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(54) **THERMALLY INSULATING BUILDING WALL STRUCTURE**

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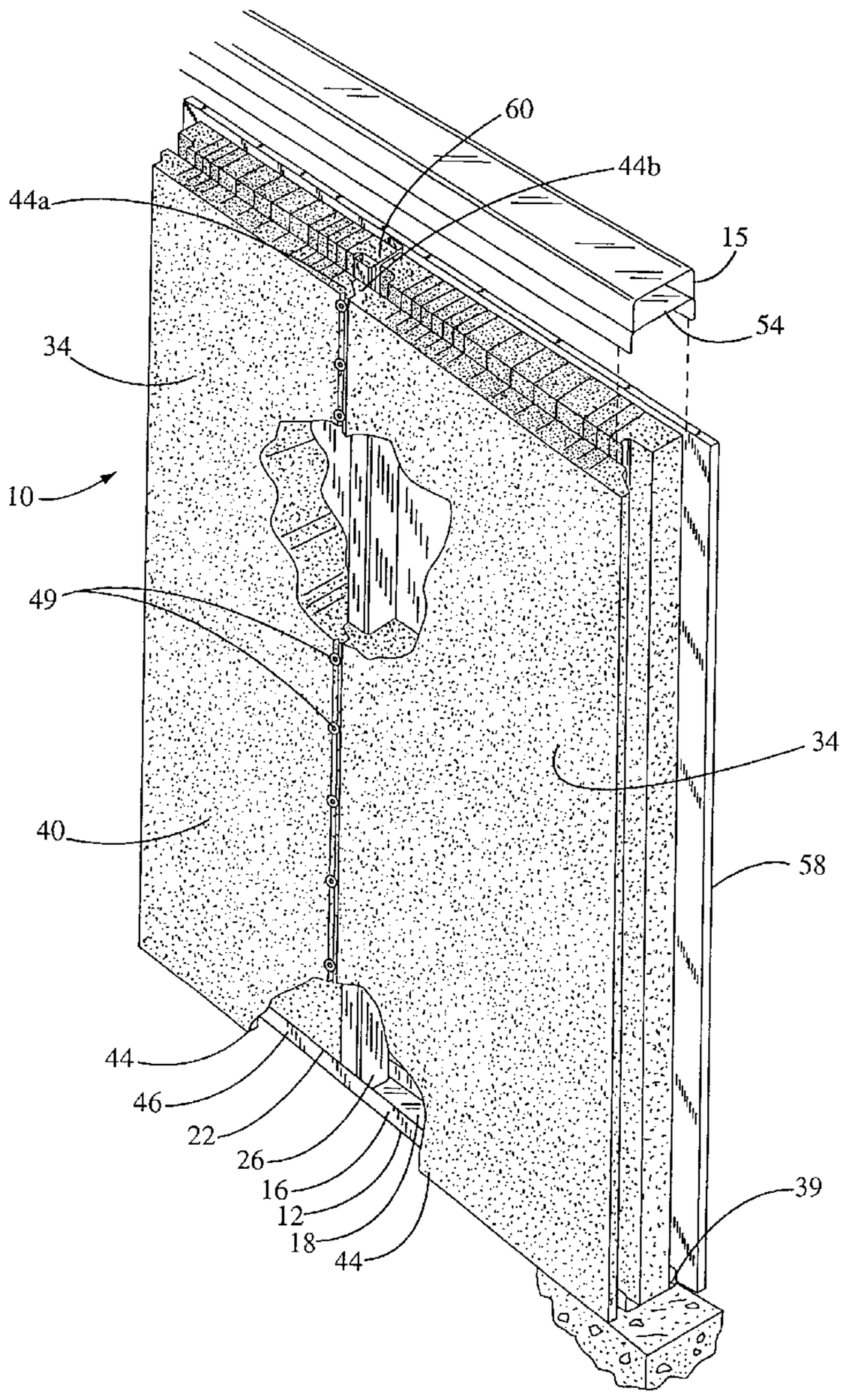
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(57) **ABSTRACT**

An insulative building wall structure including parallel channel-bearing track and load plate structures with a plurality of spaced apart posts extending perpendicularly there between and a plurality of respective foam panels disposed between the posts. The panels are provided with a plurality of vertical slits such that width adjustment thereof can be accomplished on-site by removing an appropriate number of slitted strips from a panel. Each panel is maintained such that a void is formed between respective interior edges of the channels and the interior surfaces of the foam panels. A wall surface panel is secured to respective interior outer edges of the track and load plate structures to create an insulative dead air space, corresponding to the above-described void, between the interior surface of each foam panel and the wall surface panel.



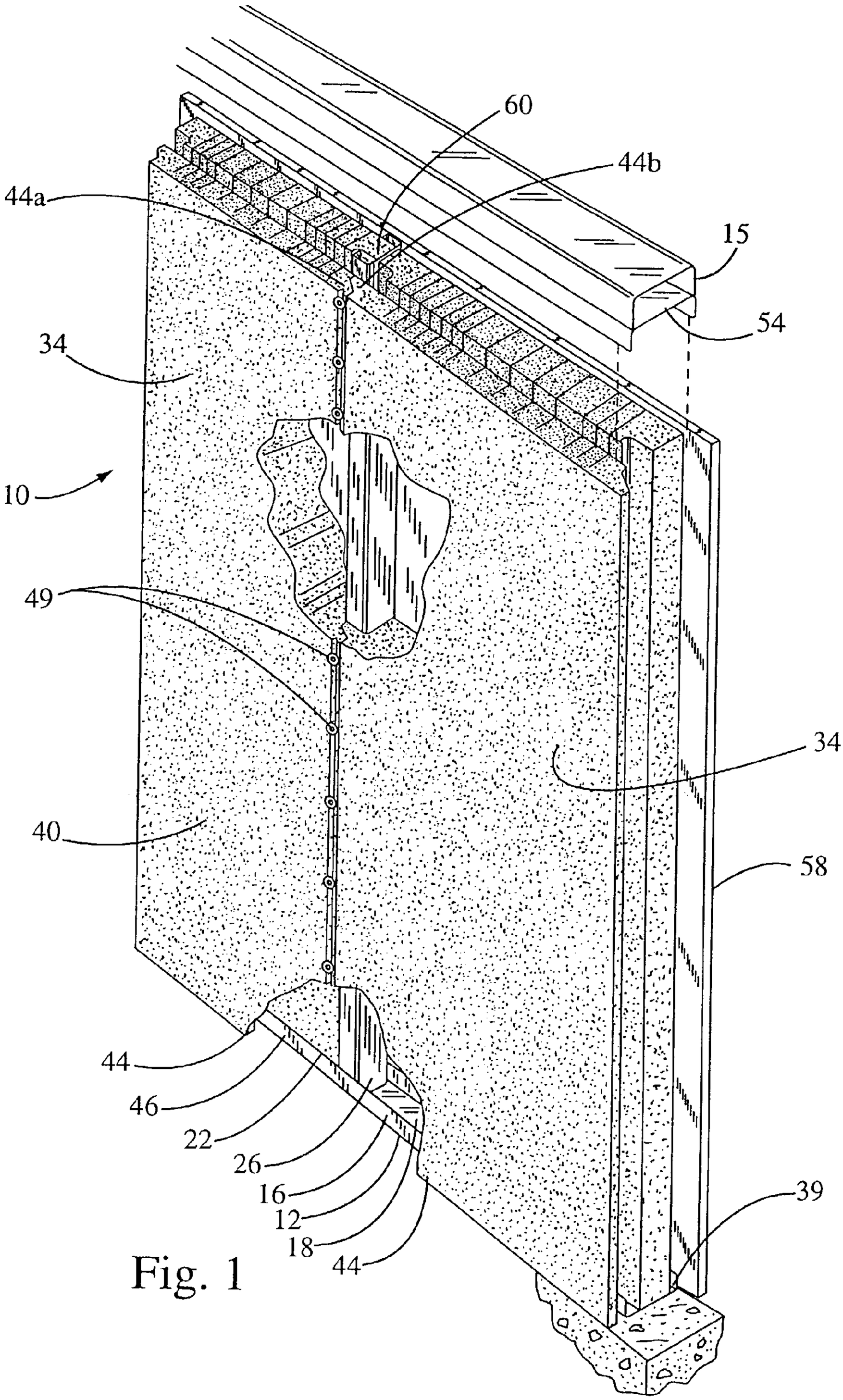


Fig. 1

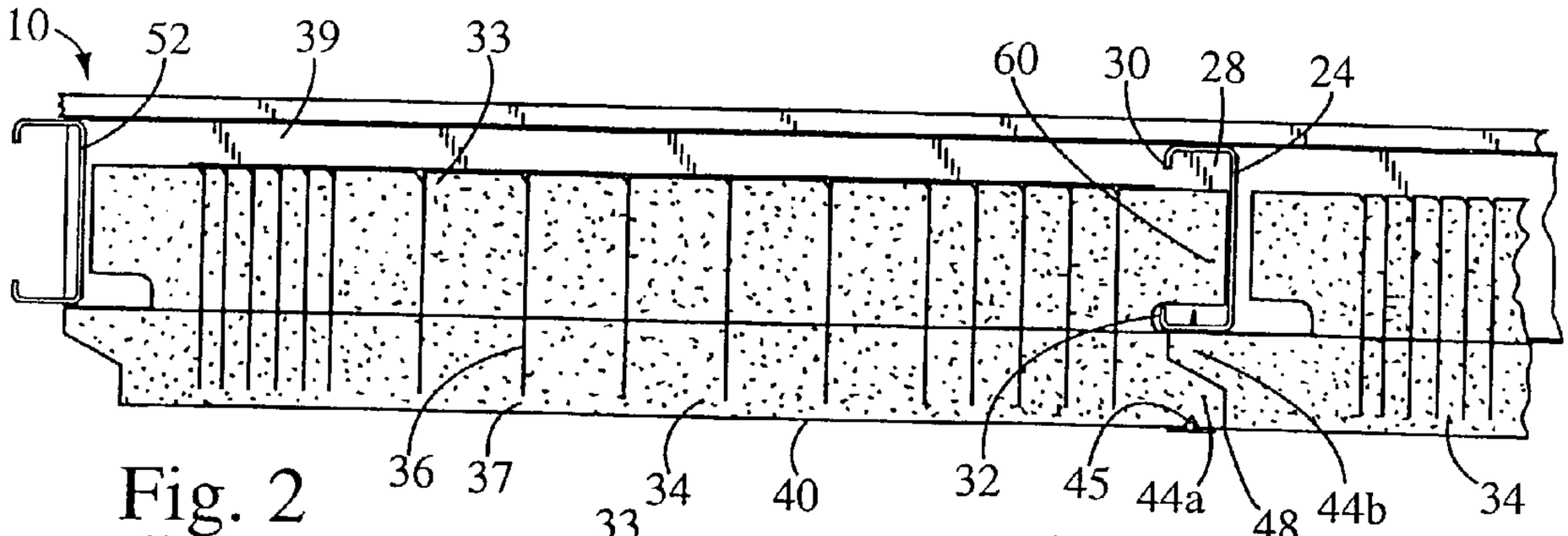


Fig. 2

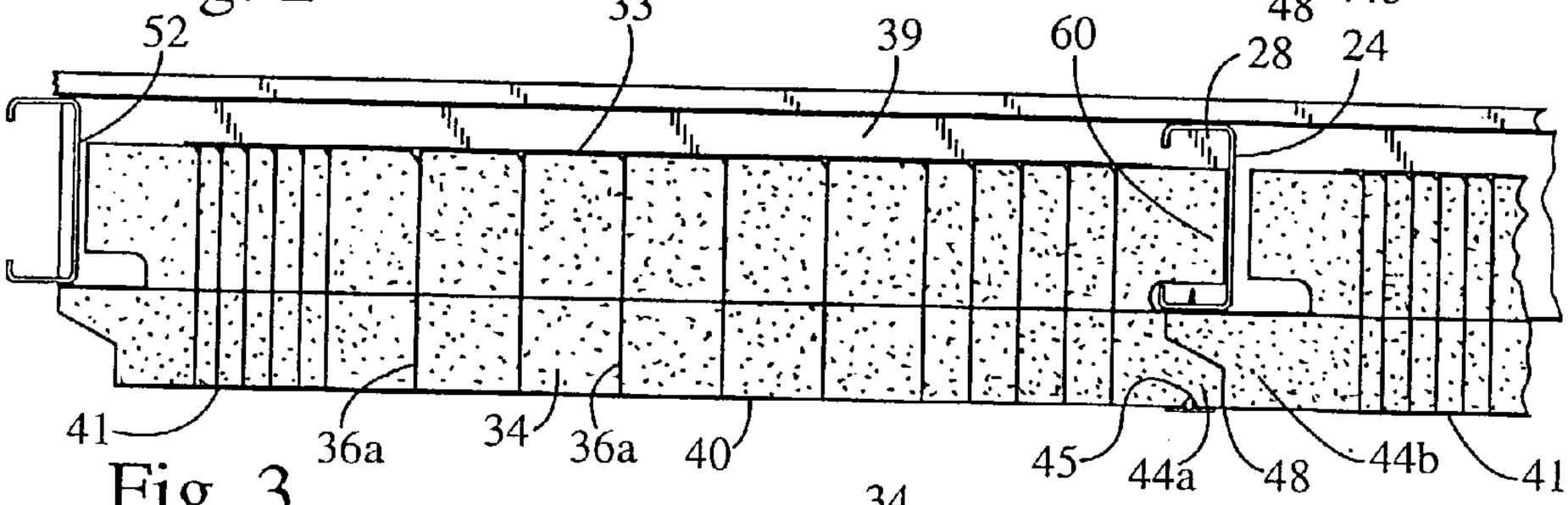


Fig. 3

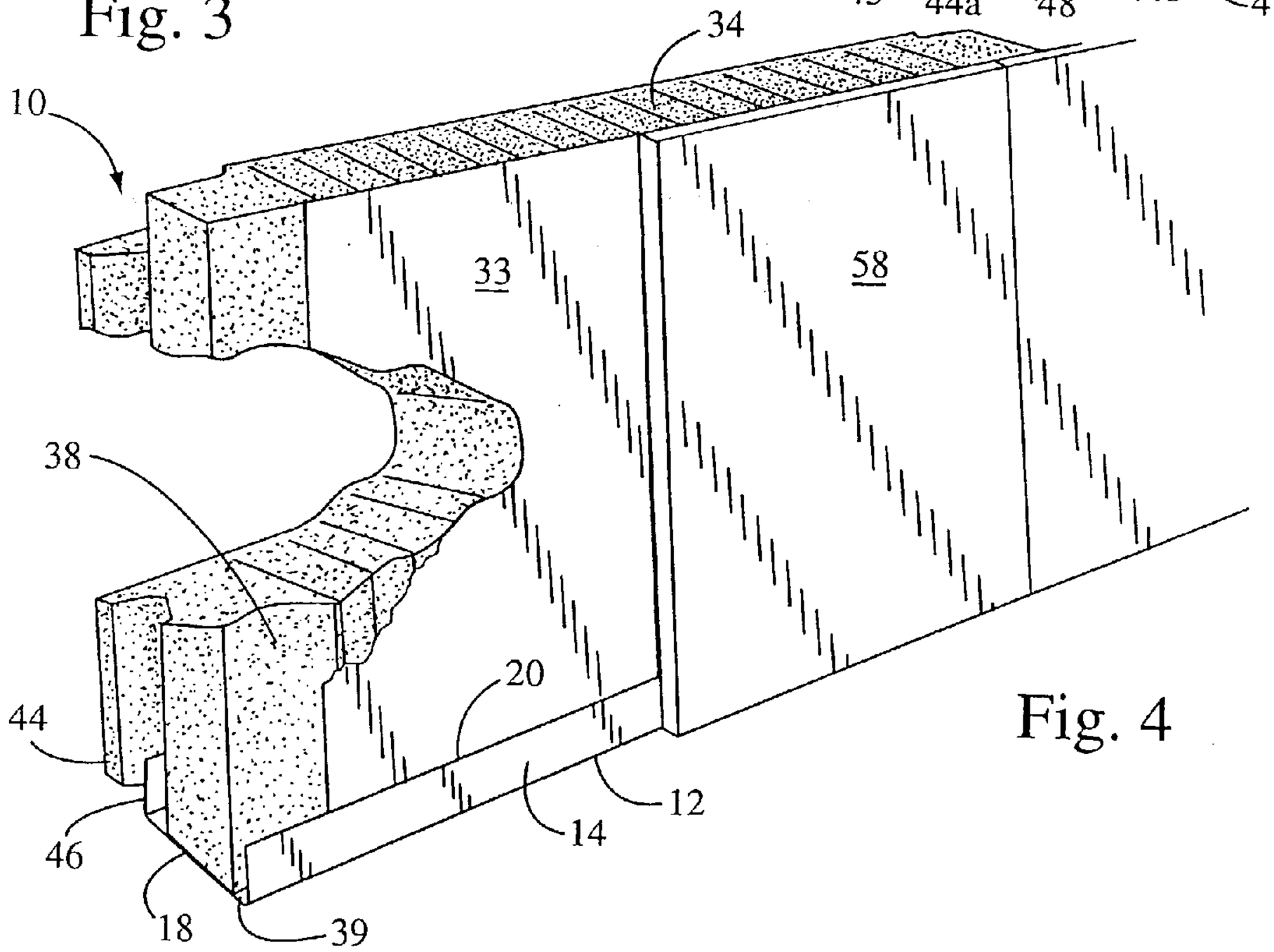


Fig. 4

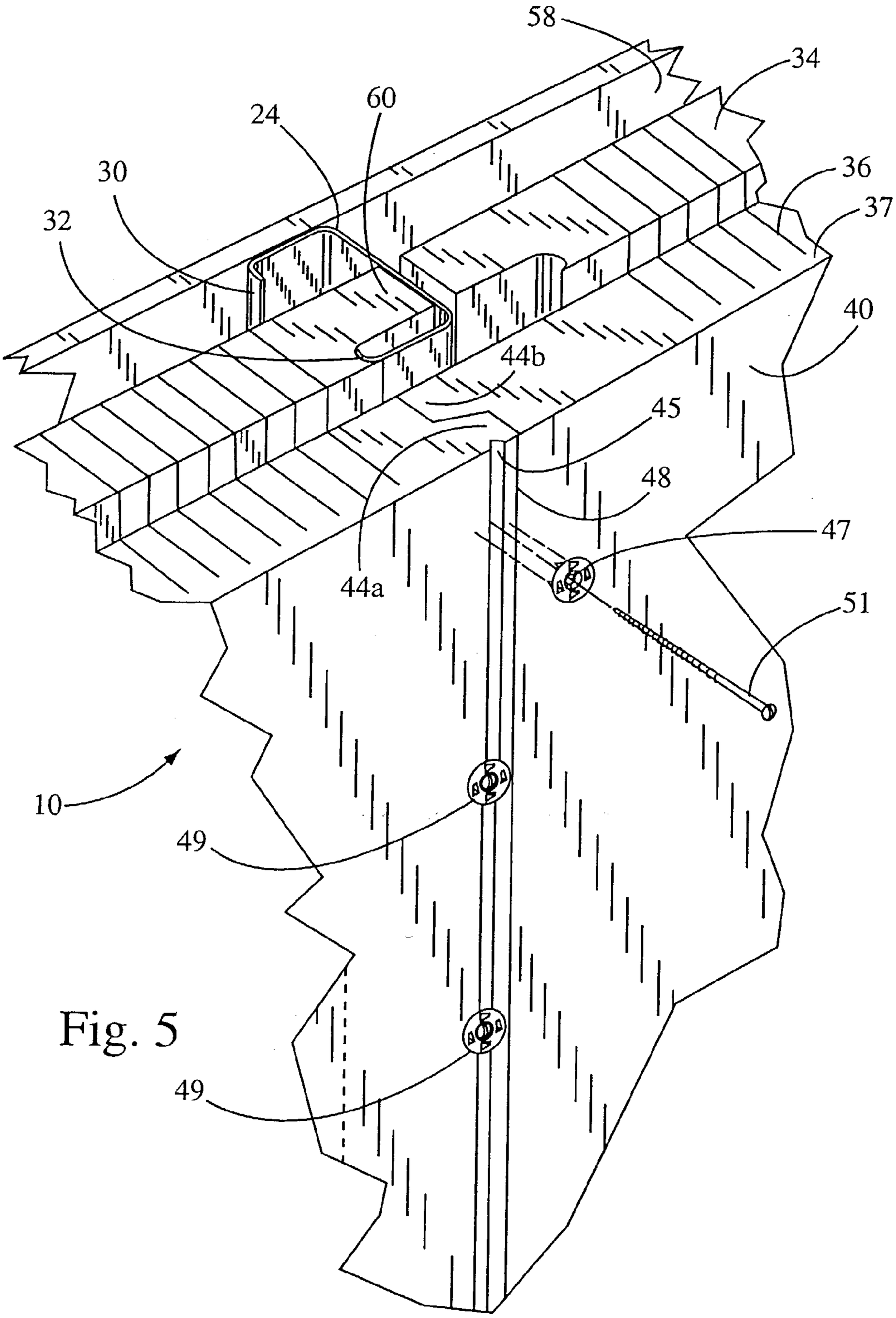


Fig. 5

THERMALLY INSULATING BUILDING WALL STRUCTURE

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] Not Applicable

STATEMENT RE: FEDERALLY SPONSORED RESEARCH/DEVELOPMENT

[0002] Not Applicable

BACKGROUND OF THE INVENTION

[0003] The present invention relates in general to a building wall, and in particular to a building wall structure employing foam panels, preferably multiply-slit for ease of sizing at a work site, in combination with adjacent dead air space between the foam panels and a covering wall surface panel such that superior insulative properties are realized in maintaining economical and comfortable ambient conditions within a building constructed of such wall structures.

[0004] It is generally readily recognized that construction in general, and residential construction in particular, many times suffers from poor building materials and/or poor construction practices as exemplified specifically in the amount of air leakage that occurs in an average house over the course of high-temperature and low-temperature seasons. While heat transfer can occur through of structures, glass windows and doors, chimneys, etc., a major ntributor toward heat transfer occurs from typical wall ructures. In particular, many such wall structures are little re than an inside sheet of thin drywall, an outside finish terial applied over a mesh base, and support posts there between r maintaining these components in a generally vertical position. en this type of construction is employed, outside temperature anges are quickly reflected in inside temperature changes because at transfer through the wall structure is nearly unimpeded.

[0005] One prior art teaching for alleviating this flawed astruction approach is disclosed in U.S. Pat. No. 353,560, to Heydon, wherein a building structure includes a wall rmed of a plurality of solid foam wall sections disposed between d encapsulating vertical floor-to-ceiling posts. These foam wall ctions extend the full depth between any inside wall panel and side finish material as would be found in a finished struction and certainly perform well in insulating against heat ansfer. However, a need yet remains for an even better sulative wall structure as well as a more easily-executed on-site istruction process for assemblage of such wall structure.

[0006] Accordingly, a primary object of the present invention is provide a building wall structure that includes both foam and egrated dead air space therewith for cumulative heat transfer ohibition.

[0007] Another object of the present invention is to provide a building wall structure that incorporates pre-slitted foam panels to permit rapid panel sizing through simple on-site removal of a slitted portion of the panel.

[0008] These and other objects of the present invention will become apparent throughout the description thereof which now follows.

BRIEF SUMMARY OF THE INVENTION

[0009] The present invention is an insulative building wall structure for use as an outside wall for a building construction. The wall structure includes an elongate track structure including an elongate first channel with a plurality of parallel spaced apart posts extending perpendicularly therefrom and a plurality of respective foam panels respectively disposed between the posts. The panels are provided with a plurality of vertical slits to produce slitted strips such that width adjustment of each panel can be quickly, easily, and accurately accomplished on-site by removing an appropriate number of strips from an inward site of the panel. While the slits can extend through the entire thickness of the panels, it is preferable that they extend only through about 90% of the thickness. When the slits do extend through the full thickness, an adhesive film is adhered to substantially the entire exterior surface of each panel such that the slitted portions remain together. A thermal-resistant material such as a reflective foil sheet is adhered to substantially the entire interior surface of each panel for enhancing heat-transfer prohibition. Each panel has a transverse depth dimension situated in the first channel which is less than the transverse depth dimension of the first channel, and is maintained within the first channel such that a void is formed between the interior edge of the channel and the interior surface of the foam panel. The wall structure additionally includes an elongate load plate structure including an elongate second channel which is parallel to the first channel of the track structure and disposed at the opposite respective ends of the posts such that the posts and foam panels reside between the track and load plate structures. Finally, a wall surface panel is secured to respective interior outer edges of the first and second channel structures. This securement finalizes the creation of a dead air space, corresponding to the above-described void, that resides between the interior surface of each foam panel and the wall surface panel.

[0010] Employment of the above-defined wall structure in the construction of houses and other building-types promotes efficiently-operational construction techniques since the structure components are easily and accurately assembled on-site according to predetermined exact size requirements as called out in typical blueprint specifications. Employment of the above-defined wall structure in such construction also promotes exceptional energy conservation through excellent R-values produced with relatively minimal and inexpensive foam product as occupants of so-constructed buildings experience superior interior temperature maintenance without critical regard for, or fluctuation because of, outside temperature readings. Of greatest importance is the combination of the reflective foil sheet facing the dead air space. In particular, and in addition to reducing thermal transfer, the reflective surface facing the dead air space provides a radiant barrier that reflects up to 97% of the sun's heat away from the interior of the building structure to thereby significantly reduce the amount of energy required to cool the structure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] An illustrative and presently preferred embodiment of the invention is shown in the accompanying drawings in which:

[0012] **FIG. 1** is a perspective view of a partially cut-away building wall structure;

[0013] **FIG. 2** is a top plan view of the wall structure of **FIG. 1**;

[0014] **FIG. 3** is a top plan view of a wall structure similar to that of **FIG. 2** except for slit length;

[0015] **FIG. 4** is a perspective view of a partially cut-away interior of a wall structure; and

[0016] **FIG. 5** is a perspective view of an exterior of a wall structure.

DETAILED DESCRIPTION OF THE INVENTION

[0017] Referring to FIGS. **1-5**, a building wall structure **10** is illustrated. The structure **10** includes a track structure **12** having an interior outer wall **14**, an exterior outer wall **16**, and an elongate first channel **18** with a vertical depth dimension, a transverse depth dimension, an interior longitudinal edge **20**, and an exterior longitudinal edge **22**. A plurality of parallel spaced apart metal posts **24** each have a first end **26** thereof disposed in the first channel **18** for perpendicular projection from the track structure **12**. Each post **24** non-limitedly is configured as a generally flat-walled U-shape configuration forming a post channel **28** with a channel entry thereto formed by opposing terminals **30**, **32** of said U-shape and accessible from one lateral side in line with the first channel **18**, with each post **24** positioned with respect to a sequentially-next post such that each channel entry faces the same direction.

[0018] Each of a plurality of respective foam panels **34**, preferably constructed of polystyrene, is disposed between two sequentially disposed posts **24**, and is provided with a plurality of slits **36** situated between the interior and exterior **38**, **40** thereof and perpendicular to the track structure **12**. The slits **36** are spaced from each other a variable distance, with distances preferably represented at 0.5 inch, 1.75 inch, and 2.25 inches in each panel **34**. As shown in **FIGS. 1, 2, 4**, and **5**, as preferred, each slit **36** does not extend through the entire thickness of each panel **34**, but rather terminates at a site **37** no greater than about 90% of the thickness (exemplified as no less than about 0.5 inch from the exterior surface **40**) of each panel **34**. However, and as shown in **FIG. 3**, each slit **36***a* can extend through the entire thickness. When this embodiment is chosen, the exterior surface **40** of each panel **34** is covered with an adhesive film **41** for maintaining the slitted panel **34** together.

[0019] At least one lateral edge of each foam panel **34** is provided with a tongue **60** which is disposed within the post channel **28** of an adjacent post **24**. Each foam panel **34** has a transverse depth dimension situated in the first channel **18** which is less than the transverse depth dimension of the first channel **18**, and each panel **34** must be spatially maintained such that a void **39** is formed and maintained between the interior **38** of the panel **34** and the interior longitudinal edge **20** of the first channel **18**. Such maintenance is accomplished with a maintenance structure here exemplified as an extension **44** of the exterior **40** of each panel **34**. In particular, each extension **44** bears against a respective outside surface site **46** of the exterior outer wall **16** of the track structure **12**. In this manner, the panel **34** is retained in place such that the void **39** is present. As clearly shown in **FIG. 2, a** tab **44***a* of one extension **44** extends toward, and overlaps a tab **44***b* of an adjacent extension **44** also extending toward, but beneath, the first tab **44***a* to meet at an outside site **48** bridging a post **24** disposed between the adjacent panels **34** and behind the extensions **44***a*, **44***b*. To assure a substantially air-tight retention of panel junction sites, each extension **44***a* is provided with a notch **45** which substantially aligns with the midpoint of the post **24**. This notch **45** serves as a guide for aligning a center opening **47** (**FIG. 5**) of a series of standard lathe anchors **49** which are pressed into the extension **44** preferably at 10-12 inch spacing as clearly shown in **FIG. 5**. Fasteners **51**, non-limitedly exemplified by screws and air-driven pins as known in the art, are inserted through the respective openings **47** and extend to the post **24** for securement therewith and resulting tight retainment of the extensions **44***a* and **44***b* to each other. The interior surface **38** preferably is covered with a thermally-resistant material such as an adhesive reflection material **33** (e.g. a standard foil) for enhancement of insulative properties as earlier described.

[0020] An elongate load plate structure **50** substantially identical to and parallel with the track structure **12** finishes the second end of the wall structure **10**. In particular, the load plate structure **50** has a second channel **54** that receives the second end **52** of each post **24**, possesses the same transverse depth dimension of each foam panel **34** (i.e. less than the transverse depth dimension of the channel **54** for void maintenance), positions the extension **44** and extension placement identically to that earlier described for the track structure **12**, and, in concert with the track structure **12**, generally stabilizes the wall structure **10**. A wall surface panel **58** as exemplified by drywall wall-board is secured to the respective interior outer walls **14**, **15** of the track structure **12** and load plate structure **50** for finishing the interior of the wall structure **10**. As shown in the drawing figures, the void **39** is positioned and maintained immediately behind a wall surface panel **58** (e.g. drywall) to thereby provide a dead air space for substantially the entire expanse of the wall structure **10**.

[0021] Operationally, the wall structure **10** can be assembled at a work site. Specifically and sequentially, the track structure **12** is secured to a standard foundation member (not shown), the posts **24** are placed and the foam panels **34** are slid into place. If a particular panel **34** is too wide to fit between posts **24**, a builder easily cuts through appropriate slits **36** to thereby remove a portion of the panel **34** and thus produce a panel **34** whose width correctly fits the available spacing. Once this operation is completed, the load plate structure **50** is placed to replicate post-**24** and panel-**34** connectivity substantially identical to that found in the identical relationships with the track structure **12**. The wall surface panel **58** then is attached, preferably with an adhesive, to the interior outer walls **14**, **15** of the track structure **12** and load plate structure **50** to thus create the dead air space (void **39**) there behind, and thereafter can be painted or otherwise used to finish the decor of a room. The exposed exterior surface **40** of each panel **34** can be traditionally covered with stucco, brick, wood, or the like to provide a visually acceptable structural appearance. In this manner, a highly thermally-efficient, yet traditionally-appearing building is produced.

[0022] While an illustrative and presently preferred embodiment of the invention has been described in detail herein, it is to be understood that the inventive concepts may be otherwise variously embodied and employed and that the

appended claims are intended to be construed to include such variations except insofar as limited by prior art.

What is claimed is:

1. A building wall structure comprising:

a) an elongate track structure having an interior outer wall, an exterior outer wall, and an elongate first channel with a vertical depth dimension, a transverse depth dimension, an interior longitudinal edge, and an exterior longitudinal edge;

b) a plurality of parallel spaced apart posts each having a first end thereof disposed in the first elongate channel and a second end, with each said post substantially perpendicular to the track structure and having a transverse depth dimension;

c) a plurality of respective foam panels each disposed between two respective sequential posts, each said panel having a transverse depth dimension situated in the first channel which is less than the transverse depth dimension of the first channel, an interior surface, and an exterior surface;

d) a maintenance structure for maintaining the interior surface of each panel spaced from the interior longitudinal edge of the first channel, whereby a void is formed between the interior longitudinal edge of the first channel and the interior surface of each foam panel;

e) an elongate load plate structure having an interior outer wall, an exterior outer wall, and an elongate second channel with a vertical depth dimension, a transverse depth dimension, an interior longitudinal edge, and an exterior longitudinal edge, said load plate structure parallel to the track structure and housing within said second elongate channel the second end of each said post; and

f) a wall surface panel secured to the respective interior outer walls of the track structure and load plate structure, whereby a dead air space corresponding to said void exists between the interior surface of each foam panel and the wall surface panel.

2. A building wall structure as claimed in claim 1 wherein the foam panels are formed of polystyrene.

3. A building wall structure as claimed in claim 1 wherein each post comprises a generally flat-walled U-shape configuration forming a post channel with a channel entry thereto formed by opposing terminals of said U-shape and accessible from one lateral side in line with the elongate first channel, with each post positioned with respect to a sequentially-next post such that each channel entry faces the same direction.

4. A building wall structure as claimed in claim 3 wherein each foam panel is configured at at least one lateral end thereof as a tongue, whereby said at least one said tongue is disposed within the post channel.

5. A building wall structure as claimed in claim 1 wherein the maintenance structure is an extension of the exterior surface of each panel, whereby said extension bears against a respective outside surface site of the exterior outer walls of the track and load plate structures.

6. A building wall structure as claimed in claim 5 wherein the extension of one panel additionally extends toward an extension of an adjacent panel to meet at an outside site in an aligned relationship with a midpoint of the post disposed between said adjacent panels and behind said extensions.

7. A building wall structure as claimed in claim 6 additionally comprising at least one elongate fastener extending from an exterior site such that said at least one elongate fastener passes through extensions adjacent each other and is secured within said post.

8. A building wall structure as claimed in claim 7 wherein a plurality of fasteners extend from respective exterior sites through said extensions adjacent each other and are respectively secured within said post.

9. A building wall structure as claimed in claim 6 wherein each foam panel has a plurality of slits between the interior and exterior surfaces thereof and perpendicular to the track and load plate structures.

10. A building wall structure as claimed in claim 9 wherein the slits extend about 90% from said interior to said exterior surfaces.

11. A building wall structure as claimed in claim 9 wherein the slits extend 100% from said interior to said exterior surfaces.

12. A building wall structure as claimed in claim 11 additionally comprising an adhesive film adhered to substantially the entire exterior surface of each foam panel.

13. A building wall structure as claimed in claim 1 wherein each foam panel has a plurality of slits between the interior and exterior surfaces thereof and perpendicular to the first and second load plate channel structures.

14. A building wall structure as claimed in claim 13 wherein the slits extend about 90% from said interior to said exterior surfaces.

15. A building wall structure as claimed in claim 13 wherein the slits extend 100% from said interior to said exterior surfaces.

16. A building wall structure as claimed in claim 15 additionally comprising an adhesive film adhered to substantially the entire exterior surface of each foam panel.

17. A building wall structure as claimed in claim 13 additionally comprising a thermal-resistant material adhered to substantially the entire interior surface of each foam panel.

18. A building wall structure as claimed in claim 9 additionally comprising a thermal-resistant material adhered to substantially the entire interior surface of each foam panel.

19. A building wall structure as claimed in claim 3 additionally comprising a thermal-resistant material adhered to substantially the entire interior surface of each foam panel.

20. A building wall structure as claimed in claim 1 additionally comprising a thermal-resistant material adhered to substantially the entire interior surface of each foam panel.

* * * * *