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RESILIENT FURRING STRIP FOR GYPSUM BOARD WALL SYSTEM

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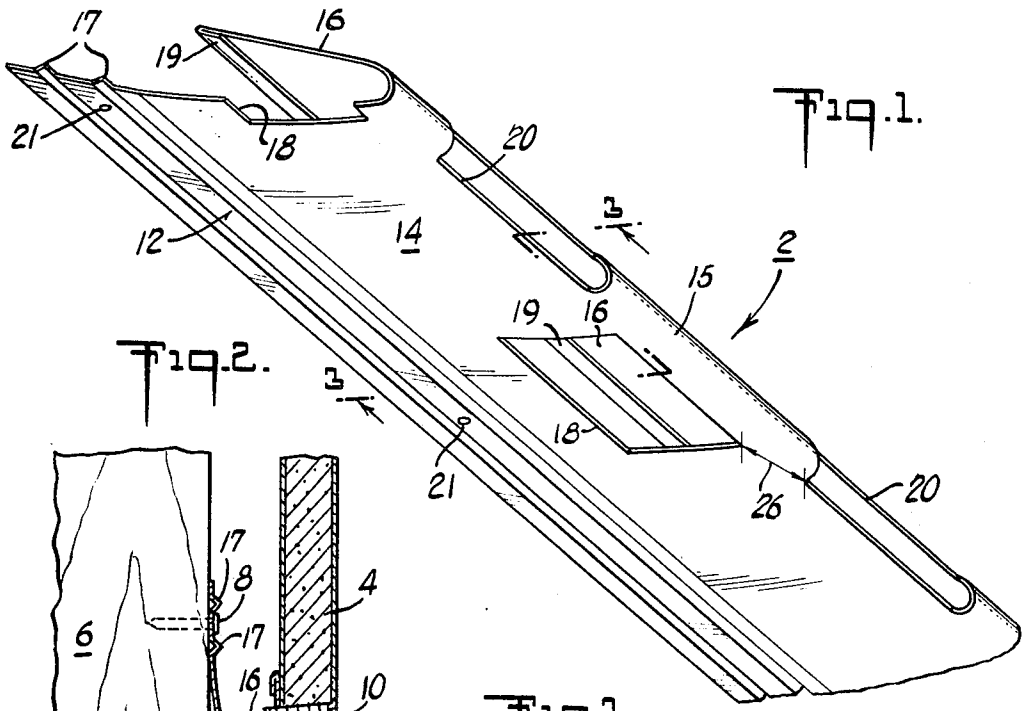


Fig. 1.

Fig. 2.

Fig. 3.

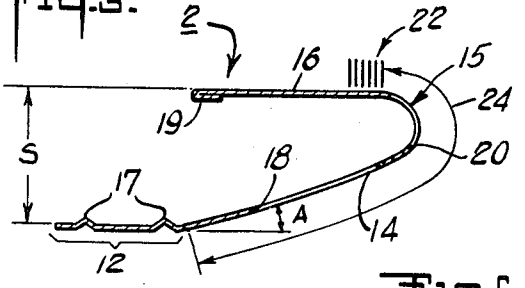
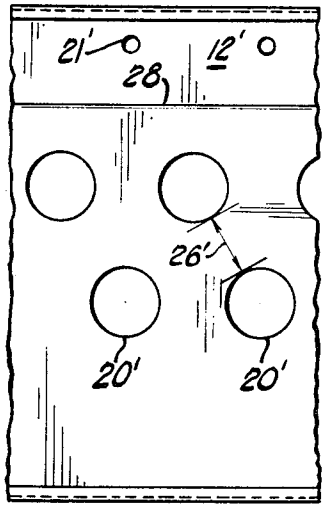


Fig. 4.



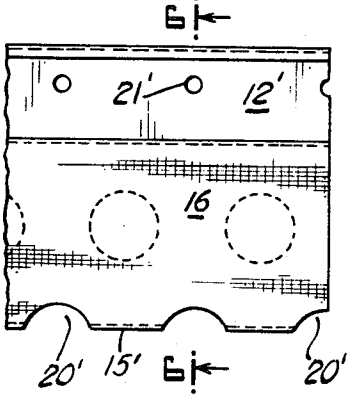
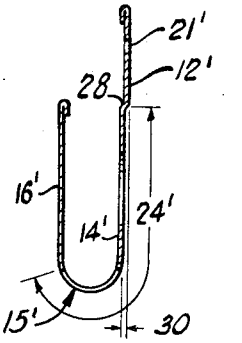


Fig. 5.

Fig. 6.



