



(86) Date de dépôt PCT/PCT Filing Date: 2000/06/19
(87) Date publication PCT/PCT Publication Date: 2000/12/28
(45) Date de délivrance/Issue Date: 2003/08/26
(85) Entrée phase nationale/National Entry: 2001/11/13
(86) N° demande PCT/PCT Application No.: US 2000/016901
(87) N° publication PCT/PCT Publication No.: 2000/079070
(30) Priorité/Priority: 1999/06/23 (09/338,892) US

(51) Cl.Int.⁷/Int.Cl.⁷ E04C 3/29, E04B 1/82

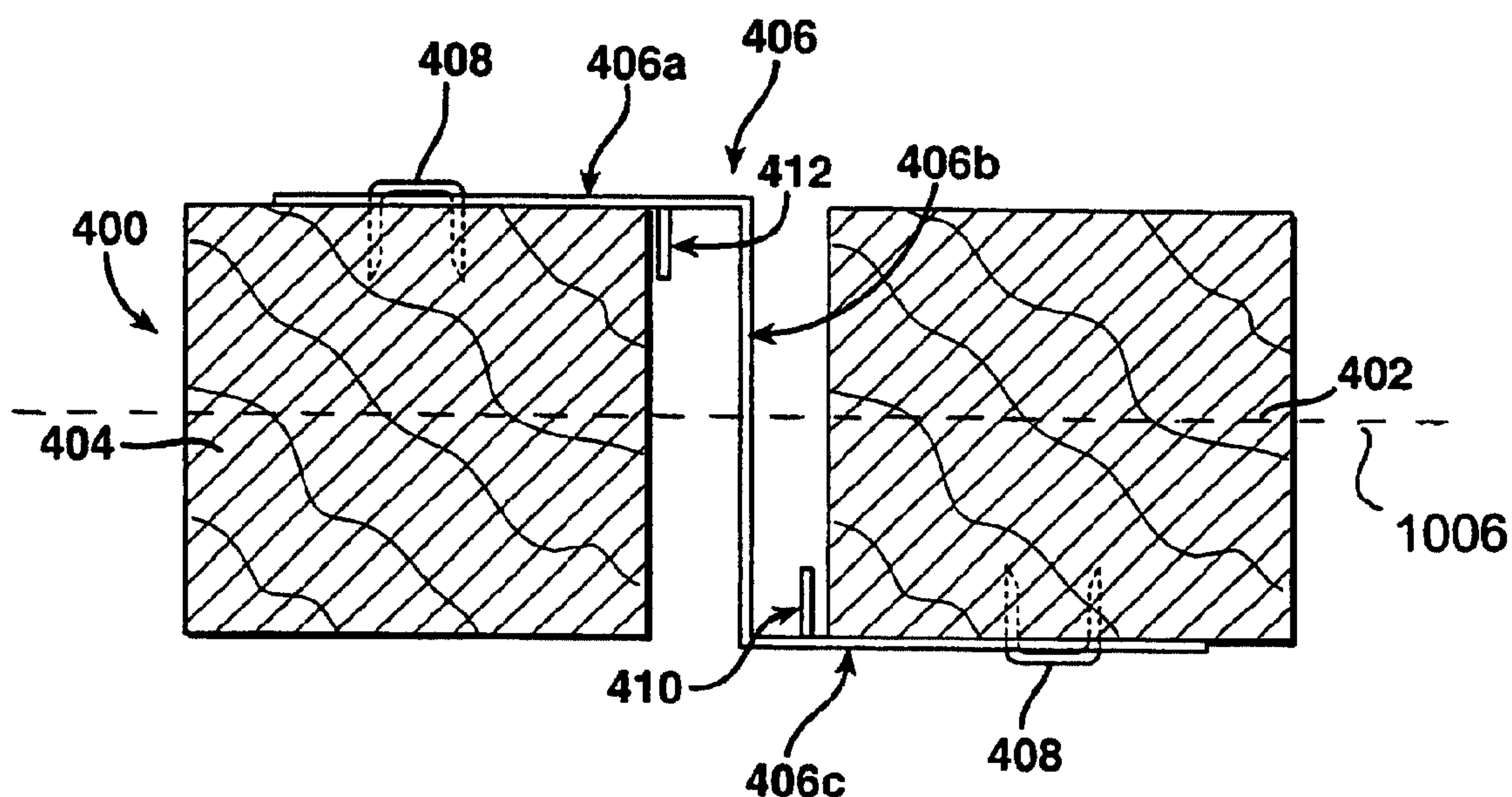
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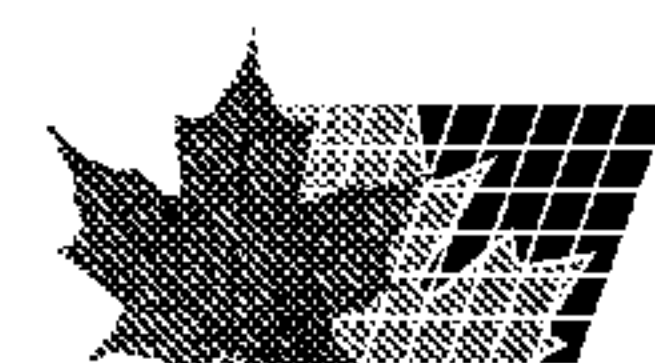
(54) Titre : ELEMENT DE CONSTRUCTION SOUPLE A AJUSTAGE AUTOMATIQUE ET SYSTEME DE RATRAPAGE
UTILISANT CELUI-CI

(54) Title: SELF-JIGGING RESILIENT CONSTRUCTION MEMBER AND RETROFIT SYSTEM USING SAME



(57) **Abrégé/Abstract:**

A construction beam (100) includes a pair of lateral members (102, 104) and a resilient web (106) extending therebetween, so as to present a cross-sectional profile corresponding to commonly used construction beam members (for example, 2" x 4" or 2" x 6" (5.08 cm x 10.16 cm or 5.08 cm x 15.24)). The resilience of the web helps to attenuate sound transmission through the beam from one lateral member to the other. In particular, in a wall frame, the lateral members are mounted at opposite ends thereof to end plates consisting of other construction beams according to the present invention (that is, a pair of lateral members with a resilient web extending therebetween). When the wall frame is used in a building structure, the lateral members of the end plates on the same side are attached to the surrounding structure, leaving the other side of the frame resiliently free floating. A wall is mounted on the free floating side of the wall frame so as to provide a resiliently free floating wall that acts as a sound attenuating "diaphragmatic" absorber. The web is preferably (but not necessarily) provided with spacers (410) formed thereon, so that the lateral members can be easily oriented relative to the web and to each other, so as to be self-jigging. The spacers may conveniently be formed by cutting and bending tabs in the material of the web in desired locations.



(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau(43) International Publication Date
28 December 2000 (28.12.2000)

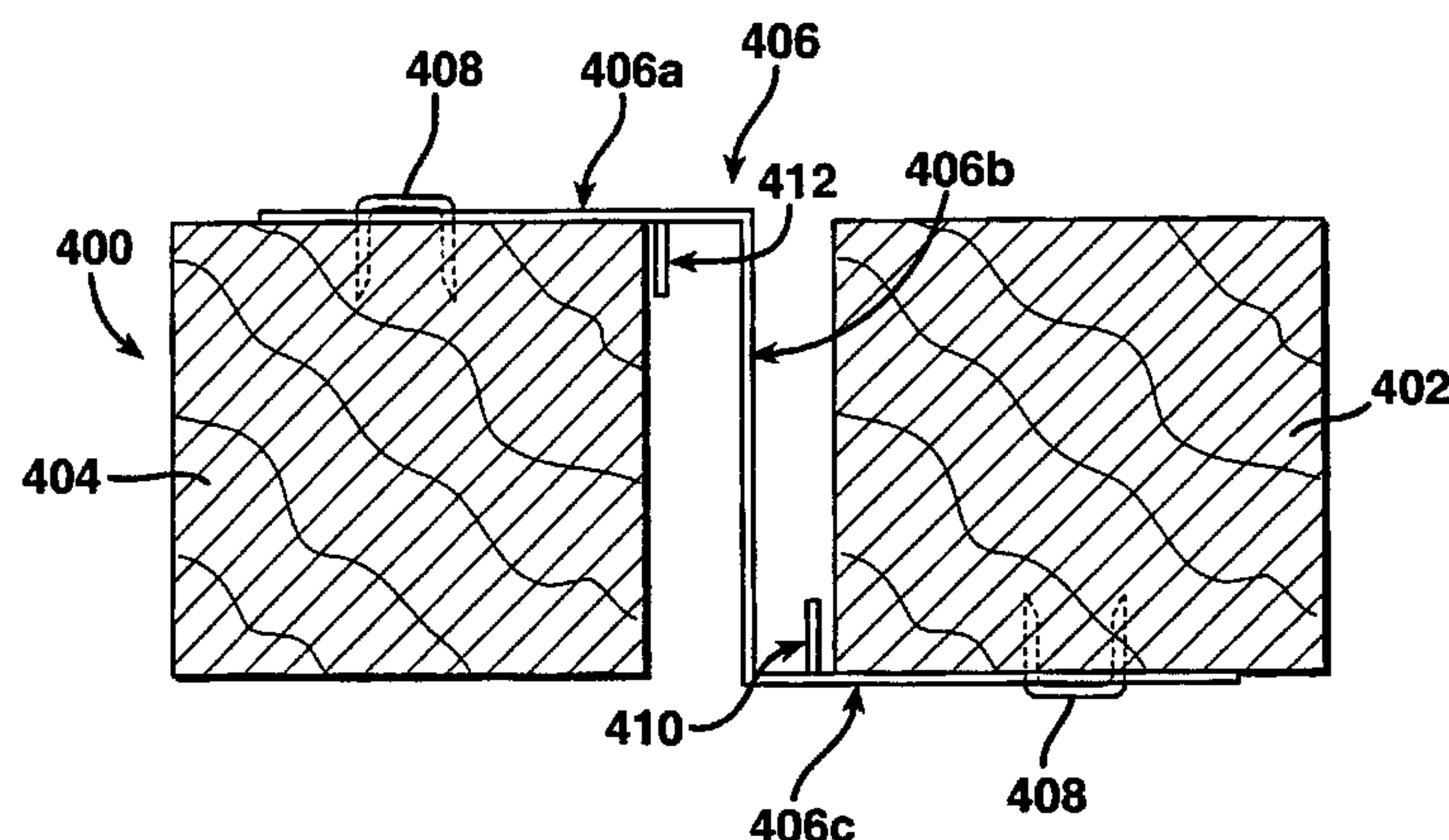
PCT

(10) International Publication Number
WO 00/79070 A1

- (51) International Patent Classification⁷: **E04C 3/29**, **E04B 1/82**
- (21) International Application Number: **PCT/US00/16901**
- (22) International Filing Date: **19 June 2000 (19.06.2000)**
- (25) Filing Language: **English**
- (26) Publication Language: **English**
- (30) Priority Data:
09/338,892 **23 June 1999 (23.06.1999)** **US**
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- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- Published:**
- *With international search report.*
 - *Before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments.*

[Continued on next page]

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WO 00/79070 A1

WO 00/79070 A1



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 00/79070

PCT/US00/16901

SELF-JIGGING RESILIENT CONSTRUCTION MEMBER AND
RETROFIT SYSTEM USING SAME

TECHNICAL FIELD AND INDUSTRIAL
APPLICABILITY OF THE INVENTION

The present invention relates to members used in construction, especially in
5 applications where sound attenuation and sound isolation is important. In particular, the
present invention relates to construction members used to construct building structures in
which sound transmission from one room to another is to be prevented or reduced. The
present invention also relates to a system for retrofitting a pre-existing standard wall
frame with an improved stud construction which improves sound attenuation
10 characteristics across the wall.

