United States Patent [19]

Sauer et al.

[11] **3,740,912**

[45] **June 26, 1973**

[54] **FIRE RETARDANT SHAFT WALL**

[75] Inventors: **Gale E. Sauer**, Williamsville; **Carl R. Mapes**, Kenmore, both of N.Y.

[73] Assignee: **National Gypsum Company**, Buffalo, N.Y.

[22] Filed: **Nov. 12, 1971**

[21] Appl. No.: **198,483**

Related U.S. Application Data

[63] Continuation of Ser. No. 34,656, May 5, 1970, abandoned.

[52] **U.S. Cl.** **52/479**, 52/483, 52/495

[51] **Int. Cl.** **E04b 2/30**, E04b 2/78

[58] **Field of Search** ..... 52/479, 481, 483, 52/241, 495, 460, 282, 281, 729, 480, 770, 732, 730, 741, DIG. 5

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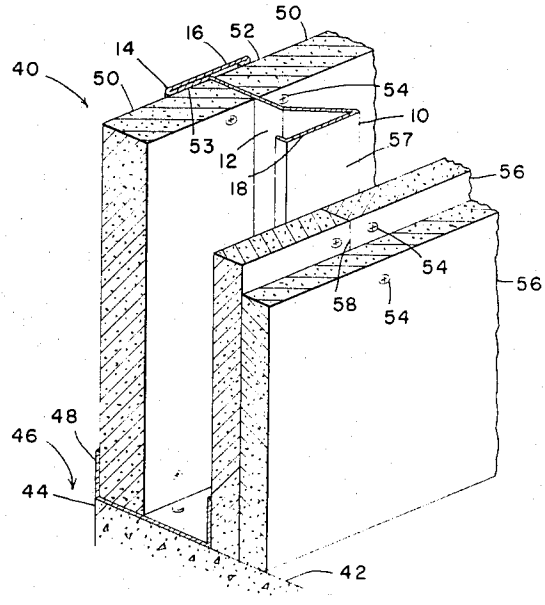
Primary Examiner—Price C. Faw, Jr.

Attorney—Robert F. Hause

[57] **ABSTRACT**

A wall construction adapted for enclosing an elevator shaft particularly suited for erection solely from one side thereof and resistant to normal distortions resulting from the heat of fire within the shaft.