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RESILIENT FURRING STRIP FOR GYPSUM BOARD WALL SYSTEM

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ABSTRACT OF THE DISCLOSURE

A strip-form member for securing wallboard to wall studs with a minimum amount of sound transmission. The cross-section of the strip is substantially U-shaped, with the strip being secured to the studs near the end of one leg of the U, and the wallboard being secured near the end of the other leg. The relative stiffness of this form of mounting member holds the wallboard in place without rattling, sagging or shifting. Plural longitudinally-extending, laterally separated rows of holes are provided in the strip material separating the wallboard from the studs. The holes in one row are located in staggered or offset relationship to the holes in the next row. This combination makes the sound transmission paths from the wallboard to the wall studs very narrow, winding and long and creates a high degree of attenuation of the sound as it travels from the wallboard to the studs.

This invention relates to metal furring strips or runners for mounting gypsum board panels on wall and ceiling structures.

Gypsum wallboard has become accepted as a standard material for indoor wall and partition systems principally because of factors of fire resistance, economy and sound absorption. Many innovations have been developed to improve the economic features and the performance of gypsum wallboard systems, and particularly to improve their acoustical insulation properties. Perhaps the main approach has been the development of special resilient furring strips for mounting gypsum board on wall and ceiling stud or joist members. Such a furring strip typically is formed of galvanized sheet steel, and is shaped to provide a resilient mounting of the gypsum board in spaced relation to the stud or joist member. The theory on which the reduction in sound transmission is generally explained is that the gypsum board is permitted to resonate independently of its supporting stud members, and impinging sound waves are not directly transmitted through the structure. In a metal furring strip having an outwardly directed intermediate web portion which resiliently spaces the gypsum board from the studs, this web portion typically is provided with apertures; this theoretically reduces the cross-sectional mass through which sound is transmitted and provides sound baffling passages to diffuse sound waves through the wall system.

It is the principal object of this invention to provide a new and improved metal furring strip which is more effective in terms of greater reduction in sound transmission through the system.

A further object of this invention is to provide greater acoustical effectiveness in a strip without sacrificing features of economy, ease of installation, fire resistance and overall strength.

In accordance with this invention, the above objects are attained in a metal furring strip having a special configuration based around a substantially U-shaped cross-section, with one leg of the U being attached to the wall studs and the other leg of the U having appropriate means for securing wallboard to it, by screws, nails, staples, adhesive, or the like. In one illustrated embodiment, from a flat base leg portion (through which attaching means, such as nails or screws are driven to fasten the furring strip or runner to the stud members) an intermediate web portion extends outwardly at an oblique angle of approximately 155 to 175 degrees, and joins a connecting web which is bent backwardly (over part of the flat base portion in spaced relation thereto), which in turn joins another portion to which the wallboard is secured by self-tapping screws or the like. In a second illustrated embodiment, the intermediate web, the connecting web and the wallboard mounting portion together have a true U-shape; one leg of the U merges with the base portion at a step portion whereby this leg extends parallel but in slightly spaced relation to the stud face. The "intermediate portion" is of substantial length, and the "intermediate portion" and the "connecting web" each have a major percentage of metal removed by longitudinally spaced stamped-out openings, the openings in the "intermediate portion" being longitudinally offset relative to the openings in the "connecting web." The improved performance of the runner according to the present invention is attributable to these and other features to be described more fully hereafter.

Further objects, advantages and details of this invention will become apparent from the following description, read in conjunction with the accompanying drawings in which:

FIGURE 1 is a perspective view of bottom and outer sides of a preferred form of metal furring strip according to this invention;

FIGURE 2 is a partial vertical section through a gypsum board wall system embodying the furring strip shown in FIGURE 1;

FIGURE 3 is a cross-section through the furring strip, indicated along lines 3—3 in FIGURE 1;

FIGURE 4 is a face view of the stamped-out flat metal strip which is bent to form a furring strip according to a second embodiment of this invention;

FIGURE 5 is a front view of the furring strip formed by bending of the flat strip shown in FIGURE 4; and

FIGURE 6 is a cross-section taken as indicated by line 6—6 in FIGURE 5.

The preferred furring strip according to this invention is indicated generally by the reference numeral 2 in FIGURES 1 through 3. This runner is formed from fully galvanized sheet steel, aluminum of suitable stiffness, or other metallic materials having the necessary strength and resilient properties. A gauge of steel within the range of .020 to .024 inch, for example, is preferred. The strip 2 can be commercially supplied in standard lengths of eight or twelve feet, or longer as needed in particular installations.

Referring to FIGURE 2, furring strip 2 is employed to mount a sheet of relatively rigid material 4, such as gypsum wallboard, on a stud 6. (It will be understood that although not illustrated specifically, this strip 2 is equally applicable for the mounting of such sheet material on ceiling joists and other similar supporting structures.) In the illustrated embodiments, gypsum board of ½ or ⅝ inch thickness is preferably used. In some cases a face board is applied over a backing board to improve sound absorption and/or fire resistance. The standard spacing of runners 2 is 24 inches center-to-center, but this may be varied in accordance with known practice. The strip 2 is secured to studs 6 by nails 8, and wallboard 4 is secured to strip 2 by self-tapping screws 10. As is known in this art, the wallboard 4 may be secured to strip 2 by other means than screws, in which case the surface or configuration of the wallboard mounting portion would be suitably modified.

The specific configuration and details of furring strip 2 will be described with reference to FIGURES 1 and 3.

This strip comprises a base portion **12**, an intermediate web portion **14**, a wallboard mounting portion **16**, and a connecting web **15** therebetween. For added longitudinal rigidity of the base portion **12**, it may be rolled or press-formed with V-shaped ridges **17**. Holes **21** are punched at closely spaced points to accommodate the nails **8**. In this embodiment, the wallboard mounting portion **16** is bent over at **19** for added stiffening and to eliminate sharp edges. Where self-tapping screws **10** are used, the outer face of wallboard mounting portion **16** (not shown) is preferably knurled or indented to resist skidding or "walking" of the points of the screws. Instead of screws or nails, the wallboard can be secured to this outer face by a suitable adhesive, by staples, or in other conventional manners.

The intermediate web portion **14** merges with base portion **12** at a large obtuse angle whereby its complementary acute angle A is within the range of 5 to 25 degrees. (In other words, this obtuse angle is preferably in the approximate range of 155 to 175 degrees.)

Two longitudinally offset sets of openings **18** and **20** are stamped out of the intermediate web portion **14** and the connecting web portion **15**, respectively. Openings **18** centrally occupy the width of the intermediate web portion **14**, and may be of any suitable shape, such as rectangular. The openings **20** may also be of any suitable shape, being oblong in this embodiment, and cutting across the curve in the connecting web **15**, as shown in FIGURE 3. These openings, **18** and **20**, substantially reduce, by about 25% to 40%, the mass of cross-section of the overall section of the runner which is responsible for providing the resilient mounting of the wallboard. The series of openings **20** represent removal of a significant amount of metal at the curved section wherein flexure occurs, thereby materially increasing the resiliency of the mounting strip. Openings **18** and **20** both are intended to act as sound attenuating passages within the wall system. Preferably, openings **18** and **20** are in offset relation to provide only a narrow, sinuous passage for the transmission of sound. Also, note particularly that the dimension **26** (see FIGURE 1) of the portions through which sound waves are transmitted is substantially narrowed as a consequence of liberally providing these openings. The spacing S in this embodiment preferably is ½ to ¾ inch.

Significant characteristics of the structure just described are the narrow dimension **26** of cross-section available for sound transmission, and the substantial width of the intermediate and connecting web portions **14** and **15** which are interposed between the wallboard **4** and stud member **6**. This width is indicated by reference numeral **24** in FIGURE 3; it extends from the juncture with the base portion **12**, outwardly around the curve to a point where the strip is held against the wallboard, somewhere in the area of the group of lines **22** in FIGURE 3.

In summary, the spacing S, the very acute angle A, the substantial dimension **24**, the removal of a major portion of metal cross-section by providing openings **18**, **20**, and the offset relation of openings **18**, **20**, collectively result in better overall qualities of the runner. Based on actual acoustical tests of this furring strip by competent testing laboratories, it scored better than competitive furring strips by margins of several percentage points.

A modified embodiment of a furring strip embodying this invention is shown in FIGURES 4, 5 and 6. Referring to FIGURE 4, a flat metal strip approximately .022 inch thick and 3½ to 4 inches wide is stamped out to produce nail holes **21'** and openings **18'** and **20'**. The openings **18'** and **20'**, which are in offset relation to one another, preferably are one-half inch or greater in diameter and have close spacing (see dimension **26'**) whereby the cross-sectional amount of metal in this region is reduced by at least 25%. By conventional manufacturing techniques the flat strip shown in FIGURE 4 is formed to assume the cross-sectional shape shown in FIGURE 6. This shape comprises a base portion **12'**, intermediate web portion **14'**, wallboard mounting portion **16'** and a connecting web portion **15'** therebetween, these portions corresponding in function to the portions numbered, respectively, **12**, **14** and **16** in the embodiment shown in FIGURES 1–3. Whereas in the first embodiment the section providing resiliency and having the length **24** (FIGURE 3) extends from the base portion at an oblique angle and then curves backwardly thereover, in FIGURE 6 it will be seen that intermediate portion **14'** is immediately spaced from contact with the stud by virtue of a short connecting portion or step **28**; as compared to the oblique angle previously mentioned, intermediate web portion **14'** extends parallel to the plane of the base portion **12'** and stud face, and the connecting web bends backwardly in the form of a pure U. Step **28** has a width of approximately 1/16 to ⅛ inch. Thus the width **24'** of the section serving to insulate the wallboard from the stud is considerable, as is indicated in FIGURE 6. In effect, this provides a larger spring element with proportionately greater resiliency, as compared with prior art designs, to dampen sound vibrations transmitted from the outer wallboard through the stud system. Also, as previously discussed with regard to openings **18** and **20**, the openings **18'** and **20'** theoretically reduce the cross-sectional avenues of sound transmission.

