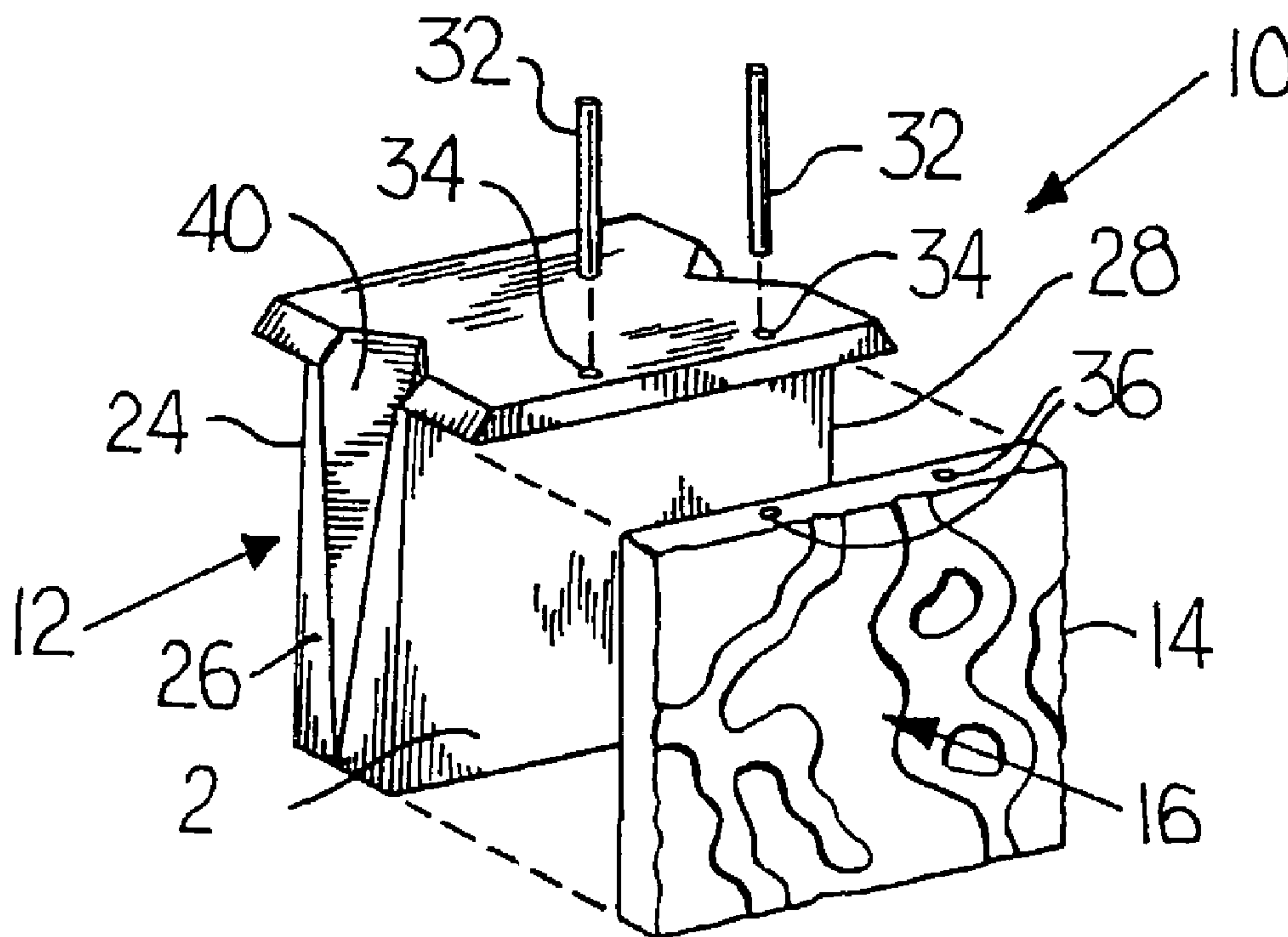




(86) Date de dépôt PCT/PCT Filing Date: 2004/07/26
 (87) Date publication PCT/PCT Publication Date: 2005/02/10
 (85) Entrée phase nationale/National Entry: 2006/01/19
 (86) N° demande PCT/PCT Application No.: US 2004/024018
 (87) N° publication PCT/PCT Publication No.: 2005/012666
 (30) Priorités/Priorities: 2003/07/25 (60/489,987) US;
 2004/07/23 (10/897,823) US