9 Claims, 5 Drawing Figures



PATENTED JUN 26 1973

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SHEET 1 OF 2

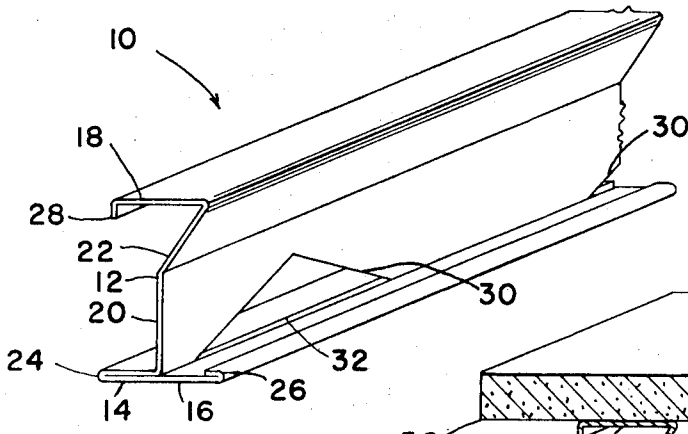


Fig. 1

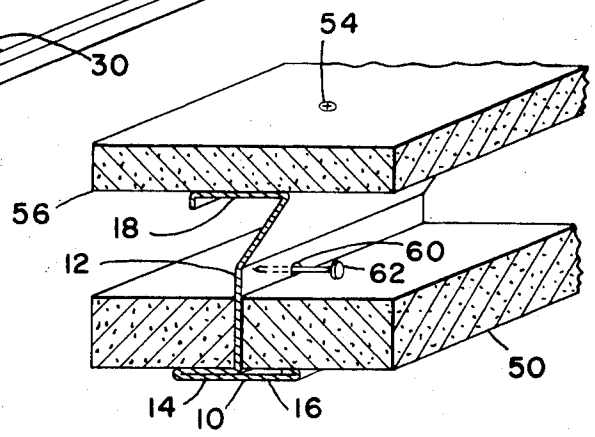


Fig. 3

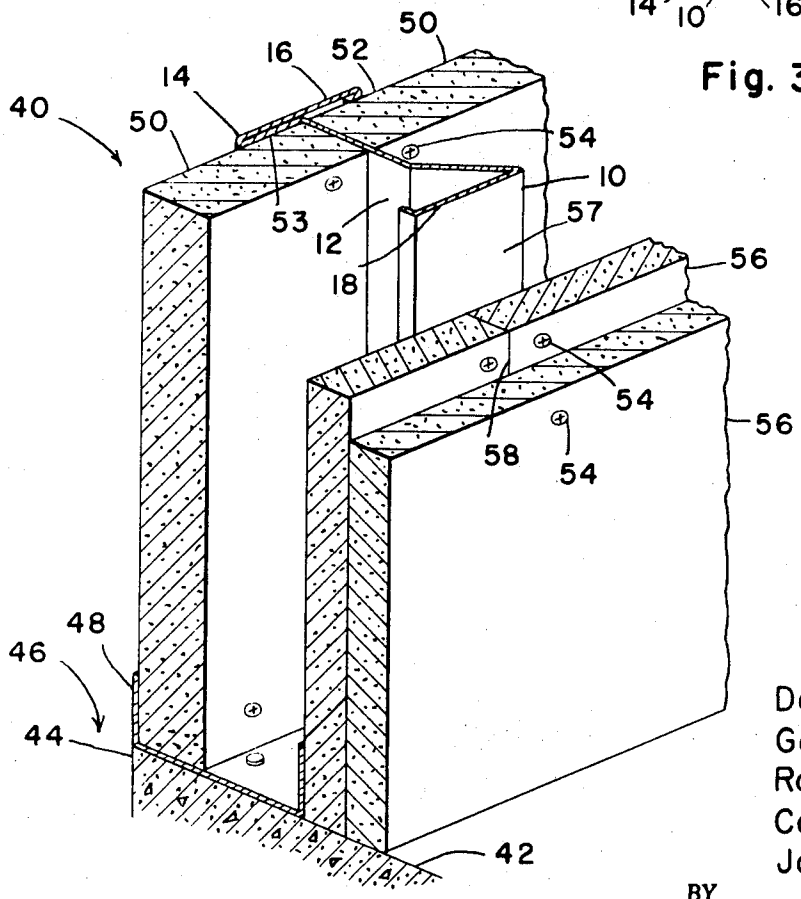


Fig. 2

INVENTORS
David Bieri
Gale E. Sauer
Robert J. Pearson
Carl R. Mapes
Jack A. Dawdy