It should be understood that various departures from the specifically disclosed embodiment of this invention can be effected without departing from the scope thereof as defined by the following claims.

What is claimed is:

1. A building wall construction comprising relatively rigid sheet material, a supporting structure, and mounting means resiliently securing the sheet material to said supporting structure in spaced relation thereto; said mounting means comprising an elongated sheet metal strip having a base portion engaging and being secured to said supporting structure, a web extending outwardly from said base portion, being bent over itself, and having a series of spaced openings therein, selected ones of said openings being offset both laterally and longitudinally with respect to adjacent ones of said openings, said web having a sheet material mounting portion located in spaced relation to said base portion, said sheet material being secured to said sheet material mounting portion.

2. The construction according to claim **1**, wherein said web extends laterally from said base portion in a straight line at an oblique angle within the range of 155 to 175 degrees and extends outwardly at said angle for a substantial distance.

3. The construction according to claim **1**, wherein said web includes a stepped portion connected to said base portion, from which said web extends laterally for a substantial distance in a plane substantially parallel to but in spaced relation to the parallel planes of the face of the supporting structure and the base portion.

4. The construction according to claim **1**, in which said openings are of substantial lateral extent, and are arranged in laterally spaced, parallel rows in which each of the openings in one row is located centrally between two adjacent openings in the next row, and the longitudinal extent of each of said openings is substantial with respect to the spacing between openings in the next row whereby sound conduction through said web is limited to relatively narrow, sinuous paths between said openings.

5. A resilient mounting means for mounting relatively rigid sheet material on a wall support structure, said mounting means comprising an elongated sheet metal strip having a first substantially flat portion, a web extending laterally and outwardly from said flat portion and being bent over itself, said web having spaced openings therein, selected ones of said openings being offset both laterally and longitudinally with respect to adjacent openings, said web having a second substantially flat portion spaced from

said first flat portion, one of said substantially flat portions being adapted to be secured to said studs and the other being adapted to be secured to the back of said sheet material.

6. The mounting means according to claim 5, wherein selected ones of the openings in said web extend across the bent cross-section of the web and are offset longitudinally from other ones of said openings.

7. The construction according to claim 5 in which said openings are of substantial lateral extent, and are arranged in laterally spaced, parallel rows in which each of the openings in one row is located centrally between two adjacent openings in the next row, and the longitudinal extent of each of said openings is substantial with respect to the spacing between openings in the next row whereby sound conduction through said web is limited to relatively narrow, sinuous paths between said openings.

8. The construction according to claim 5, wherein said strip has a narrow stepped portion extending outwardly from said first-mentioned flat portion and connecting same to said web, said web extending from said stepped portion a substantial distance in spaced, substantially parallel relation to the plane of said base portion, and said web being bent backwardly in a substantially U-shaped curve.

9. The construction according to claim 8, wherein said first-mentioned flat portion has longitudinally spaced nail holes therethrough and said second-mentioned flat portion has a knurled surface to prevent skidding of self-tapping screws.

10. An integrally-formed resilient mounting means for mounting relatively rigid sheet material on wall studs and the like, comprising an elongated sheet metal strip having a substantially flat base portion, a resilient web portion extending transversely from said base portion and being bent backwardly over itself in a substantially U-shaped curve, the outer part of said web overlying part of said portion and being spaced from said base portion, said web portion having longitudinally spaced openings some of which are extended across said U-shaped curve, said openings in said web being of substantial lateral extent and being arranged in laterally-spaced, parallel rows in which each of the openings in one row is located centrally between two adjacent openings in the next row, the longitudinal extent of each of said openings being substantial with respect to the spacing between openings in the next row whereby sound conduction through said web is limited to relatively narrow, sinuous paths between said openings.

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