(51) Cl.Int./Int.Cl. *E04B 1/70* (2006.01)
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(54) Titre : APPAREIL INSERT DESTINE A UN MOULE, PROCEDE DE PRODUCTION D'UNE UNITE DE BETON,
 PROCEDE D'INSTALLATION D'UN MUR ET PROCEDE DE RAJUSTAGE D'UN MOULE EXISTANT
 (54) Title: INSERT APPARATUS FOR A MOLD, METHOD OF MANUFACTURING A CONCRETE UNIT, METHOD OF
 INSTALLING A WALL AND METHOD OF RETROFITTING AN EXISITING MOLD



(57) Abrégé/Abstract:

Disclosed is an insert apparatus (10) for a mold (110) for manufacturing structural units (100). The insert apparatus (10) includes a carrier (12) for operatively engaging a portion of the mold (110), and a face (14) having a design portion (16) thereon. The face (14) is in operative communication with the carrier (12), and the design portion (16) extends into or out of an inner cavity (112) of the mold (100). A method of manufacturing such a structural unit (100), a method of retrofitting an existing mold (110) for manufacturing such a unit (100) and a method of installing a wall (18) using the structural units (100) are also disclosed.

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

(19) World Intellectual Property
Organization
International Bureau



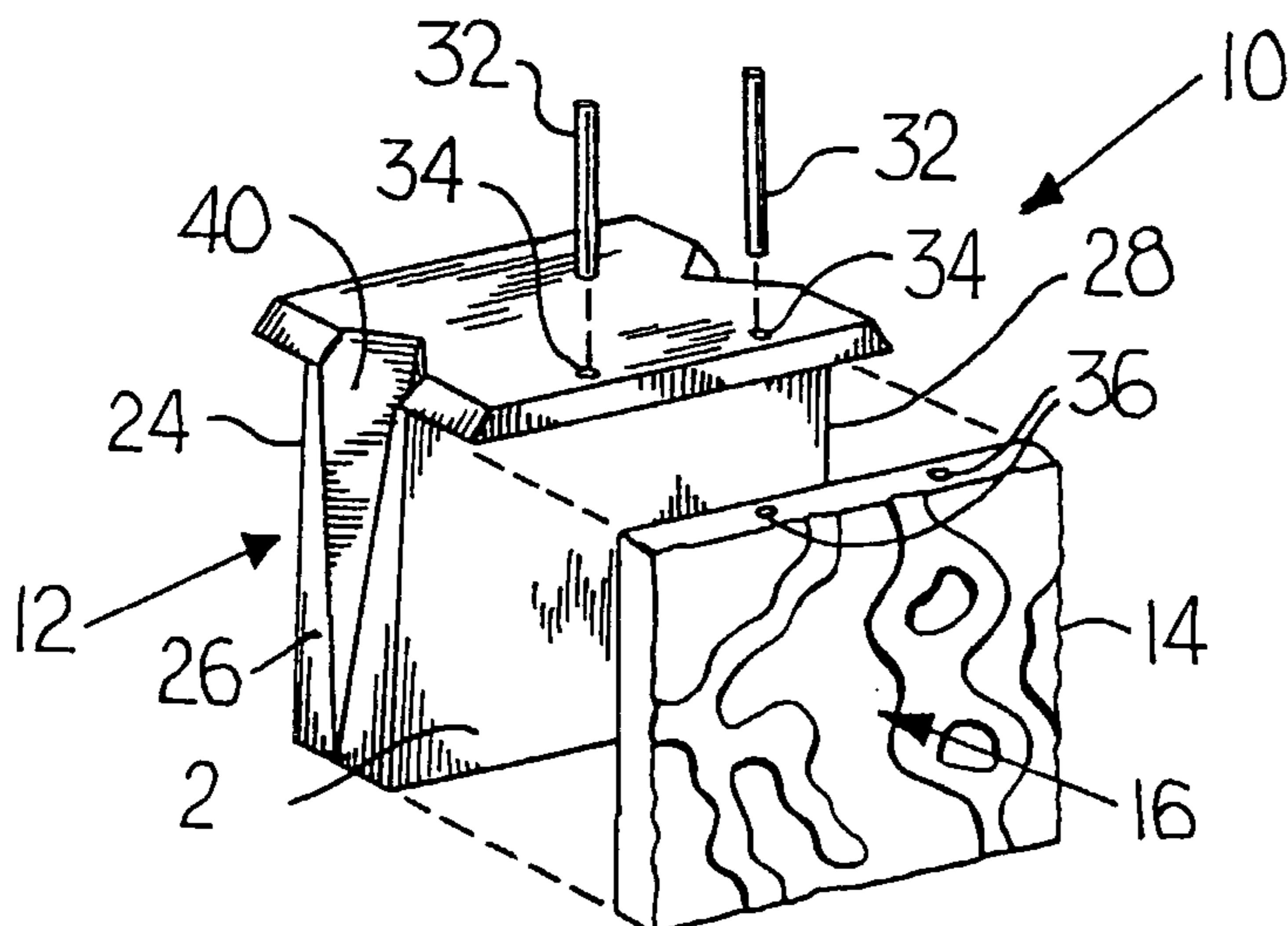
(43) International Publication Date
10 February 2005 (10.02.2005)