BY
Robert F. Hanson
ATTORNEY

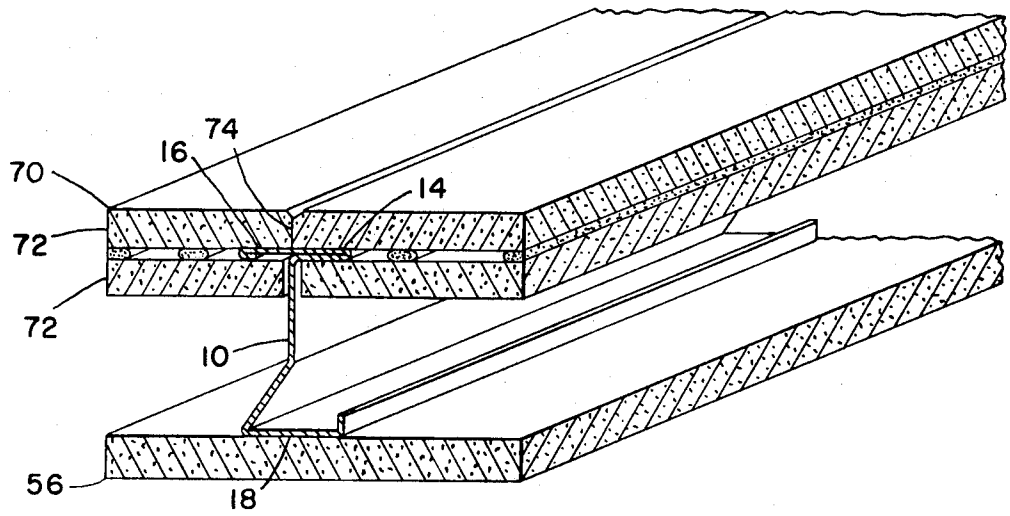


Fig. 4

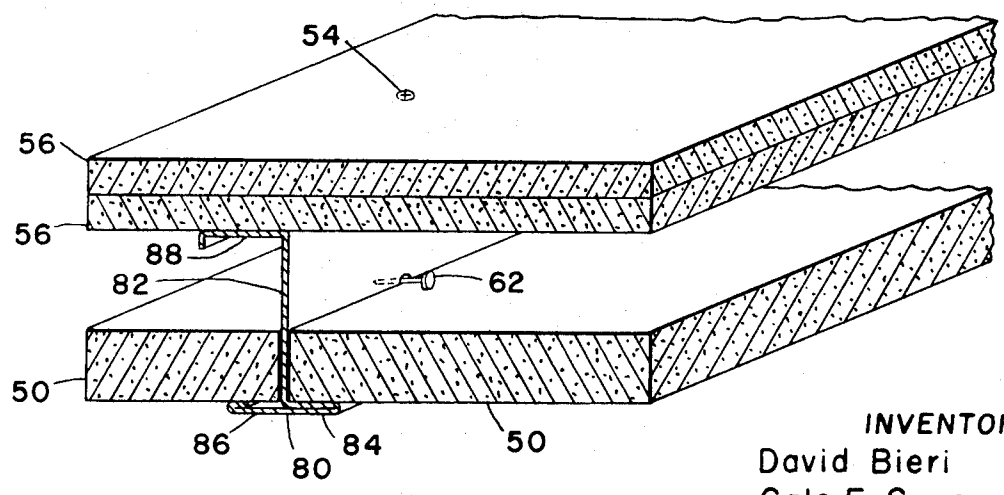


Fig. 5

INVENTORS
David Bieri
Gale E. Sauer
Robert J. Pearson
Carl R. Mapes
Jack A. Dawdy

BY
Robert F. Hause
ATTORNEY

FIRE RETARDANT SHAFT WALL

This is a continuation of application Ser. No. 34,656, filed May 5, 1970, now abandoned.

This invention relates to an elevator shaft wall of gypsum boards affixed to vertically disposed lightweight metal studs, particularly studs having a central web having a width extending essentially in the direction of the thickness of the wall, a pair of oppositely directed flanges extending generally perpendicularly from the lateral edge of the web only on the shaft side of the wall and a plurality of spaced apart expansion relief slots in the web adjacent to the flanges.

The need for special construction systems for walls adapted for being assembled solely from one side, in constructing walls around elevator shafts, is completely obvious. At least in walls of gypsum board, the common construction systems involve assembling operations on both sides of the wall. Gypsum board walls are particularly desirable relative to providing fire retardance and relative to ease of handling of materials during construction.

Walls constructed of metal studs, particularly with one face of the metal stud exposed on a side of the wall where there is a potential of fires and high temperature, are subject to failure in a fire by high temperature expansion of the one side of the stud relative to the lack of expansion on the other side, and the resultant bowing of the wall into the fire-causing disruption and separation of the elements forming the wall.

It is an object of the present invention to provide an improved shaft wall, readily assembled from one side and relatively resistant to high temperatures on the opposite side.

It is a further object to provide a novel metal stud for supporting such improved shaft walls.

These and other objects will be clearly understood in considering the preferred embodiments as set forth in the specification and shown in the drawings in which:

FIG. 1 is an isometric view of a metal stud made in accordance with the present invention.

FIG. 2 is a cross sectional perspective view of a vertical wall embodying the stud of FIG. 1.

FIG. 3 is a view similar to cross section of FIG. 2, of a modified form of the invention.

FIG. 4 is a view similar to FIG. 3 of a further modified form of the invention.

FIG. 5 is a view similar to FIG. 3 of a still further modified form of the invention.

Referring to FIG. 1 there is shown an elongate, lightweight, metal stud **10**, formed from sheet metal, preferably 24 gauge galvanized steel, and formed to include a central web **12**, a pair of elongate, oppositely directed flanges **14** and **16** in a plane perpendicular to the general extent of web **12** and along one lateral edge thereof, and a single, elongate flange **18**, parallel to flanges **14** and **16** and along the opposite lateral edge of web **12**.