BACKGROUND OF THE INVENTION

Standard wall frame systems including a plurality of interconnected individual
stud have long been used to construct walls. Also, in general, it is conventionally known
to resiliently mount a wall or ceiling in order to isolate sound or attenuate transmission
15 therethrough.

U.S. Patent No. 3,445,975 to Nelsson discloses a partition in which first and
second lath panels are held against a metallic stud, channel, or furring member by a clip
fastener. One portion of the stud, channel, or furring member is cantilevered away from
the portion at which the lath panels are clipped thereto. According to Nelsson, this
20 permits the free portion of the stud, channel, or furring member to flex as the lath panels
mechanically respond to sound waves incident thereon. The remainder of the structure
dampens this surface movement, reducing sound transmission to the opposite surface of
the partition.

U.S. Patent No. 3,324,615 to Zinn discloses a construction member having a
25 plurality of laterally extending supporting tabs by which wallboard segments are
resiliently mounted.

U.S. Patent No. 3,046,620 to Tvorik et al. discloses a ceiling hanger member
whereby a furring strip (to which a ceiling member is attached) is resiliently attached to a
joist, such that the weight of the furring strip and ceiling member resiliently separates the
30 furring strip from the joist.

Another known method of sound attenuation is to build a wall frame in which individual studs are laterally staggered relative to a toe plate and head plate. Therefore, alternate studs are used to mount wall board on respective sides of the frame so that a given stud is spaced away from one of wall boards.

5 Unfortunately, the foregoing conventional methods of noise attenuation are problematic in that they generally move away from basic construction methods and thereby increase complexity and cost. For example, they require additional parts (such as Tvorik et al. and Nelsson) or specially made parts (such as the channel member with specially formed support tabs, as in Zinn). The staggered stud arrangement necessarily results in a
10 thicker wall partition which reduces the area of the room whose walls are framed in this manner, and increases the cost of the toe and head plates.

In addition, nail fasteners generally cannot be used with metal members, thereby undesirably restricting available construction methods.

Finally, a standard wall frame system must generally be completely torn down to
15 put a conventional sound attenuating systems into place. It would be therefore desirable to be able to retrofit a standard wall frame system so as to increase its sound attenuation characteristics.

In addition to the devices for sound attenuation described hereinabove, a wood I-beam is commercially available (for example, under the brand name "BCI Advantage"
20 from Boise Cascade Corporation) that comprises a pair of wood members with a rigid wooden panel extending therebetween. However, because the wooden panel is essentially non-resilient, this I-beam offers little or no sound attenuation benefit.

SUMMARY OF THE INVENTION

25 The present invention is therefore most generally directed to a construction member that relies on resilient flexibility in order to attenuate sound transmission therethrough, but also more closely conforms to conventional building members in order to minimize or eliminate the need for any special handling or the like in use.

In particular, the present invention is directed to a beam member which are preferably comparable in size to conventional wood beams (for example, 2" x 4" or 2" x 6" (5.08 cm x 10.16 cm or 5.08 cm x 15.24 cm)). The beam comprises a plurality of spaced
5 apart lateral members; and a resilient sound dampening web including a first edge portion, a second edge portion and an intermediate portion; wherein said first and second edge portions are fixed to respective ones of said lateral members; wherein said intermediate portion extends between said lateral members to form a generally S-shaped structure and permits flexure between said lateral members; wherein said resilient sound dampening web
10 includes at least one spacer arranged thereon for orienting at least one of said lateral members relative to said resilient sound dampening web. The web is preferably relatively stiff, but permits a slight flexure between the lateral members. The lateral members are preferably made from an easily workable material such as wood.

The web comprising one or more spacers facilitate the arrangement of the
15 respective lateral members relative to each other and relative to the web. In part, this facilitates the assembly of the lateral members relative to each other and to the lateral web so as to obtain a beam member according to the present invention.

In a particular embodiment of the present invention, a retrofit system comprising one lateral member having a resilient web attached thereto is provided. The resilient web is
20 provided with one or more spacers so that the one lateral member having the resilient web attached thereto can be easily positioned relative to a respective beam in a standard wall frame construction, thereby imparting the sound attenuation benefits of a frame using resilient construction beams without needing to completely tear down the original structure. In this arrangement, respective beams in the standard wall frame act as the other
25 lateral member of the beam according to the present invention.

The invention also provides a wall frame in a building construction comprising a first end plate comprising a first pair of lateral members and a first resilient web extending therebetween; and a stud comprising a second pair of lateral members and a second resilient web extending therebetween; wherein said first resilient web includes at least one

first spacer arranged thereon for orienting at least one of said first pair of lateral members relative to said first resilient web; wherein said second resilient web includes at least one second spacer arranged thereon for orienting at least of said second pair of lateral members relative to said second resilient web; wherein said first and second resilient webs are made
5 from one of a resilient polymeric material and a metallic material; wherein said stud is orthogonally mounted on said end plate.

The invention also provides in a building structure, a frame for mounting a wall comprising a first end plate comprising a first pair of lateral members and a first resilient web extending therebetween; a second end plate generally parallel to said first end plate
10 and comprising a second pair of lateral members and a second resilient web extending therebetween; and a stud comprising a third pair of lateral members and a third resilient web extending therebetween; wherein respective ones of said third pair of lateral members are fixed to respective ones of said first pair of lateral members and said second pair of lateral members; wherein lateral members of said first, second, and third pairs of lateral
15 members on the same side of the frame are attached to the building structure, such that the lateral members of the first, second, and third pairs of lateral members on the other side of the frame are left resiliently free; wherein said first resilient web includes at least one first spacer arranged thereon for orienting at least one of said first pair of lateral members relative to said first resilient web; wherein said second resilient web includes at least one
20 second spacer arranged thereon for orienting at least one of said second pair of lateral members relative to said second resilient web; wherein said third resilient web includes at least one third spacer arranged thereof for orienting at least one of said third pair of lateral members relative to said third resilient web; wherein said stud is orthogonal to said first and second end plates with respective ends thereof being fixed to said first and second end
25 plates; and wherein each resilient web relates to a corresponding pair of lateral members by having respective edge portions of resilient web fixed to respective ones of said lateral members on opposite sides of an imaginary reference plane passing through both members of the corresponding pair of lateral members.

The invention also provides a beam member comprising an I-beam comprising a pair of flange portions and a rigid web extending therebetween; a secondary member; and a resilient web extending between said I-beam and said secondary member, an edge portion of said resilient web being fixed to a flange portion of said I-beam, said resilient web including at least one spacer arranged thereon for orienting at least one of said I-beam and said secondary beam relative to said resilient web.

The invention also provides a frame member for hanging a ceiling in a building structure, comprising a beam comprising a pair of lateral members and a resilient web extending therebetween; wherein one of said lateral members is fixed to the building structure, and the other of said lateral members is left resiliently free-floating, the other of said lateral members being adapted to have a ceiling member fixed thereto; wherein said resilient web includes at least one spacer arranged thereon for orienting at least one of said lateral members relative to said resilient web.

In one aspect, the invention provides a retrofittable member for converting a standard beam into a sound-attenuating resilient beam, comprising a lateral member; and a plurality of resilient webs attached to and extending from said lateral member, wherein said resilient webs include at least one spacer arranged thereon for orienting said lateral member with said resilient webs attached thereto relative to the standard beam so that the resilient webs can be attached to the standard beam, thereby obtaining the sound-attenuating resilient beam; wherein said resilient webs comprise a first portion, a second portion bent at an angle relative to said first portion, and a third portion bent at an angle relative to said second portion and generally parallel to said first portion, wherein said first portion is attached to said lateral member, and wherein said third portion includes said at least one spacer formed thereon for orienting said lateral member and said resilient webs relative to the standard beam, whereby the third portion is attachable to the standard beam; wherein, along a length of said lateral member, respective first portions of said plurality of resilient webs are attached to said lateral member on opposite sides thereof in an alternating fashion, thereby leaving respective said third portions arranged on opposite sides of said lateral beam such that the standard beam is receivable between said respective third portions so as to be held away from respective said second portions by respective said at least one spacers formed on said respective third portions.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be described in detail hereinbelow, with reference to the drawings appended hereto, in which:

5 Figure 1 is a partial perspective view of an end of a construction beam according to the present invention;

Figure 2 is an end view of a beam according to the present invention;

Figure 3 is a plan view of a beam according to a second embodiment of the present invention;

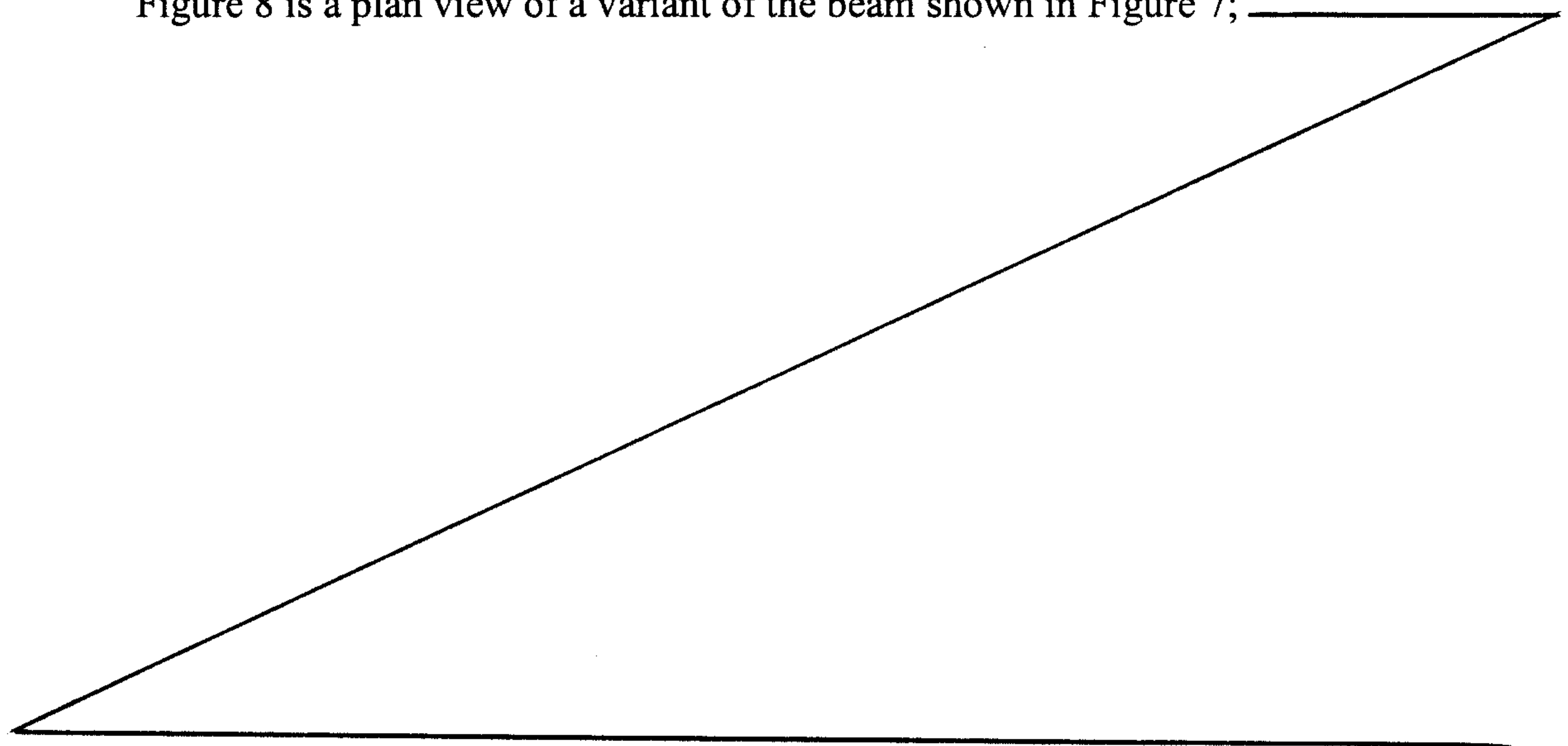
10 Figure 4 is a perspective view of an example of a resilient web for linking lateral members in a beam according to the present invention;

Figure 5 is a partial perspective view of a framework for mounting wallboard or the like, utilizing beams according to the present invention;

15 Figure 6 is a partial perspective view of a beam according to a third embodiment of the present invention;

Figure 7 is a plan view of a beam according to the embodiment of the present invention shown in Figure 6;

Figure 8 is a plan view of a variant of the beam shown in Figure 7;



3(c)

Figure 9 is a perspective view of a retrofit assembly including a lateral member and a web, according to a fourth embodiment of the present invention; and

Figure 10 is a cross-sectional view of a construction member according to a fifth embodiment of the present invention shown in Figure 9.

5 DETAILED DESCRIPTION AND PREFERRED EMBODIMENTS OF THE PRESENT INVENTION

Figures 1 and 2 illustrate a portion of a beam 100 according to the present invention. In general, beam 100 comprises lateral members 102 and 104 with a web 106 spanning therebetween.

10 Figs. 1 and 2 depict an imaginary reference plane 1006 passing through the lateral members 102 and 104 as well as through the resilient web 106. Ends of the resilient web 106 are fixed to the lateral members 102 and 104 on opposite sides of the imaginary reference plane 1006. Preferably, but not necessarily, the imaginary reference plane 1006 is also a line of symmetry for each of the lateral members 102 and 104. Alternatively, the
15 imaginary reference plane 1006 divides each of the lateral members 102 and 104 in substantially the same manner.

Lateral members 102, 104 are generally rectangular or squared in cross-sectional profile and preferably have at least the same thickness y (see Figure 2). Moreover, lateral beams 102, 104 are preferably identical so that each has the same width, proportionately
20 spaced with web 106 therebetween so as to present an overall beam width x . Lateral members 102, 104 are preferably (but not necessarily) identical in shape so as to facilitate manufacture of beam 100 from one source of stock.

The beam 100 can present a cross section having a major dimension x and minor dimension y corresponding to any standard beam size (for example, 2" x 4", 2" x 6" (5.08
25 cm x 10.16 cm or 5.08 cm x 15.24 cm), and so on, without limitation).

According to the present invention, lateral members 102, 104 are elongate rigid members. Accordingly, a variety of suitably rigid materials could be used. However, lateral members 102, 104 are preferably (but not exclusively) made from wood, (in part, in keeping with an intent of the present invention to present a construction member very
30 similar to those conventionally used in the art). Wood is also desirable because it can be worked, generally, in more ways than comparable metal members (for example, it can be easily cut, driven with nails or screws, etc.). Not only can continuous lumber be used, but

composite materials, such as plywood or wood particle board can be used. In addition, finger jointed wood members can be used according to the present invention. A plastic material reinforced with glass fibers may also be used in accordance with the present invention.

- 5 Web 106 is made from a relatively rigid material that has some flexibility. If web 106 is relatively too flexible, lateral members 102, 104 have too much relative freedom of movement and beam 100 is no longer, overall, a rigid member. If web 106 is relatively

too stiff, then the benefits of sound isolation/attenuation are lost. Generally, web 106 may be made from any suitably stiff and resilient material, including (without limitation) rubber, asphalt, plastic or other resilient polymeric material.

In one example of the present invention, web 106 is made from galvanized 22 gauge steel. As seen in Figure 4, web 106 includes edge portions 106a and an intermediate portion 106b. Edge portions 106a are embedded in lateral members 102, 104, and intermediate portion 106b extends obliquely between lateral members 102, 104. However, intermediate portion 106b may, most generally, extend between lateral members 102, 104 in any orientation so long as flexure between lateral members 102, 104 is relatively easy (compared to, for example, an intermediate portion extending straight across the gap between lateral members 102, 104, which does not readily flex).

It is noted that the use of galvanized steel as described here may offer additional ancillary benefits, such as improved fire safety protection.

Edge portions 106a are embedded in lateral members 102, 104 in any conventional manner. One possible method (not illustrated) is to form grooves in lateral members 102, 104 that are wider than the thickness of edge portions 106a. Once edge portions 106a are suitably disposed in the respective grooves, additional strips of material (such as wood) are pressed into the remaining space in the grooves, such that edge portions 106a are wedged into place and retained in the grooves.

Web 106 may extend continuously substantially the entire length of lateral members 102, 104. However, when beams 100 are used in construction, it is useful to provide a plurality of spaced apart webs 106, such that piping, wiring and the like can be passed through the openings between webs 106 (see Figure 3).

Whether one or a plurality of webs 106 are provided, it is specifically contemplated that beams 100 are provided in standardized lengths (for example, 8 feet (2.44 meter)) as seen in Figure 3 and can be cut down as required.

As mentioned above, it is an important feature of the present invention to provide a construction member that can be used like conventional construction beams. Accordingly, Figure 5 is a partial perspective view of a frame work (as might be used for walls in a building).

As seen in Figure 5, beams 100a, 100b are mounted as studs on a laterally extending beam (that is, a head plate or toe plate) 100c. (Another laterally extending beam (not shown) is provided at the other end of beams 100a, 100b.) The structure of

each of beams 100a-100c is in accordance with the description of the present invention hereinabove, and will not be repeated here. Attention is drawn to the manner in which lateral members 102a and 102b and 104a and 104b are mounted with respect to lateral
5 members 102c

and 104c, respectively, with nails, screws or any other conventional fasteners (not shown here). Accordingly, it can be appreciated that one side of the frame (that is, lateral members 102a-102c) are resiliently separated by way of respective webs 106', 106'', and 106''' from the other side of the frame (that is, lateral members 104a-104c). Accordingly,
10 sound impinging on a wall member mounted on one side of the frame is attenuated upon transmission to the other side of the frame because of the resilience of webs 106', 106'', and 106'''.

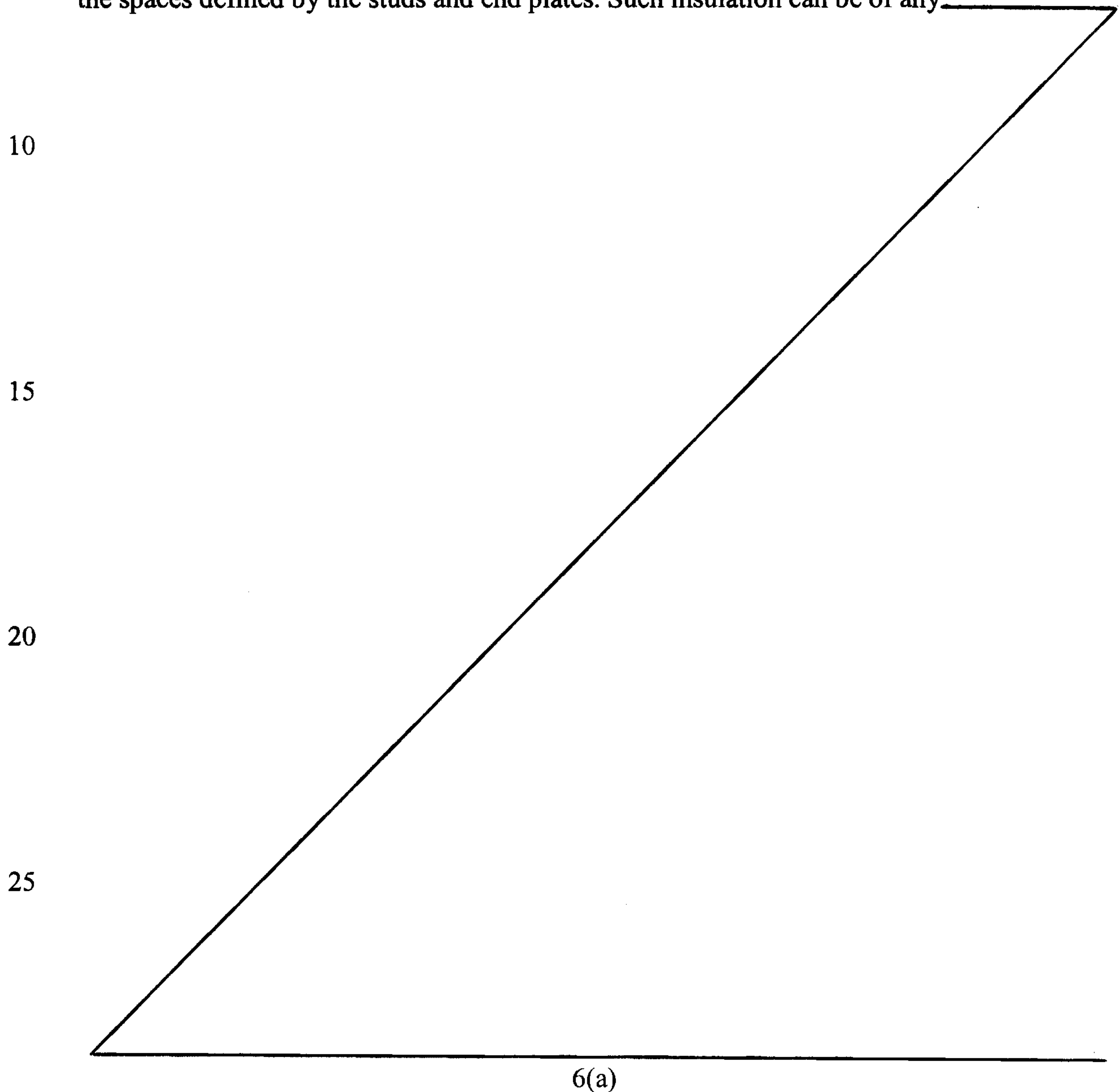
Furthermore, it is possible to resiliently mount a wall so that it acts like a diaphragmatic sound absorber. In particular, only one "side" of the frame assembly (for
15 example, lateral member 104c and/or lateral members 104a, 104b) is fixed to the surrounding building structure, and the other side of the frame assembly has wall board or the like mounted thereon (that is, on lateral members 102a, 102b), without attachment to the surrounding structure. The wall is therefore mounted on the "free" or "floating" side of the studs.