PCT

(10) International Publication Number
WO 2005/012666 A2

- (51) International Patent Classification⁷: **E04C**
- (21) International Application Number: PCT/US2004/024018
- (22) International Filing Date: 26 July 2004 (26.07.2004)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
60/489,987 25 July 2003 (25.07.2003) US
10/ , 23 July 2004 (23.07.2004) US
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- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, 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, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:**
— without international search report and to be republished upon receipt of that report
- 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.

(54) Title: INSERT APPARATUS FOR A MOLD, METHOD OF MANUFACTURING A CONCRETE UNIT, METHOD OF INSTALLING A WALL AND METHOD OF RETROFITTING AN EXISTING MOLD



(57) Abstract: Disclosed is an insert apparatus (10) for a mold (110) for manufacturing structural units (100). The insert apparatus (10) includes a carrier (12) for operatively engaging a portion of the mold (110), and a face (14) having a design portion (16) thereon. The face (14) is in operative communication with the carrier (12), and the design portion (16) extends into or out of an inner cavity (112) of the mold (100). A method of manufacturing such a structural unit (100), a method of retrofitting an existing mold (110) for manufacturing such a unit (100) and a method of installing a wall (18) using the structural units (100) are also disclosed.

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**INSERT APPARATUS FOR A MOLD, METHOD OF MANUFACTURING A
CONCRETE UNIT, METHOD OF INSTALLING A WALL AND
METHOD OF RETROFITTING AN EXISTING MOLD**

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates generally to apparatus and methods for manufacturing structural units, such as concrete blocks, brick, clay-based material, pavers, segmental retaining walls (SRWs), etc., from a mold and, in particular, to an insert apparatus for use in connection with a mold for manufacturing a concrete unit, a method of manufacturing a concrete unit having a design or indicia applied on a side or sides of the unit, a method of installing a plurality of concrete units as a wall surface and a method of retrofitting an existing mold for manufacturing a concrete unit having a design or indicia applied on a side thereof.

Description of Related Art

[0002] In the field of manufacturing concrete units, such as concrete, concrete blocks, pavers, bricks, SRWs and the like, a mold is required. In operation, a conveyor or similar transport mechanism moves a pallet or plate underneath the mold, which typically includes an open top, open bottom and multiple inner cavities for forming the concrete unit. After the pallet or plate has moved into engagement with the underside of the mold, a fill drawer moves over the open top of the mold and places material, such as concrete or cement, into the inner cavity portion of the mold. Next, a machine head or plunger compresses the material, thereby providing additional compaction of the concrete material in the mold. Typically, the mold is vibrated while the concrete material is being placed or injected therein to provide better settling and uniformity.