In the embodiment of FIG. **1**, web **12** includes an elongate perpendicular portion **20**, adjoining and perpendicular to flanges **14** and **16** and an elongate acutely angled portion **22** disposed between perpendicular portion **20** and flange **18**.

Flanges **14** and **16** are formed by the sheet metal of the stud being bent to extend from the web **12** outward to the edge **24** of one flange **14**, being reversely folded to extend therefrom to the outer edge **26** of flange **16**,

and then being reversely bent back on itself for a short distance from edge **26**.

A short lip **28** extends inwardly, perpendicularly, from the edge of single flange **18** remote from web **12**, for stiffening of flange **18**.

A plurality of openings **30, 30** are disposed in web **12**, at about 6 inch intervals, having an extent of about three inches along the side **32** of the opening **30** which is adjacent the flanges **14** and **16**. Openings **30, 30** are shown in the preferable form of isosceles triangles, however they can be merely slits extending along the junction of web **12** and flanges **14** and **16** or any shape opening extending up to about halfway across the width of web **12**.

In FIG. **2**, the stud **10** is shown supporting wall **40**, which is constructed on floor **42** at an edge **44** adjacent an elevator shaft **46**. Studs **10** are vertically disposed at two foot spacings with the bottom of each stud **10** affixed within a floor channel **48** affixed to floor **42**.

One inch thick, 2 foot wide gypsum core boards **50** are disposed between adjacent studs **10** with a back face **52** abutting the inner surface **52** of flanges **14** and **16**. Core boards **50** are a standard form of gypsum board, with a set gypsum core enclosed within a paper covering. Boards **50** extend the full distance from the floor **42** to the ceiling thereabove (not shown). Self-drilling, self-tapping drywall screws **54** affix the boards **50** to the flanges **14** and **16**.

Two layers of 4 foot wide ⅝ inch fire-rated gypsum wallboard **56** is attached to the outer surface **57** of flange **18** with appropriate length drywall screws **54**, with the lateral edges **58** of the boards **56** of the two respective layers being located over alternate studs **10**.

In the modification of FIG. **3**, the stud **10** is provided with a plurality of small holes **60** located in web **12** along a line 1 inch from the flanges **14** and **16**, and core board **50** is affixed against flanges **14** and **16** by small nails or clips **62** inserted in the holes **60**. The alternative of a single layer of fire-rated wallboard **56** is shown screw-attached to flange **18**.

In FIG. **4**, the stud **10** has a prelaminated panel **70** mounted on each of the respective flanges **14** and **16**, with the respective flanges disposed in between the laminations **72, 72**, along each of the panel vertical edges **74**.

FIG. **5** shows a modified stud **80** having a flat web **82**, flanges **84** and **86** along edge of web **82** and a single flange **88** along the other edge of web **82**. Core boards **50** are affixed against flanges **84** and **86** with nails or clips **62**. Two layers of fire-rated gypsum wallboard **56** are screw-attached to flange **88**.

The erection of the walls of the present invention can be done by builders working from only the one side of the wall. After one stud **10** or **80** is affixed at its bottom and top, a core board **50** or panel **70** is positioned relative thereto, working from the one side of the wall, and another stud is then positioned relative to the opposite edge of the board or panel. Subsequently, the wallboards **36** are screw-attached to the studs **10** or **80**. Accordingly, a first series of coplanar gypsum boards **50** or panels **70** are disposed against and are supported by the inner surface **53** of flanges **14** and **16**, or of flanges **84** and **86**. A second series of coplanar gypsum boards **56** are disposed against and are supported by the outer surface **57** of flange **18** or **88**.

The studs may alternatively be all affixed in place first, particularly the flat webbed stud **80**, after which

boards **50** are respectively set in place and affixed against flanges **14, 16** or **84, 86.**

The stud **10** permits of improved access for the purpose of screw-attaching core boards **50** to flanges **14** and **16,** by reason of the angled portion **22** of web **12.** The affixation of core boards **50** with nails or clips **62** is preferred, relative to screw attachment, with studs **80,** which lack a web angled portion.