20 A particularly beneficial wall board structure comprises, generally, first and second dry wall layers with a visco-elastic material layer interposed therebetween. In particular, a visco-elastic asphalt material is useful with such a wall board structure.

In order to enhance the effect of decoupling the one side of the wall frame from the surrounding structure, it is desirable to provide a soft gasket (made from, for example,
25 foam rubber) between the lateral beam 100c and the surrounding structure (that is, the ceiling and/or floor). This promotes relatively free movement of the one side of the frame that is not fixed to the surrounding building structure.

To further enhance the effect of decoupling the wall from the surrounding structure, it is preferable to provide flexible joint material at junctions between wall board segments (not illustrated here), including at corners of rooms. Therefore the wall surface is visually continuous but physically decoupled, in order to take advantage of the resultant sound attenuation effects.

Also, it is very desirable to provide additional sound and/or thermal insulation in the spaces defined by the studs and end plates. Such insulation can be of any



conventional type, including blown, rolled or batting, foam board, etc. The addition of such insulation enhances sound attenuation effects resulting from the present invention.

Figures 6 and 7 are a partial perspective view and a partial plan view, respectively, of beam 200, in accordance with another embodiment of the present invention.

5 The design concept underlying beam 200 is fundamentally similar to that of beam 100. Like before, lateral members 202 and 204 are provided, and are resiliently spaced apart from each other by web 206. Unlike web 106 in beam 100, however, web 206 is not embedded in lateral members 202, 204. Instead, web 206 is fixed (by any conventional means, such as nails 205, as shown in Figures 6 and 7) relative to opposite faces of lateral
10 members 202, 204 along the major dimension of the beam cross section.

As in the first embodiment, a plurality of spaced apart webs 206 may be provided along the length of beam 200 (see, for example, Figure 7).

Web 206 is preferably made from a material that is slightly more flexible than that used for web 106, such as 24 gauge (0.05 cm thick) galvanized steel.

15 Initial comparative testing has been undertaken comparing the sound attenuation characteristics of conventional construction members versus beam 100 and beam 200, respectively. Initial results indicate that beam 100 has greater than expected attenuation characteristics, and that beam 200 should have even better attenuation performance than beam 100. This latter effect is thought to be caused by the shape and orientation of web
20 206, which more easily permits a normal compression between lateral members 202, 204.

In addition, as a variation of the embodiment illustrated in Figure 7, the plurality of webs are alternately arranged so that the portion of the webs extending obliquely thereacross alternates (thereby crossing each other, as seen from an end of beam 200) (see Figure 8). In Figure 8, beam 300 comprises lateral beams 302 and 304, and includes a
25 plurality of first webs 306a which are spaced from and alternate with a plurality of second webs 306b. Accordingly, respective intermediate portions of webs 306a and 306b criss-cross as seen from an end of beam 300.

Inasmuch as sound that one seeks to attenuate or isolate is typically physically unique relative to particular environments (for example, a home theater room, a movie
30 theater, a machine shop, a recording studio, a concert hall), it is an important feature of the present invention to provide a construction member that can be "tuned" in order to tailor its sound attenuation properties for a specific environment. In other words, a beam according to the present invention can be specifically manufactured so that its resilient

properties (in terms of, for example, spring constant) are made to correspond to a particular kind of sound (especially in terms of its frequency) so that sound attenuation can be maximized.

Such “tuning” can be accomplished by varying the thickness of web 106, 206, either uniformly or variably over the entire area of web 106, 206. In addition, notches, slits, or other openings can be formed in web 106, 206 to control the resilience of web 106, 206 in accordance with known principles of physics. In addition, suitably sized perforations or openings in a continuous web can be formed so as to create a tunable Helmholtz resonator effect between adjacent cavities defined between studs in the framework illustrated in Figure 5. By altering the number and/or size of the perforations or openings, a resultant Helmholtz resonant frequency can be controlled, at which attenuation of sound at that frequency is maximized. It should be noted that this is different from reference to a plurality of webs as shown in Figures 3, 7, and 8.

It can therefore be appreciated that adjoining rooms may be constructed (for example, adjoining musical studios) such that each room can be tuned in accordance with its respective mode of use. In particular, this may be accomplished by constructed “double wall” framework, where two frames of the structure illustrated in Figure 5 are constructed face-to-face, such that the respective opposing sides of the frames are fixed to the surrounding building structure and their respective opposite sides are left free floating in the manner discussed above.

Assembly of lateral members and resilient webs according to the present invention is facilitated by providing at least one spacer on the resilient web or webs to orient the lateral members relative to the resilient web.

Figure 10 is a schematic cross-sectional view of a beam 400, somewhat similar to beams 200 and 300 in Figures 6-8. Here again, beam 400 comprises lateral members 402 and 404, and a resilient web 406 extending therebetween.

Resilient web 406 is attached to opposite facing sides of lateral members 402 and 404, respectively, by, for example, staples 408 (although any conventional attachment method can be used, including, without limitation, screws, nails, bolts, and the like).

Resilient web includes a first portion 406a, a second portion 406b bent at an angle to first portion 406a, and a third portion 406c bent at an angle to second portion 406b and generally parallel with first portion 406a. Generally, lateral members 402 and 404 are

received in the bends defined by the first and second portions 406a and 406b, and by the second and third portions 406b and 406c, as shown in Figure 10.

It is a particular feature of this embodiment to provide a spacer 410 (412) on at least one of first and third portions 406a and 406c to space a respective at least one of the lateral members 402 and 404 away from second portion 406b of the resilient web 406. In general, the provision of spacers 410 (412) allows easy assembly of the lateral members and the resilient web (known in the art as "self-jigging"). In particular, the provision of spacers 410, 412 prevents the respective lateral members 402, 404 from being placed in abutting relation to second portion 406b. If such an arrangement were to be had, then the abutment of the resilient members against the second portion 406b would undesirably retard the resilient sound-damping characteristics of the resilient web 406.

It is noted that the slight spacing shown in Figure 10 between lateral members 402 and 404 and the resilient web 406 is for clarity of illustration only and is not illustrative of the present invention.

An imaginary reference plane 1006 is depicted in Fig. 10. The imaginary reference plane 1006 relates to the lateral members 402 and 404 similarly to how the imaginary reference plane 1006 of Figs. 1-2 relates to the lateral members 102 and 104 in both the preferred and alternative arrangements.

The arrangement of the present invention illustrated in Figure 10 can be extended desirably to an apparatus and method for retrofitting standard beam members, especially beam members already assembled into a standard frame arrangement.

Figure 9 illustrates a retrofitting assembly 500 comprising a lateral beam 502, to which at least one resilient web 506 is attached by staples 508 or the like. Each resilient web 506 as shown includes spacers 510 and 512. However, the provision of spacers 512 is most important here. It is emphasized that assembly 500 in and of itself is not a construction member per se, but is used in conjunction with standard beams in order to provide a resilient beam arrangement.

As before, resilient web 506 may be made from any suitably resilient material, including (without limitation) metal, rubber, asphalt, plastic, or other resilient polymeric material. In one example, spacers 510, 512 are protruding tabs formed integrally with the resilient web 506. In a specific example, spacers 510, 512 may be punch-formed into the material of the resilient web 506 (especially, but not necessarily only, where the resilient

web 506 is made from metal). The punch-formed portions can simply be turned away from the web material as needed to form the required spacers.

In the arrangement illustrated in Figure 9, it is especially important to provide spacers 512 as shown. The assembly 500 is arranged relative to a single standard beam
5 such as a 2"x4" (5.08 cm x 10.16 cm) (not shown here) and fastened thereto (again, by

staples, screws, nails, bolts, or any known and suitable fastener). The arrangement of the assembly 500 relative to a standard beam is made simple by the provision of spacers 512, especially where assembly 500 is coupled to a standard beam forming part of a conventional framework.

5 In addition, the resilient webs 506 may be provided in an alternating arrangement, so that opposite sides of lateral member 502 are attached to respective resilient webs 506, as seen in Figure 9 (this is similar to the arrangement illustrated in Figure 8 and discussed above). With this arrangement, the assembly 500 may be even more easily arranged relative to a standard beam by orienting the assembly 500 so that respective free ends of
10 the resilient webs 506 are arranged on opposite sides of the standard beam. Although the alternating arrangement of resilient webs 506 seen in Figure 9 is beneficial (for reasons similar to those discussed above relative to Figure 8), it is not necessary according to the present invention. The present invention is certainly operable with the resilient webs 506 all arranged in like manner along lateral member 502.

15 As with the other embodiments discussed above, lateral member 502 may be rectangular or squared in cross-section, and may preferably be made from continuous lumber or a composite wood material, as well as plastic reinforced with glass fibers.

In one example of the present invention, the spacers 410, 412, 510, 512 may be arranged to space the respective lateral members about 0.25 inches from the portion of the
20 resilient web spanning the space between the lateral members. However, the present invention is not restricted to a specific spacing, except for that sufficient to prevent the respective lateral members from fully abutting the resilient web, as discussed above.

One of ordinary skill will appreciate that the resilient web 506 may be shaped so as to be attached to lateral members of different profiles. In one example, a lateral
25 member 502 which is rectangular or squared in cross-section attached to the resilient web 506 may be used so as to be attached to a conventional rigid I-beam (discussed above relative to the related art) or vice versa.

It will be appreciated that the assembly 500 as seen in Figure 9 can be seen as somewhat analogous to a conventional resilient channel. However, at least because of the
30 self-jigging aspect of the assembly 500 (due to the provision of spacers), the assembly 500 is much easier to work with compared with resilient channel structures.

Although construction members according to the present invention have been described hereinabove for wall frames and the like, they are also contemplated for use in

mounting floating ceilings which are acoustically isolated from a building structure. In addition, construction members according to the present invention may also be used in floor construction.

In particular, a construction member for mounting a floating ceiling may be used
5 by fixing one of the lateral members to the building structure and fixing a ceiling member to the free floating lateral member (that is, the lateral member not fixed to the building structure).

The use of substantially identical lateral members is contemplated according to the present invention. However, use of dissimilar lateral members is also expressly within the
10 scope of the present invention. For example, one of the lateral members 102, 104 shown in Figure 2 may be replaced by a conventional wood I-beam of the type described above. In particular, web 106 may be embedded in one of the flange portions of the wood I-beam, in the manner disclosed above.

Although the present invention is directed primarily to construction members
15 made from non-metal materials, the design concepts may be of interest in the manufacture of metal studs comprising a pair of metal members with a resilient web extending therebetween in accordance with the foregoing description. In particular, a metal stud using the invention disclosed herein could be made from a single piece of sheet metal, formed into shape.

20 The present invention being thusly described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the scope of the invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.

WE CLAIM:

1. A beam member comprising:
a plurality of spaced apart lateral members; and
a resilient sound dampening web including a first edge portion, a second edge portion and an intermediate portion;
wherein said first and second edge portions are fixed to respective ones of said lateral members;
wherein said intermediate portion extends between said lateral members to form a generally S-shaped structure and permits flexure between said lateral members;
wherein said resilient sound dampening web includes at least one spacer arranged thereon for orienting at least one of said lateral members relative to said resilient sound dampening web.
2. The beam member according to claim 1, wherein said lateral members are squared in cross-section.
3. The beam member according to claim 1, wherein said web is made from metal.
4. The beam member according to claim 3, wherein said web is made from galvanized steel.
5. The beam member according to claim 3, wherein said web is made from 26 gauge stock or thinner.
6. The beam member according to claim 4, wherein said web is made from 26 gauge stock or thinner.
7. The beam member (100) according to claim 1, wherein said plurality of lateral members (102, 104) are made from wood.

8. The beam member according to claim 1, wherein said plurality of lateral members are made from wood particle board.
9. The beam member according to claim 7, wherein said lateral members are made from finger jointed wood segments.
10. The beam member according to claim 1, wherein said lateral members are made from a plastic material reinforced with glass fibers.
11. The beam member according to claim 1, wherein said resilient web is made from a resilient polymeric material.
12. The beam member according to claim 1, wherein said at least one spacer is arranged on at least one of said first and third flat portions of said web so as to space a respective said lateral member from said second flat portion.
13. The beam member according to claim 1, comprising a plurality of spaced apart said webs extending between said respective pairs of said lateral members.
14. The beam member according to claim 13, wherein said plurality of spaced apart webs are arranged in an alternating orientation relative to said respective pairs of lateral members so as to criss-cross in cross section.
15. The beam member according to claim 1, comprising two said spaced apart lateral members with said resilient web extending therebetween.
16. The beam member according to claim 1, wherein one of said lateral members is an I-beam having a flange portion attached to said resilient web.

17. A wall frame in a building construction comprising:
- a first end plate comprising a first pair of lateral members and a first resilient web extending therebetween; and
 - a stud comprising a second pair of lateral members and a second resilient web extending therebetween;
- wherein said first resilient web includes at least one first spacer arranged thereon for orienting at least one of said first pair of lateral members relative to said first resilient web;
- wherein said second resilient web includes at least one second spacer arranged thereon for orienting at least one of said second pair of lateral members relative to said second resilient web;
- wherein said first and second resilient webs are made from one of a resilient polymeric material and a metallic material;
- wherein said stud is orthogonally mounted on said end plate.
18. The frame according to claim 17 wherein both lateral members of said second pair of lateral members are fixed to respective lateral members of said first pair of lateral members.
19. The frame according to claim 17, wherein said stud comprises a plurality of spaced apart second resilient webs extending between said second pair of lateral members.
20. The frame according to claim 17, further comprising a second end plate comprising a third pair of lateral members and a third resilient web extending therebetween, an opposite end of said stud from said first end plate being mounted on said second end plate, wherein said third resilient web includes at least one third spacer arranged thereon for orienting at least one of said third pair of lateral members relative to said third resilient web.

21. The frame according to claim 20, wherein said third resilient web is made from one of a resilient polymeric material and a metallic material.

22. In a building structure, a frame for mounting a wall comprising:

a first end plate comprising a first pair of lateral members and a first resilient web extending therebetween;

a second end plate generally parallel to said first end plate and comprising a second pair of lateral members and a second resilient web extending therebetween; and

a stud comprising a third pair of lateral members and a third resilient web extending therebetween;

wherein respective ones of said third pair of lateral members are fixed to respective ones of said first pair of lateral members and said second pair of lateral members;

wherein lateral members of said first, second, and third pairs of lateral members on the same side of the frame are attached to the building structure, such that the lateral members of the first, second, and third pairs of lateral members on the other side of the frame are left resiliently free;

wherein said first resilient web includes at least one first spacer arranged thereon for orienting at least one of said first pair of lateral members relative to said first resilient web;

wherein said second resilient web includes at least one second spacer arranged thereon for orienting at least one of said second pair of lateral members relative to said second resilient web;

wherein said third resilient web includes at least one third spacer arranged thereof for orienting at least one of said third pair of lateral members relative to said third resilient web;

wherein said stud is orthogonal to said first and second end plates with respective ends thereof being fixed to said first and second end plates; and

wherein each resilient web relates to a corresponding pair of lateral members by having respective edge portions of resilient web fixed to respective ones of said lateral

members on opposite sides of an imaginary reference plane passing through both members of the corresponding pair of lateral members.

23. The frame according to claim 22, wherein wall board is mounted on at least some lateral members on said other side of the frame so as to define a resiliently mounted wall acting as a diaphragmatic sound damper.

24. The frame according to claim 22, wherein said third resilient web includes at least one opening therein sized in accordance with Helmholtz resonator principles so as to correspond to a predetermined sound frequency.

25. The frame according to claim 22, wherein said first, second, and third resilient webs are made from one of a resilient polymeric material and a metallic material.

26. A beam member comprising:

an I-beam comprising a pair of flange portions and a rigid web extending therebetween;

a secondary member; and

a resilient web extending between said I-beam and said secondary member, an edge portion of said resilient web being fixed to a flange portion of said I-beam, said resilient web including at least one spacer arranged thereon for orienting at least one of said I-beam and said secondary beam relative to said resilient web.

27. The beam member according to claim 26, wherein said rigid web and said resilient web have generally parallel directions of extension.

28. A frame member for hanging a ceiling in a building structure, comprising:
a beam comprising a pair of lateral members and a resilient web extending therebetween;
wherein one of said lateral members is fixed to the building structure, and the other of said lateral members is left resiliently free-floating, the other of said lateral members being adapted to have a ceiling member fixed thereto;
wherein said resilient web includes at least one spacer arranged thereon for orienting at least one of said lateral members relative to said resilient web.
29. The frame member according to claim 28, wherein said lateral member fixed to said building structure is an I-beam comprising a pair of flange portions and a rigid web extending therebetween.
30. The frame member according to claim 29, wherein one of said flange portions is fixed to the building structure and the other of said flange portions is connected to said resilient web.
31. The frame member according to claim 30, wherein said I-beam is made from wood.
32. A retrofittable member for converting a standard beam into a sound-attenuating resilient beam, comprising:
a lateral member; and
a plurality of resilient webs attached to and extending from said lateral member, wherein said resilient webs include at least one spacer arranged thereon for orienting said lateral member with said resilient webs attached thereto relative to the standard beam so that the resilient webs can be attached to the standard beam, thereby obtaining the sound-attenuating resilient beam;

wherein said resilient webs comprise a first portion, a second portion bent at an angle relative to said first portion, and a third portion bent at an angle relative to said second portion and generally parallel to said first portion, wherein said first portion is attached to said lateral member, and wherein said third portion includes said at least one spacer formed thereon for orienting said lateral member and said resilient webs relative to the standard beam, whereby the third portion is attachable to the standard beam;

wherein, along a length of said lateral member, respective first portions of said plurality of resilient webs are attached to said lateral member on opposite sides thereof in an alternating fashion, thereby leaving respective said third portions arranged on opposite sides of said lateral beam such that the standard beam is receivable between said respective third portions so as to be held away from respective said second portions by respective said at least one spacers formed on said respective third portions.

33. The member according to claim 32, wherein said spacer is a tab formed in said resilient web.

34. The member according to claim 33, wherein said resilient web is made from a metallic material and said tab is punch-formed in said metallic material and bent perpendicularly away therefrom.

35. The member according to claim 32, comprising a plurality of spaced apart said resilient webs.

36. The beam member according to claim 1, wherein said imaginary reference plane is also a plane of symmetry for each of said lateral members.

37. The beam member according to claim 1, wherein an imaginary division of said lateral members by said imaginary reference plane divides each of said lateral members in substantially the same manner.

38. The beam member according to claim 1, wherein one of said lateral members is an I-beam comprising a pair of flange portions and a rigid web extending therebetween.

39. The frame according to claim 22, wherein said imaginary reference plane is also a plane of symmetry for each of said lateral members.

40. The frame according to claim 22, wherein an imaginary division of said lateral members by said imaginary reference plane divides each of said lateral members in substantially the same manner.

41. The frame according to claim 22, wherein one of said lateral members is an I-beam comprising a pair of flange portions and a rigid web extending therebetween.

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FIG. 1

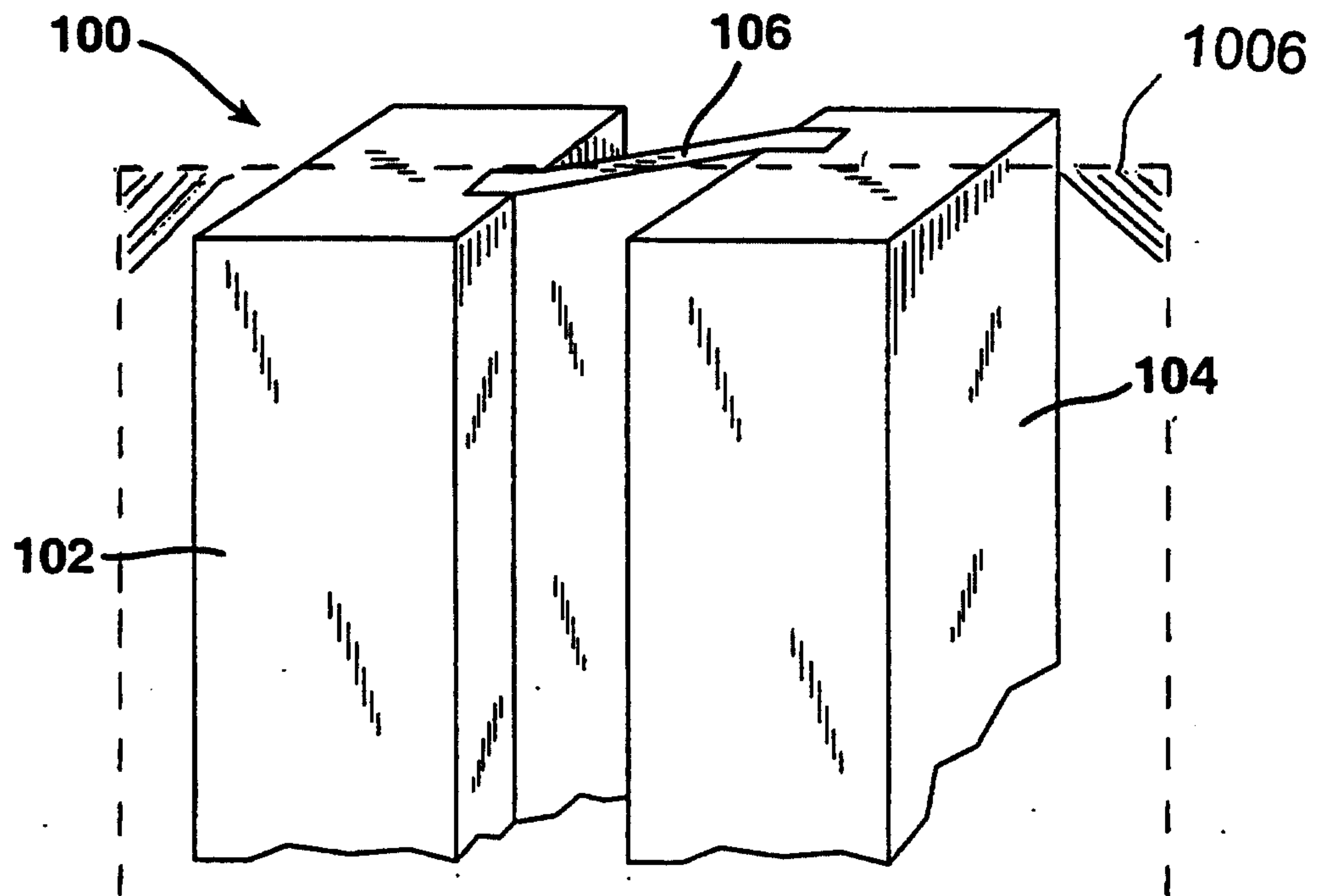
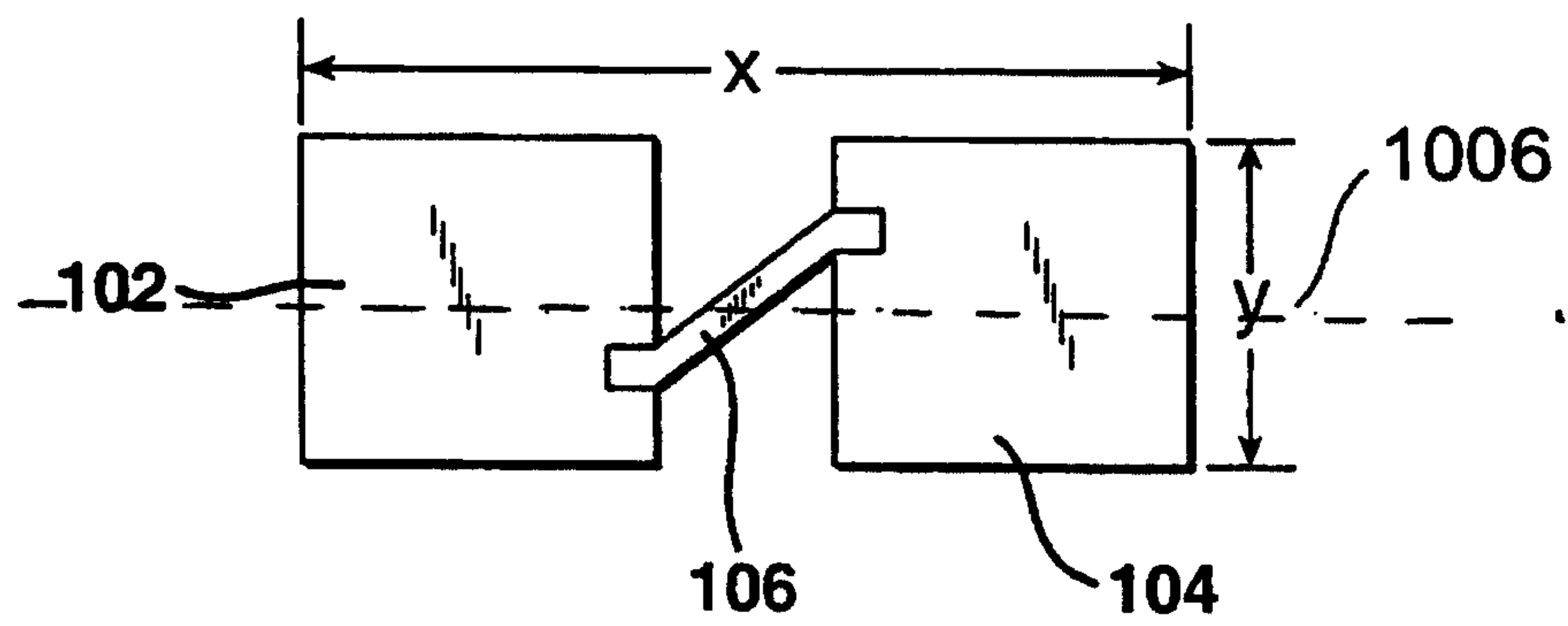


FIG. 2



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FIG. 3

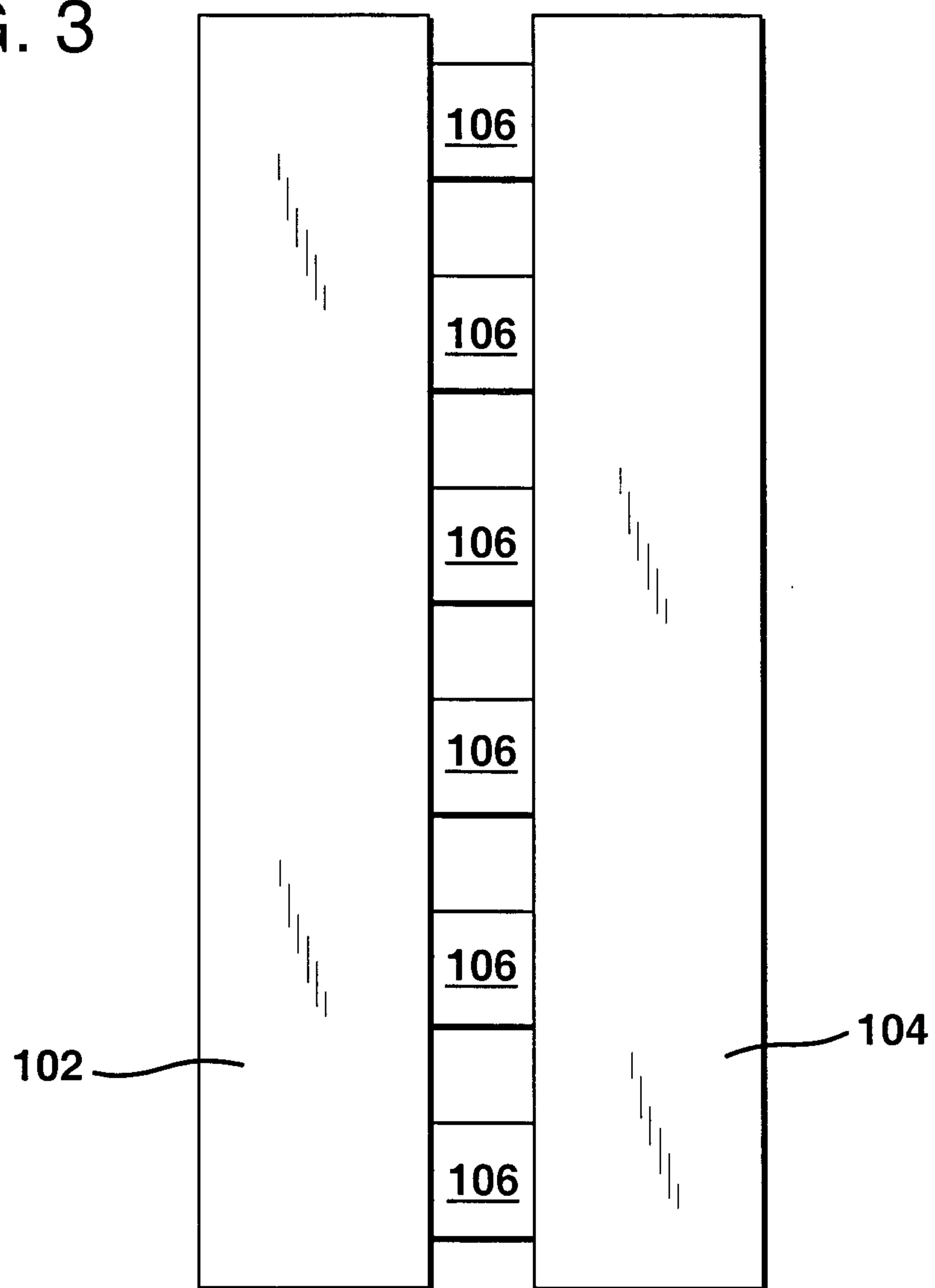
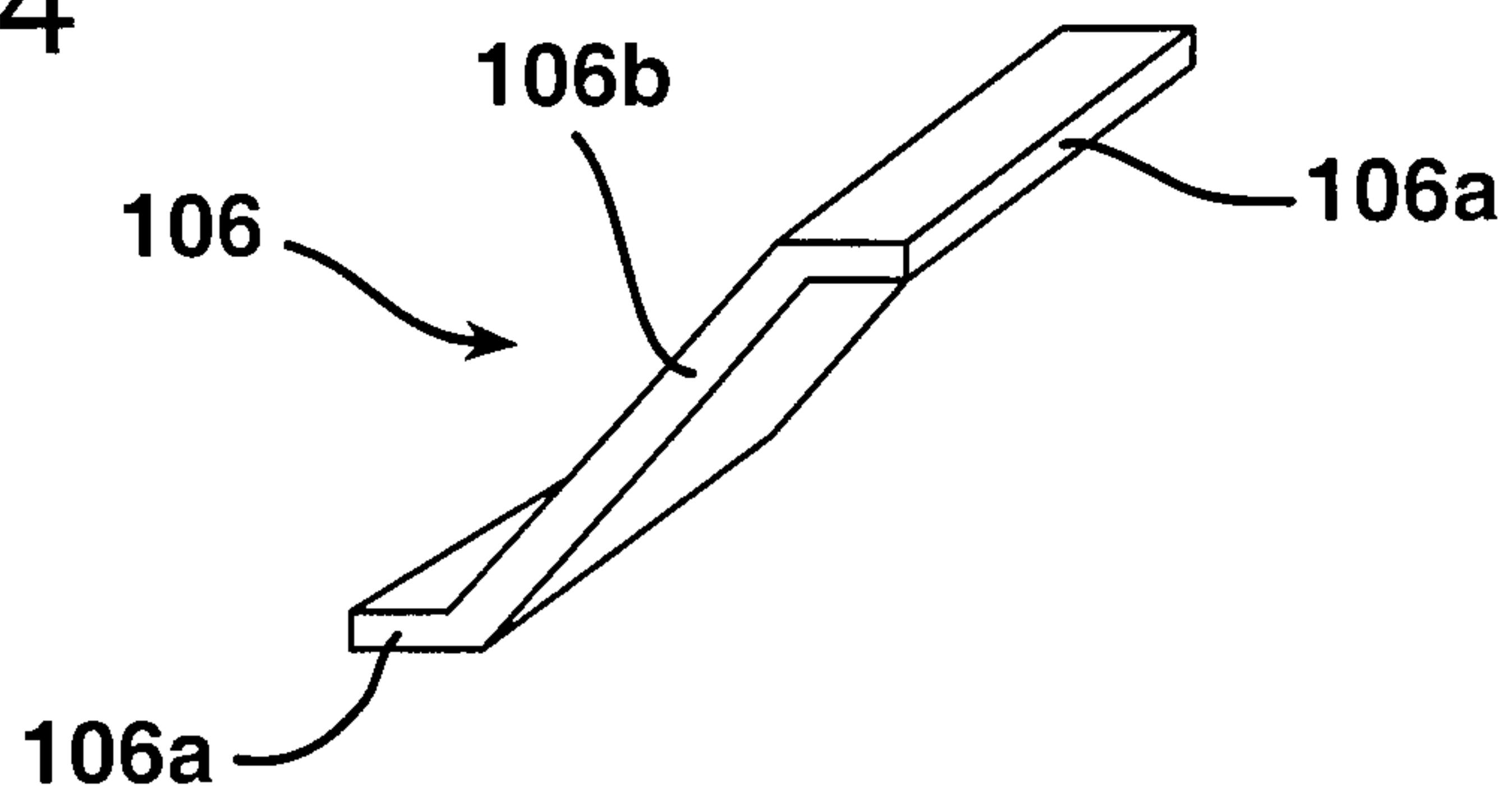


FIG. 4



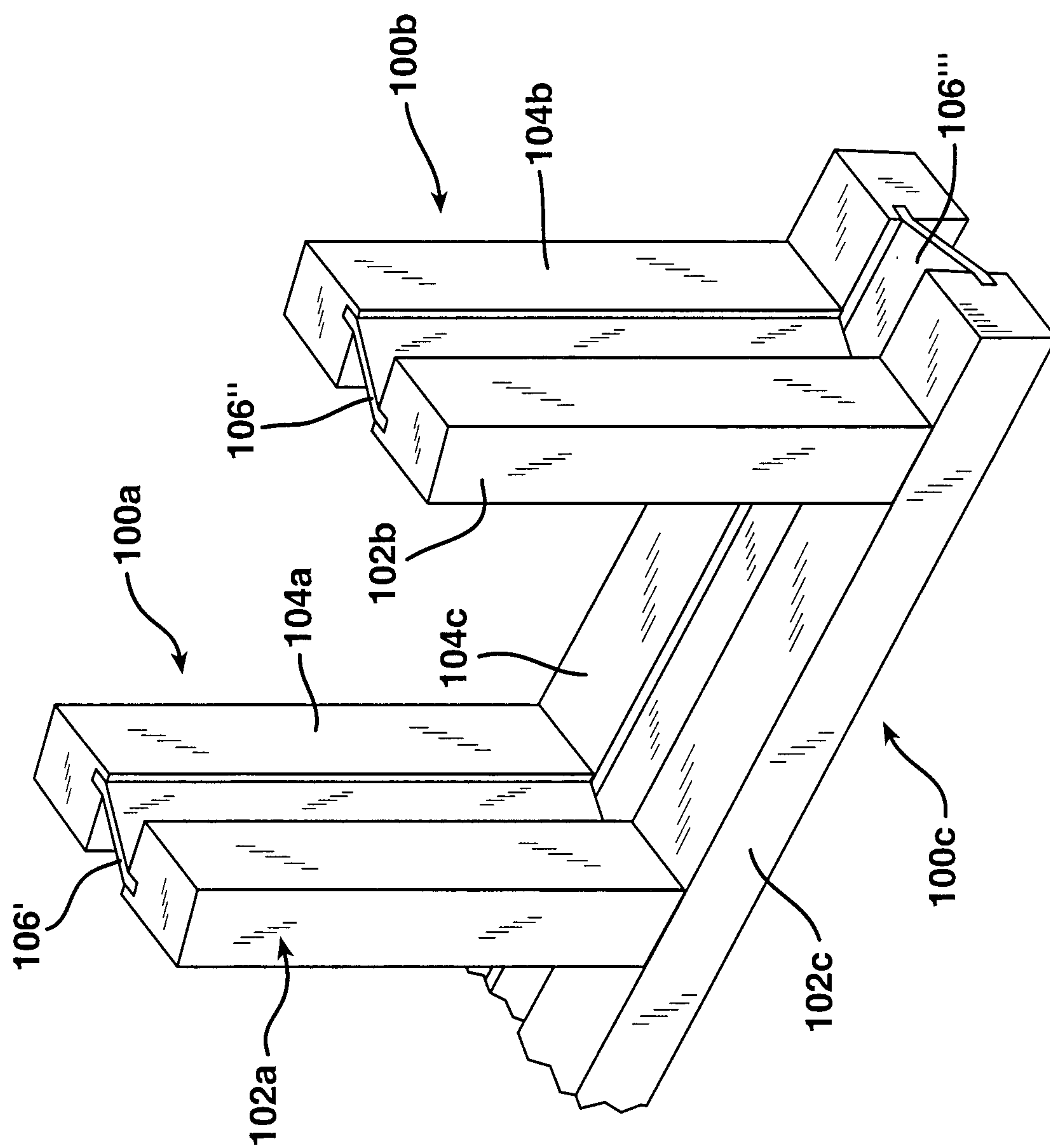
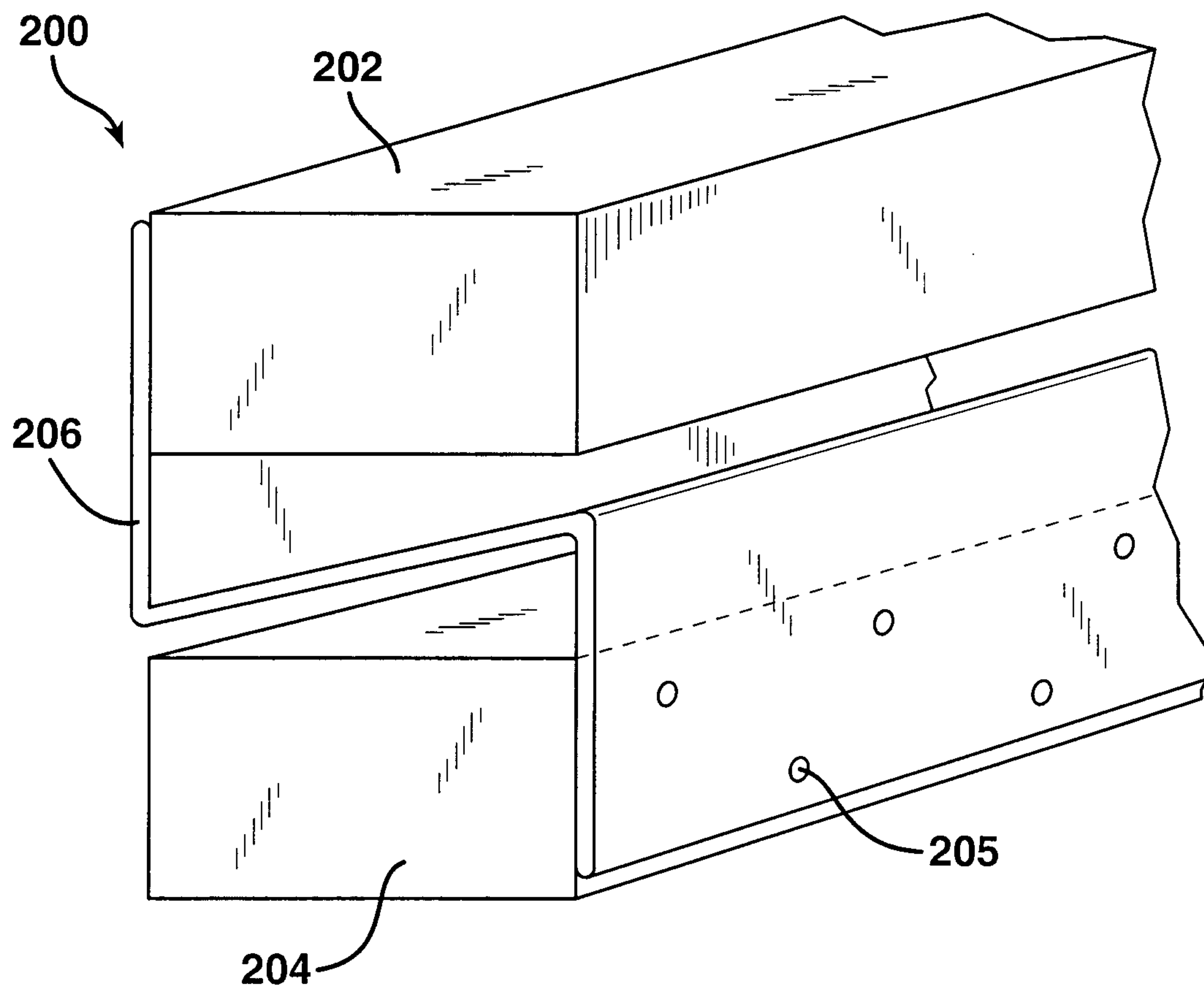


FIG. 5

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FIG. 6



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FIG. 7

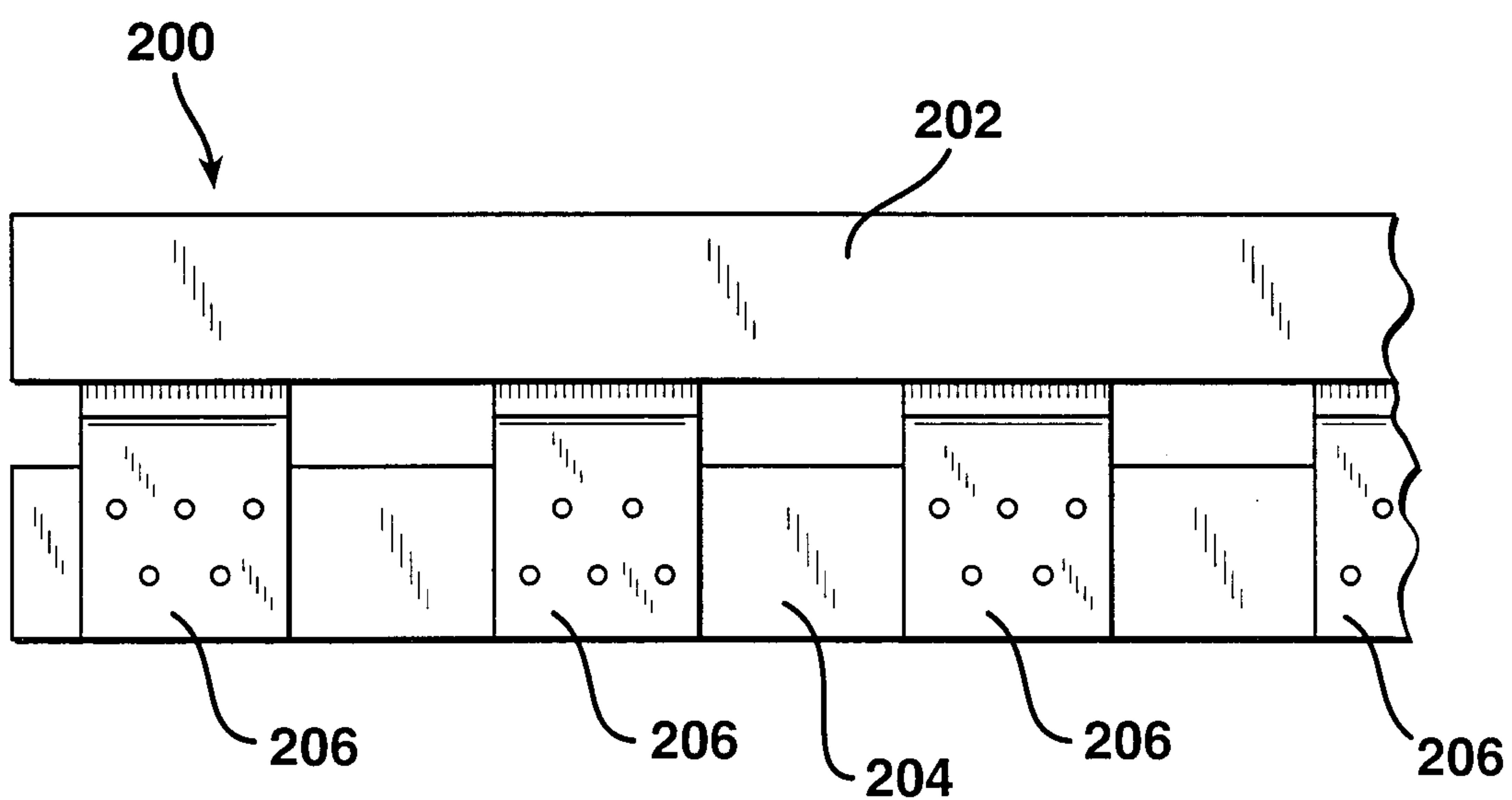
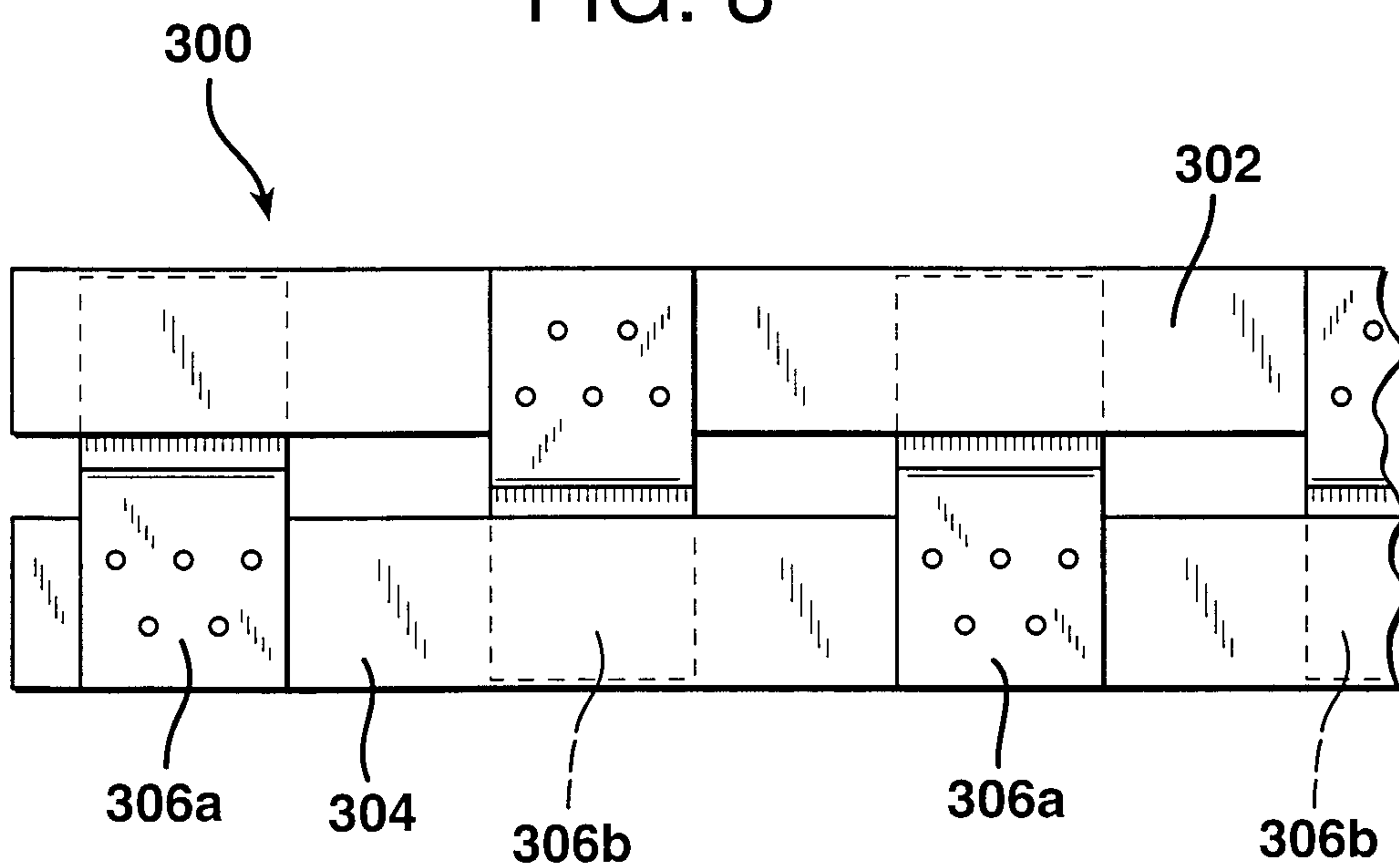
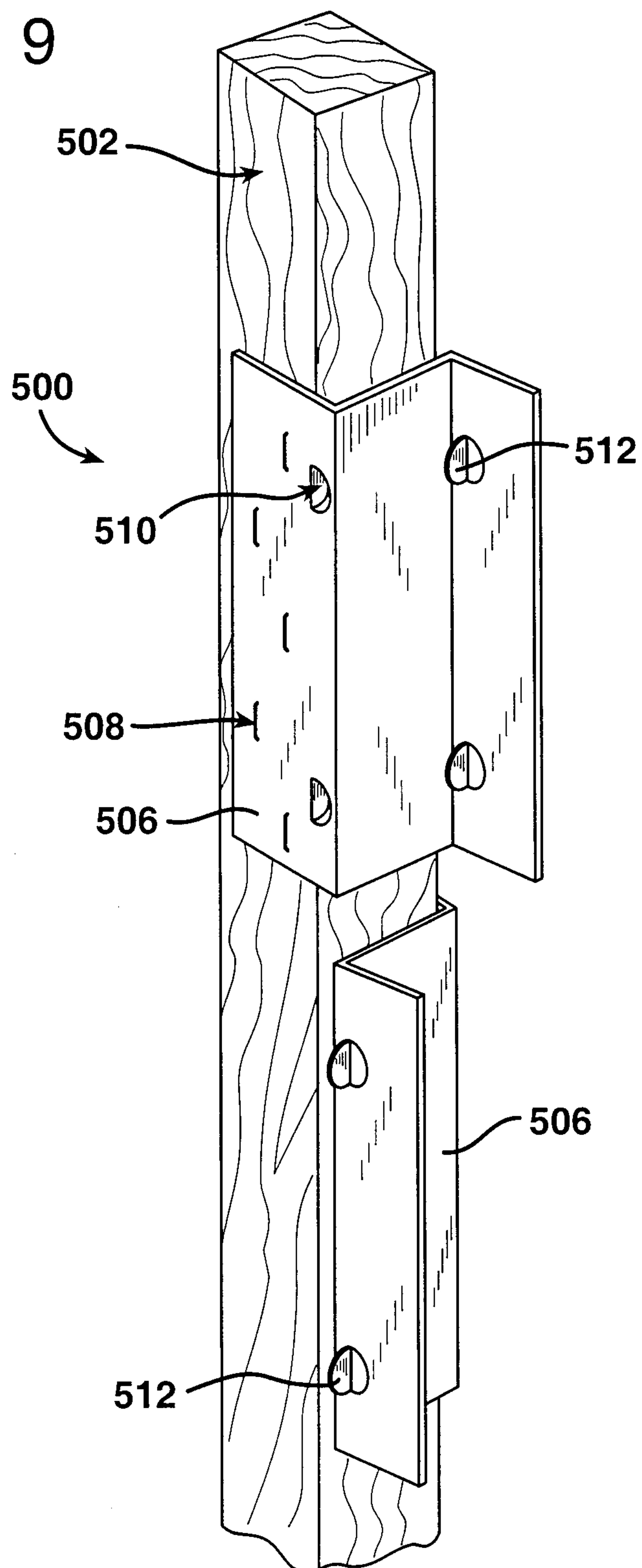


FIG. 8



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FIG. 9



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FIG. 10