[0003] After the concrete material is molded or shaped within the inner cavity of the mold, the pallet or plate moves down in a vertical manner away from the bottom of the mold and the compacted, consolidated and condensed concrete units also move down with the pallet. Typically, the concrete units are further cured, such as by natural curing, or by some other catalytic means. In this manner, a concrete unit is manufactured.

[0004] Concrete units, such as blocks, are now being used extensively in both consumer and construction situations. For example, a consumer may now wish to build his or her own retaining wall or decorative wall on their property. Accordingly, a need has arisen for more functional, decorative and/or aesthetically pleasing concrete units. Therefore, in order to manufacture such specialized units, typically the mold must be modified to apply a design

surface. There are different processes for accomplishing a decorative or roughened surface, with the two typical processes being either roughening the surface as the unit is dropped down through the mold or mechanically impressing a design or indicia using complicated mechanical devices or a labor-intensive single mold apparatus.

[0005] One drawback to applying a design or other indicia on a concrete unit is the limitation of how a concrete unit is manufactured by the mold. As discussed above, the bottom or plate moves to bound the mold and allow concrete material to be placed therein, and when this material is consolidated/compacted/condensed (CCC), the pallet or plate moves away from the bottom of the mold in a vertical direction. Therefore, any design that is placed upon a vertical surface of the concrete unit would be removed or otherwise distorted as the CCC concrete unit drops and slides down through the mold via the pallet. However, this does not pose an insurmountable problem when merely producing concrete units with a roughened surface. Since the design is not specific and only a roughened surface is desired, systems and processes have been developed for applying such a roughened surface to a unit. For example, see U.S. Patent Nos.: 6,464,199 to Johnson; 6,209,848 to Bolles et al.; 6,138,983 to Sievert; 6,113,379 to LaCroix et al.; 5,217,630 to Sayles; and 5,879,603 to Sievert. See also Patent Application Publication No. U.S. 2001/0007380 to LaCroix et al. However, such processes and molds are deficient in that only a roughened or textured surface can be applied to the vertical face of the unit. Therefore, such systems and processes are not capable of producing a specified design or indicia, which would not be removed or distorted as the CCC concrete unit is discharged from the mold.

[0006] Other processes have been developed for placing decorative surfaces, designs and indicia on a vertical face of a concrete unit. For example, see U.S. Patent Nos.: 5,817,249 to Forlini; 2,532,049 to Wittke; 1,693,693 to Dexter; and 1,635,093 to McPherson et al. However, these molds and processes are quite complicated. The mold must be specifically designed to create the design or indicia and typically a wall of the mold must be pressed in toward the concrete material and then removed prior to dropping the unit from the mold. In addition, such intricate molds and machines are expensive and labor intensive, since multiple parts and walls and other mechanisms must be utilized to apply the indicia, remove the design portions and allow the block to be removed from the mold. Further, such molds and processes may not be well suited for the mass production of concrete units.

SUMMARY OF THE INVENTION

[0007] It is, therefore, an object of the present invention to provide an insert apparatus, a method of manufacturing and a method of retrofitting a mold for manufacturing a structural

unit that overcomes the deficiencies of the prior art. It is another object of the present invention to provide an insert apparatus and methods of manufacturing a structural unit having a design, indicia, projection or recess on one or more vertical surfaces of the unit. It is yet another object of the present invention to provide an insert apparatus and methods of manufacturing a structural unit that changes the general dimensions of the unit. It is a still further object of the present invention to provide an insert apparatus for use in connection with a mold for manufacturing a structural unit that is simple in its use and does not remove or otherwise distort the applied design when the unit is removed from the mold. It is another object of the present invention to provide a method of manufacturing a structural unit having a design or indicia impressed or recessed upon a vertical side or sides of the unit that is more efficient and capable of mass manufacturing such units. It is a still further object of the present invention to provide a method of retrofitting an existing mold, such that a structural unit can be produced having a design, indicia, projection or recess thereon.