The presence of openings **30, 30** in either the stud **10** or the stud **80** is for the purpose of expansion relief of the side of the stud facing an elevator shaft, in the event of fire and high temperatures in the elevator shaft. It has been found that wall structures of the type disclosed herein, without such means for expansion relief in the studs, undergo an extreme bowing into the zone of the shaft under high temperature conditions in the shaft. Openings **30** permit the flanges **14, 16** to bow toward the shaft in a plurality of short sections adjacent each opening **30,** whereby the balance of the stud remains substantially in place, and the wall continues to restrict the passage of fire and heat.

Having completed a detailed disclosure of the preferred embodiments of our invention so that those skilled in the art may practice the same, we contemplate that variations may be made without departing from the essence of the invention.

We claim:

1. A wall, readily assembleable from one side and suitable for construction where the second side is relatively inaccessible, comprising a plurality of spaced apart vertically disposed elongate, formed sheet metal studs, each said stud being formed from a single sheet of sheet metal, gypsum boards on the said one side of said wall screw attached to the outer surface of a single solitary flat screwable portion of each of said studs, said flat screwable portion of each said stud facing said one side of said wall, and gypsum boards on said second side of said wall affixed against the inner surface of a pair of oppositely directed flanges, said oppositely directed flanges being formed from an elongate portion of said sheet metal which extends in width from the outer edge of one of said flanges to the outer edge of the opposite said flange, said oppositely directed flanges forming the second side of said stud on the said second side of said wall, and portions of single thickness of said sheet metal stud adjoining said flat screwable portion on said one side and said oppositely directed flanges on said second side.

2. A wall comprising a plurality of spaced-apart, vertically disposed, elongate, formed sheet metal studs and a plurality of gypsum boards affixed to said studs, said boards and said studs forming a wall which is suitable for erection from a first side without need for anyone on the opposite side, said studs each being formed from a single sheet of sheet metal and having a web formed from a single thickness of said sheet metal disposed substantially perpendicular to the plane of the wall, said studs each having a single solitary flange extending parallel to the plane of the wall from the edge of said web forming one side of said stud on said wall first side, said studs each having a pair of oppositely directed elongate flanges disposed in a plane parallel to the plane of the wall, said pair of flanges forming the opposite side of said stud, means joining said three flanges to said web, a first series of coplanar gypsum boards having lateral edge portions disposed against, and supported by the inner surface of said oppositely directed flanges of said studs, means for holding said lateral edge portions against said oppositely directed flanges and a second series of coplanar gypsum boards disposed against and supported by the outer surface of said single flanges of said studs.

3. The wall of claim **2** wherein said web includes a substantially flat portion which extends between a pair of lateral edges of coplanar gypsum boards of said first series, said flat portion being substantially perpendicular to the plane of the wall and having a width substantially greater than the thickness of said gypsum boards of said first series, said stud being formed to permit insertion and removal of one of said pair of lateral edges of one gypsum board while said opposite lateral edge of said one gypsum board is disposed against one of the pair of flanges of an adjacent stud.

4. A wall construction as defined in claim **2** wherein the side of said wall with said first series of coplanar gypsum boards is adjacent an elevator shaft.

5. A wall construction as defined in claim **2** wherein said studs are formed from a single elongate sheet of steel of about 24 gauge and said pair of oppositely directed flanges being formed from an elongate portion of said sheet metal which extends in width from the outer edge of one of said flanges to the outer edge of the opposite said flange.

6. A wall construction as defined in claim **2** wherein said web is all in a single plane perpendicular to the planes of said flanges.

7. A wall construction as defined in claim **2** wherein said web comprises two portions, one portion being adjacent and perpendicular to said oppositely directed flange and the other portion being adjacent and acutely angled to said single flange.

8. The wall construction of claim **2** wherein said studs are disposed at about two foot spacings and said first series of coplanar gypsum boards are about two feet by one inch by room height.

9. The wall construction of claim **2** wherein said studs are disposed at about two foot spacings and said first series of coplanar gypsum boards consist of two laminated boards of about two feet by half inch by room height.

* * * * *

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,740,912 Dated June 26, 1973

Inventor(s) Gale E. Sauer and Carl R. Mapes

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, line 22, "52" (second occurrence) should be ---53---; same column, line 59, "36" should be ---56---.

Inventors' names on drawing "David Bieri, Gale E. Sauer, Robert J. Pearson, Carl R. Mapes and Jack A. Dawdy" should be ---Gale E. Sauer and Carl R. Mapes---.

Signed and sealed this 19th day of February 1974.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents