainment of this object, there is first provided a noise screening panel structure comprised of a plastic casing enclosing a batt of sound absorptive fibrous material, such that a noise shield is easily constructed along a screen or fence line, straight or curved as desired, and to any necessary practical height, by erecting a succession of steel H-section beams as uprights at spacings corresponding to the desired panel lengths, say at about one meter spacing, and then simply filling in each screen section defined between the successive uprights with a corresponding vertically aligned series of such panels inserted from the top and with ends engaged in the opposed vertical slots provided by the more or less parallel flanges on respectively adjacent sides of the beams, and then advantageously capping the top with inverted channel beams secured to the uprights, preferably with dependent flanges external of the beams and forming skirts dependent slightly below the top margins of the uppermost panels. Moreover, the panels and manner of support are applicable to other uses as in total enclosures of noise sources.

In the panel itself, the end portions are shaped for reception in such inter-flange slots; and the top and bottom narrow walls of the panel have respectively longitudinal groove and broad rib or land formations of complementary shapes, such that, on insertion of successive similarly oriented panels in a given fence vertical section, a tongue-and-groove type engagement is achieved by the land of one and the groove of the other panel. This engagement itself is effective both to provide an acoustical labyrinth or seal as well as some degree of aligning function, or to afford a recess region concealing contact-sealing strips externally applied on the respective panels.

Further, the front face wall of the panel is provided over its major area with a plurality of successively joined, forwardly inclined, oblique longitudinal faces in an echelon arrange-

ment, exhibiting a saw tooth vertical cross-section, in which are provided a multiplicity of sound wave accepting openings presenting a close extensive arrangement of open areas across the substantially entire front face for receiving the acoustical energy of the noise, with uniform absorption throughout the panel structure. In a preferred form of the invention, each of such openings is surrounded by a short integral flange or collar-like formation, resulting in effect in respective tubular openings which may be round, oval, or polygonal. Such tubular openings are effective not only in directing the incoming sound relative to the rest of the panel structure, but also to provide reinforcements for the wall section at the areas otherwise weakened by the presence of those openings.

Additionally the flanged character of the opening conduces to the exclusion of liquid water as from rain or other natural precipitation. Both this angularly corrugated front face configuration, and alternating depressions and raised portions in the back opposed wall are also effective for overall structural rigidification of the wide panel areas, therefore also increasing strength against wind loadings which may arise; but further in the combination with the sound absorbing material batt, they are effective to attain a higher efficiency for sound or noise absorption purposes, particularly with a spaced disposition of the batt from the front and back casing walls as hereinafter detailed.

Thus the casing serves not merely as a container for the fibrous sound absorption material partially filling its internal volume, but also it has a cooperative effect with that material in achieving higher noise abating efficiency.

Moreover, in the panels as hereinafter disclosed, the back wall, which is usually exposed to the view of the general public outside of the "fenced in" noisy region, has such form that it not only achieves certain mechanical or structural purposes and acoustical functions, but also in the erected fence results in an appearance somewhat more akin to a vertical paling fence, or a lattice work, which has an eye appeal and esthetic effect considerably greater than would otherwise result with a broad flat panel area.

The overall or general design of the panel structure is such that it is susceptible in particular embodiments to advantageous low cost fabrication by various common techniques for manufacturing plastic articles. Thus by one embodiment, the casing may be fabricated essentially as one piece, from extruded hollow stock heated and then blow molded to an appropriate final shape; into which, with appropriate spacing means present, the batt of sound absorbing material is then introduced from one or the other end, with the ends then simply closed by hinged flap-like end wall structures, also integrally molded or suitably secured thereon after the molding of the main hollow body section.

By another form which the same basic design may take, the casing may be produced as two molded half-shells, by any of various known techniques such as injection molding, vacuum forming, centrifugal or rotational casting. After emplacement of the fibrous batt, the two facing half-shells are brought together in telescoped relation of their margins; and then joined at the marginal overlaps by welding or by cementing. The latter embodiment in fabrication procedure has the advantage, that to the extent of the minimum usable and maximum overlap available in the seams, half-shells produced from the same molds or tooling may be used to provide a variety of product panels of different thickness, therefore different absorption material content. This is advantageous not only from the view point of tooling costs, but further where the half-shells are to be made and stores in inventory for subsequent assembly into finished panels as needed, a minimum inventory, both in the total number of shells and as well in variety of shells, is required to meet potential demands for a variety of panel thickness sizes. In a given manufacturing operation, this then means that less warehousing or storage space is required as well as a lower inventory in order to provide quick delivery of order demands which may be made.

Further a band of somewhat elastic material, impregnated with bituminous material, may be carried around the larger circumference, i.e., the top, bottom and side edges, of the panel; which is a simple expedient for achieving several advantageous mechanical and acoustical sealing functions as hereinafter appearing.

A further object of the present invention is to provide a noise screen or sound screen panel of a type comprising a plastic housing having a front wall perforated for sound or noise energy acceptance and containing a sound absorbing fibrous material and having improved absorption efficiency.

Another object is to provide a noise shield panel which is adapted to fabrication in a low cost and a simple manner by common plastic fabrication techniques.

Another object is the provision of a noise shield panel of improved form capable of erection in and support in a relatively simple sound screening fence structure.

A still further object is the provision of a noise shield panel having improved mechanical and physical characteristics to withstand outdoor weathering environments.

Another object is to provide an overall noise screen fence which is simple, of relatively low cost and flexible in installation.

Another object is the provision of a simple inexpensive method of fabricating the panels. Other objects and advantages will appear from the following description and the drawings wherein:

FIG. 1 is a perspective view of a portion of a noise screening fence embodying the present invention;

FIG. 2 is an enlarged fragmentary perspective view in which three panels of a section of the fence appear;

FIG. 3 is still further enlarged and perspective view of a panel of the invention showing the front and top sides and also a vertical section taken at the line 3—3 in FIG. 4;

FIG. 4 is a perspective fragmentary view showing the back and one end of the panel of FIG. 3;

FIG. 5 is a vertical transverse section through a panel of modified structures, the section taken as indicated by the line 5—5 on FIG. 6; and

FIG. 6 is a fragmentary rear view of the panel of FIG. 5, wherein a back pattern is represented rather schematically.

In FIG. 1 is shown, in more or less generalized form, a noise screen fence embodying the present invention comprised of steel uprights 10, so-called H- or I-beam sections either driven into, or embedded in appropriate concrete bases or anchoring footings in the ground at spaced locations along the screen or fence line; the space between successive uprights being filled from above by a vertical aligned set or series of superimposed like generally rectangular sound absorbing panels 11 successively received with opposite ends slid into the effective vertical slots 15 provided by the opposed parallel flange halves on respective sides of the webs of the uprights, and a protecting and stiffening capping 12 of inverted U- or trough-shaped steel channels secured on or over the tops of the uprights.

The spacing of the uprights is slightly greater than the panel length to allow easy insertion, despite slight non-parallelism. Each panel, for example, may be on the order of 1 m long and 30 cm high.

With a lintel provided by say a channel section 14 disposed with flanges upward between two uprights, a door 13 is provided by hinging on one upright a group of panels similarly supported in a frame of channel irons. If desired, an upward facing channel may be secured between uprights at the bottom of each fence section. The structure may follow a curved fence or screen line by rotating the uprights successively slightly from web parallelism up to the ability of the flange halves (or "slots") of the successive rotated uprights to accept the panel ends.

The enlarged fragmentary view of FIG. 2 shows more clearly a portion of a fence section delimited by two successive uprights 10, with three of the panels 11 having their end portions engaged in the respective vertical opposed slots 15 of the uprights; a pair of which slots for adjacent screen sections

are afforded back-to-back on each H-shaped upright. The top edge of the panel, by a central longitudinal ridge or land 16, is engaged with a correspondingly shaped or mating groove 17 in the bottom of the like panel thereabove. The positions of the land and groove obviously could be reversed in the casing component of the panel.

FIGS. 3 and 4 show details of a panel 11 of this invention as comprising a hollow plastic shell or casing including a front side or wall with a corrugated or echelon-shaped portion above a narrow vertical bottom margin face 20, providing a plurality, here four, of narrow longitudinal wall elements or faces 21, forwardly inclined 3° to 30° from the vertical and connected to each other and to the bottom face by more or less horizontal wall elements or joining portions 22. In the vertical bottom face there is a horizontal single series (through a plurality could be used) of longitudinally spaced, like round apertures 23, each having a surrounding horizontally outwardly extending short collar or tubular flange; while in each inclined face there are three like horizontal series 24, 25, 26 of similar apertures with the apertures of the series successively offset laterally. As appears in FIG. 3, a local saw-toothed vertical section (i.e., in the region in from the ends) results in the front wall, with internal back edges or ridges 22a running longitudinally of the panel for the width of the echelon formation.

In the back wall of the casing, depressed areas 27, extending vertically over the panel back wall height, define therebetween in effect alternating broad lands or raised portions 28; and the front and back walls in the embodiment of FIGS. 3 and 4 are integrally connected by the top and bottom side walls 29, 30, which have formed therein the correspondingly placed complementary shaped flat-topped land 16 and flat-bottomed groove 17, here extending over the full panel length. The sides of the land and groove are similarly inclined, tapered, so that when one panel is set upon the other, the interfitting tongue-and-groove type engagement assures in effect an acoustical seal as well an aligning mechanical engagement of the panels in what may be loosely termed a coplanar relation.

Also at the ends, from top to bottom of the panel, the front and back walls have parallel vertical outside surfaces as inset flats 31, 32 respectively; the horizontal widths of flats are about equal to the depths of the inter-flange slots 15 of the uprights, with the panel thickness as measured between these flat outer surfaces 31, 32, corresponding to the slot width (i.e. the nominal flange spacing).

A form-stable rectangular batt of fibrous sound-absorbing material such as glass or mineral fiber, either encased in a protecting envelope such as a loose plastic film bag 35 or coated with a spray-on synthetic resin, extends horizontally over substantially the length of the panel and vertically from the interior land resulting at the bottom groove 17 substantially to the inside bottom of the top wall 29; thus filling only about the front of the casing interior. The looseness of such a thin bag itself promotes sound absorption. The sack 35 may be polyethylene or other suitable thin film; and may be tubular film end-sealed after introduction of the batt.

To the extent that the glass fiber batt 34 is not very hygroscopic, it is not absolutely necessary that it be completely enveloped by a film covering, but for helping to maintain the batt form, it is yet advantageously spray-coated with a suitable synthetic resin as described, to a thickness which does not interfere with sound absorption.

A batt 34 of glass fiber is already generally protected against absorption of moisture; for the fibers themselves are also coated with a phenolic resin. Thus the panel filling is quite difficulty destroyed by fire because the synthetic resin coating becomes ineffective only after reaching a temperature of 380°C .

By vertical spacer blocks 36 interposed near the ends and at one or more intermediate locations and likewise of fibrous sound-absorbing material, the batt 34 is held spaced from the back wall and against the inward longitudinal edges 22a formed on the inside of the casing front wall; these blocks 36

being either gripped between the batt 34 and the back wall or cemented to the latter.

The opposite end faces or edges of the panel are closed by housing end walls such as 38 (see FIG. 4), corresponding in outline to the vertical transverse cross section at the end portions of the casing and each preferably formed or molded as a flap structure integrally hinged along one vertical edge to the vertical end edge of the front wall. These flaps then are automatically held closed by the uprights after insertion of the panels.

The casing may be made of a synthetic plastic such as polyethylene, especially low density polyethylene. In the form of FIGS. 3 and 4, preferably it is fabricated as a blow-molded structure or element by starting with a piece of thermoplastic tubular stock heated and received in an appropriately shaped blowing mold.

In the panel structure modification of FIGS. 5 and 6, wherein corresponding elements or structural features are designated by similar reference numerals, the general structure is similar to that already described, except that the casing is made in two pieces; and that the back wall, as schematically indicated in FIG. 6, has a checker board like pattern of vertically and horizontally spaced and staggered rows and columns of like square-shaped elevations 40 and box-like depressions, 41, from the flat bottom of which latter the back of the batt 34 is spaced, here by certain ones 41a, of the square depressions projecting further inwardly to engage the batt rather than by use of the spacer blocks previously described for FIGS. 3 and 4. At least four of the deeper box-like depressions 41a are provided in symmetrical locations near the panel periphery, that is, near the corners, though others may be additionally used. This pattern, as in the previously described rear wall and sawtooth corrugated front wall configuration provides not only spacings relative to the batt for purposes to be described, but also structural stiffening of the walls, hence of the panel as a whole.

Here the casing is made in the front half and rear half-shells 42, 43 with flange-like portions telescoped into overlapped relations in the regions of the panel top wall land 16, the bottom wall groove 17, and the corresponding vertical regions on the lateral end walls; the two halves being welded or cemented together in a peripheral seam or joint 44 running continuously around the top, sides, and bottom.

The continuous peripheral flange 43a formed by the top, the bottom and the end wall portions of the back half-shell at its open side, is shown telescopically received within the corresponding flange 42a at the open back of the front half-shell, in the fashion of a paper-board box and its cover, but of course this relation may be reversed. In either case, the possible extent of the overlap permits of a certain selection or variation of product panel thickness obtainable from a given set of molds and from a previously manufactured stock of such half-shells; so that panel products with different thicknesses of the batt 34 may be easily produced; different upright sections as required being used in the fence.

The back shape of FIG. 5-6 may be utilized in a one-piece panel casing as described for FIGS. 3-4; and conversely the back wall form of FIGS. 3-4 may be used in a two-piece casing described for FIGS. 5-6 with, of course, the spacing blocks 36 then used.

In FIGS. 5-6, the various apertures in the noise-source-facing front wall are shown as simple unflanged apertures as at 23a and 26a. These apertures of either panel form may be round, elongated or polygonal, with or without flanges of corresponding shape; and the direction of the flange axes may range from horizontal to perpendicular to the inclined faces. The flange apertures, 23, 24, 25, 26, may be molded each with an initial cap thereacross, as by blow molding of the casing; and thereafter these caps may be sheared, sawed or ground off of the short tubes in effect present at each aperture. By this design, it is practically impossible for rain or other natural precipitation to pass through the openings.

FIGS. 5-6 show a feature useable also in the FIG. 3 form, namely, externally on the peripheral joint region an elastic sealing band 45 comprised of say a band of Moltoprene or other suitable elastic material impregnated with a bituminous substance contributing to noise sealing; the band on the land of an inferior panel and in the groove of a superior panel then sealing to each other as well as adhering to their respective panels in a location concealed by the nesting of these formations.

These seal bands, adherent to the circumference of the individual panels and coming into contact in the concealed recess region between the lands and grooves of super-imposed panels, effect a contact seal in the concealed location. This not only helps hold the panels to one another an anti-rattling expedient and effects an acoustical seal, but also at the ends to some degree helps achieve a better acoustical seal between the panels and the webs of the upright-forming H-beams in a noise screen fence in which such panels finds advantageous use.

Further those bands maintain that acoustical seal as well as a mechanical seal, despite a fair degree of thermal expansion and contraction of the panels in the assembled fence. This obviously contributes to the overall efficiency and performance of such a fence or screen as a whole.

It is observed that the spacing and offset of the openings is such as to provide a "dense field" of such openings, and a uniform sound absorption over the exposed front face of the panel.

Moreover, the flanging of the openings is effective to confer strength on the flat areas perforated by such openings, at the very regions where the apertures as such weaken the overall rigidifying effect of the general front and back configurations adverted to, strengthening the panel as a whole against the force of wind loadings which may occur.

With these panel forms, sound waves, propagating from a noise source horizontally or obliquely upward to a panel, can penetrate well into these apertures or tubes present in such multiplicity in the front panel wall and thus reach the panel interior.

The oblique faces 21, especially with the described tubular form of the openings, in effect bend the sound waves to enter the panel interior at an angle; and this itself causes some dissipation of sound energy, so that there is not quite so much to be interiorly absorbed and converted into heat.

The sound enters through the openings 23, 24, 25, 26 into the hollow panel where it is partially absorbed with about 50 percent reduction in noise level on initially encountering and passing through the sound absorbing material batt 34. The part penetrating the batt to reach the hollow space between the batt and the back wall is in great part reflected from the inner back wall surface back again to the batt where it is further absorbed, so that finally little is returned to the inner side of the front wall. Hence, entirely apart from a still further reflection from the front wall back to the batt, any interiorly reflecting sound reaching the front wall and passing back out through the above-described flanged openings is extremely attenuated and is no longer disturbing.

The irregularity of the internal back wall surface, i.e., the non-coplanar character of its various areas, results in irregular or diffuse reflection, aiding absorption.

The casing thus serves not only as a container for the fibrous sound absorbent material, but cooperates with the latter in a combination attaining a higher sound absorbing efficiency.

Obviously both panel forms have respective advantages in ease of fabrication of the housing as well as in completion of the final assembly.

It may be noted that, apart from the functional features of the patterning of the back wall, its vertical grooving in the panel form of FIGS. 3-4 confers on the noise screen a fence-like aspect; and also the back pattern of FIGS. 5-6 produces in the noise screen a rather interesting appearance as contrasted to what would result from the use of plain flat-backed panels.

The following example is explanatory of the performance of such noise screen erected along the margin of a freeway.

In front of the screen, the sound level of the noise from passenger automobiles was found to be 91 to 94 decibels, dB (A) as measured with a sound meter in accordance with DIN 45633, with evaluation or calibration curve A in accordance with this standard. Such a measurement may be used as an approximate measure for loudness and oppressiveness of noise. At a point seven meters behind the screen, the noise level was measured at only 63 dB (A); at 20 m distance from the screen at 62 dB (A). Thus the difference in the sound level at 20 m behind the screen amounted to a drop of considerably more than 10 dB (A). But each 10 dB (A) more or less in sound intensity means a doubling or halving of the perceived loudness. Since by a screen of the invention, the noise level was attenuated by more than 10 dB (A), this represented a reduction by more than half in the noise perception.

A sound or noise screen in accordance with the invention is a practical combination of steel, synthetic plastic elements and sound absorbing material.

I claim:

1. A noise shield panel, especially adapted for construction of a noise shield fence for screening of highways and like noise sources, comprised of:

a synthetic plastic casing

and, within the casing, a sound-absorbing fibrous material batt; the front wall of the casing, intended to be disposed toward the noise source, in substantial part being comprised of several superposed, forwardly inclined wall elements

successively integrally connected by respective approximately horizontal wall elements,

resulting in a saw-tooth-like, wall local cross-section; said inclined wall elements each having a multiplicity of sound energy admitting apertures therethrough.

2. A noise shield panel as described in claim 1, wherein:

said casing has

an elongated rectangular form in frontal aspect, and roughly rectangular form in side aspect, with a thickness dimension small as compared to height and width;

said batt extending over the major part of the casing height and width.

3. A noise shield panel as described in claim 1, wherein: the forwardly inclined elements are inclined from the vertical by an angle of from about 3° to about 30°.

4. A noise shield panel as described in claim 2, wherein: said panel front wall includes four said inclined wall elements.

5. A noise shield panel as described in claim 3, wherein: said apertures are surrounded by respective short outward flanges integral with the inclined wall elements.

6. A noise shield panel as described in claim 1, wherein:

in each of said inclined wall elements,

said apertures are arrayed equi-spaced in rows,

with the apertures of adjacent rows offset from each other.

7. A noise shield panel as described in claim 6, wherein:

the casing front wall further includes

a vertical wall element provided with at least one row of sound energy admitting apertures therethrough,

said vertical wall element located below the lowermost inclined wall element, and thereto joined by a further approximately horizontal element.

8. A noise shield panel as described in claim 2, wherein:

the sound absorbing material is a form-stable glass fiber batt of rectangular cross section enclosed by a moisture shield, such as a synthetic plastic film envelope or a spray coating of a bituminous resin.

9. A noise shield panel as described in claim 2, wherein:

the sound absorbing glass fiber batt has a rectangular cross section

and is

disposed against inside edges of the saw tooth section region of the wall,

and spaced from the back wall of the casing,

by spacer blocks of sound absorbing material interposed at both ends of the casing between the batt and said back wall.

10. A noise shield panel as described in claim 9, wherein:

the said front and back walls, at two opposite end regions of the panel, have flat marginal external surfaces parallel to each other over the entire end marginal extent of the panel,

whereby the said end regions are adapted to engage in respective inter-flange slots of correspondingly spaced H-section beam uprights.

11. A noise shield panel as described in claim 10, wherein:

for introduction of the sound absorbing batt,

at least one of the two opposite casing end walls is provided as a flap connected in hinge-like fashion with an adjacent edge of one of said back and front walls.

12. A noise shield panel as described in claim 2, wherein:

the casing has a back wall with alternating elevations and depressions running transversely of the casing length.

13. A noise shield panel as described in claim 2, wherein:

said batt has a rectangular cross section;

said back wall is stiffened by a checkerboard-like pattern of integrally molded square inward depressions,

with at least four of said depressions located near the periphery of the casing and similarly depressed inward deeper than the others, and contacting the back of the said batt, thereby to support it against inside edges of the saw tooth-like section region of said front wall.

14. A noise shield panel as described in claim 2, wherein:

one edge wall of the casing has a land and the opposite edge wall parallel thereto has a correspondingly located and shaped groove,

whereby like panels similarly oriented may be placed edgewise one upon another with a tongue-and-groove type engagement of lands and grooves.

15. A noise shield panel as described in claim 2, wherein:

the synthetic plastic casing is comprised of two half-shell members,

embodying respectively said front and back walls, and respective peripheral flanges forming side, top and bottom end wall portions,

the flange of one member telescoped into the flange of the other, and overlapped portions of said flanges secured as a seam to form the hollow casing.

16. A noise shield panel as described in claim 15, wherein:

the flanges of the two half-shells are secured as a seam running around all four narrow sides of the casing;

the overlapped seamed flanges being bonded to one another by cementing or welding.

17. A noise shield panel as described in claim 15, wherein:

the said half-shells of the casing are vacuum formed, injection molded, or centrifugally cast.

18. A noise shield panel as described in claim 2, wherein:

a sealing band runs around all four narrow edge walls of the casing;

said band comprises of a bituminous-impregnated elastic band.

19. A noise shield panel as described in claim 2, wherein:

the synthetic plastic casing is a blow-molded body.

20. A noise shield panel as described in claim 2, wherein:

the forwardly inclined elements are inclined from the vertical by an angle of from about 3° to about 30°;

the casing front wall further includes a vertical wall element located below the lowermost inclined wall element, and thereto joined by a further approximately horizontal element;

said vertical wall element provided with at least one row of sound energy admitting apertures therethrough;

said apertures in each of said inclined wall elements are arrayed equi-spaced in rows,

with apertures of adjacent rows offset from each other;

the said front and back walls, at two opposite end regions of the panel, have flat marginal external surfaces

parallel to each other over the entire end marginal extent of the panel,
 whereby the said end regions are adapted to engage in respective inter-flange slots of correspondingly spaced H-section beam uprights;
 the sound absorbing material is a form-stable glass fiber batt of rectangular cross section
 disposed against inside edges of the saw tooth section region of the front wall,
 and spaced from the back wall of the casing.
 21. A noise shield panel as described in claim 20, wherein: the sound absorbing glass fiber batt is enclosed by a moisture shield such as a synthetic plastic film envelope or a spray coating of bituminous type resin.
 22. A noise shield panel as described in claim 20, wherein: the casing back wall has alternating elevations and depressions running transversely of the panel length; and said batt is spaced from the back by spacer blocks of sound absorbing material interposed at both ends of the casing between the glass fiber batt and the said back wall.
 23. A noise shield panel as described in claim 20, wherein: said back wall is stiffened by a checkerboard-like pattern of integrally molded square inward depressions, with at least four of said depressions located near the periphery of the casing and similarly depressed inward deeper than the others,
 and contacting the back of the said fiber batt, thereby to support it against inside edges of the sawtooth-like section region of said front wall.
 24. A noise shield panel as described in claim 20, wherein: one edge wall of the casing has a land and the opposite edge wall parallel thereto has a correspondingly located and shaped groove,
 whereby like panels may be placed similarly oriented edgewise one upon another with a tongue-and-groove type engagement of lands and grooves.
 25. A noise shield panel as described in claim 2, wherein: the forwardly inclined elements are inclined from the vertical by an angle of from about 3° to about 30°;
 the casing front wall further includes
 a vertical wall element located below the lowermost inclined wall element, and thereto joined by a further approximately horizontal element;
 said vertical wall element provided with at least one row of sound energy admitting apertures therethrough;

said apertures in each of said inclined wall elements are arrayed equi-spaced in rows,
 with the apertures of adjacent rows offset from each other; said apertures are surrounded by respective short collar-like round outward flanges integral with the wall elements;
 the said front and back walls, at two opposite end regions of the panel, have flat marginal external surfaces parallel to each other over the entire end marginal extent of the panel,
 whereby the said end regions are adapted to engage in respective inter-flange slots of correspondingly spaced H-section beam uprights;
 the sound absorbing material is a form-stable glass fiber batt of rectangular cross section
 disposed against inside edges of the saw tooth section region of the front wall,
 and spaced from the back wall of the casing.
 26. A noise screening fence constructed of noise shield panels as described in claim 20 and
 a plurality of H-beam uprights embedded in the ground at a spacing from one another corresponding to the length of said panels as measured between the ends having said flat surfaces;
 a plurality of said panels being disposed one upon another in vertical alignment between respectively adjacent uprights with opposite panel ends engaged in the inter-flange slots of the uprights;
 and with an inverted channel beam spanning the top ends of adjacent uprights
 forming an upper edge of the noise screening fence.
 27. A noise screening fence as described in claim 26, including, between two adjacent uprights,
 a door constructed of the described panels.
 28. For fabrication of a noise shield panel as described in claim 19, a method comprising the steps of:
 blowing a heated section of thermoplastic synthetic tube in a blow mold having an internal shape corresponding to the configuration of the desired finished panel
 with the apertures of the front wall blown in a flanged form initially closed by a cap-like wall across the flange outer end;
 removing the cap-like closures from the flange ends, by sawing or grinding off, to free the apertures;
 and introducing the fibrous batt into the interior of the casing.

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