[0008] The present invention is directed to an insert apparatus for a mold for manufacturing at least one structural unit. The insert apparatus includes a carrier configured to operatively engage the mold. The insert apparatus also includes a face having design portions and in operative communication with the carrier portion. The design portions extend into or out of an inner cavity of the mold.

[0009] The present invention is also directed to a method of manufacturing a structural unit having a design or indicia applied on at least one side of the unit. The method includes the steps of: (a) engaging a carrier within a mold, where the carrier is in operative communication with a face having design portions extending into or out of an inner cavity in a mold; (b) placing a material into the inner cavity of the mold, such that one or more sides of the inner cavity comprise the face portion; (c) at least one of consolidating, compacting and condensing the material, thereby forming the structural unit; and (d) removing the structural unit from the mold.

[0010] The present invention is also directed to installing a plurality of structural units as a wall. This method includes the steps of: providing multiple structural units, where some or all of these units include a design portion extending from and/or recessed within a face surface of the structural unit; successively applying mortar to a surface of the structural unit and positioning a successive structural unit on the mortared surface, thereby forming the wall with a wall surface having a desired master design thereon; and applying additional mortar to at least one mortar joint between at least two structural units, the additional mortar effectively

joining the design portions between the at least two structural units, thereby providing a more complete desired master design on the wall surface.

[0011] The present invention is further directed to a method of retrofitting an existing mold for manufacturing a structural unit having a design or indicia applied on at least one side of the unit. The mold includes an inner cavity with one or more sides comprising the plate element removably attached to the side. The method includes the steps of: (a) detaching and removing the plate element from the side of the inner cavity of the mold; (b) providing an insert apparatus including a carrier in operative communication with a face having design portions; and (c) engaging the carrier in place of the removed plate element, wherein the design portions of the face portion extend into or out of the inner cavity of the mold.

[0012] The present invention is also directed to an improvement for use in connection with a mold for manufacturing a structural unit having a design applied on at least one side of the unit. The improvement comprises an insert. This insert is configured to operatively engage a portion of the mold. The insert comprises a carrier having a face portion with at least one design portion extending into or out of the inner cavity of the mold.

[0013] The present invention is also directed to an insert for a mold for manufacturing at least one structural unit. The insert includes a carrier configured to operatively engage a portion of the mold. In addition, the carrier includes a face portion with at least one design portion extending into or out of the inner cavity of the mold.

[0014] The present invention, both as to its construction and its method of operation, together with the additional objects and advantages thereof, will best be understood from the following description of exemplary embodiments when read in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] Fig. 1 is a perspective view of an insert apparatus according to the present invention;

[0016] Fig. 2 is an edge view of the insert apparatus of Fig. 1;

[0017] Fig. 3 is an edge view of a further embodiment of an insert apparatus according to the present invention;

[0018] Fig. 4 is a schematic view of an insert apparatus according to the present invention;

[0019] Fig. 5 is an edge view of a further embodiment of an insert apparatus according to the present invention;

[0020] Fig. 6 is a front view of a modified plate element for use in connection with a mold according to the present invention;

[0021] Fig. 7 is a perspective and exploded view of a further embodiment of an insert apparatus according to the present invention;

[0022] Fig. 8 is a top view of a mold according to the prior art;

[0023] Fig. 9 is a schematic view of the insertion of an insert apparatus according to the present invention in a mold;

[0024] Fig. 10 is a schematic view of the installation of multiple modified structural units according to the present invention;

[0025] Fig. 11 is a front view of a portion of a wall constructed using the modified structural units made in accordance with the methods of the present invention; and

[0026] Fig. 12 is a detailed front view of a further embodiment of a wall built with structural units using the methods according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0027] For purposes of the description hereinafter, the terms “upper”, “lower”, “right”, “left”, “vertical”, “horizontal”, “top”, “bottom”, “lateral” and derivatives thereof shall relate to the invention as it is oriented in the drawing figures. However, it is to be understood that the invention may assume various alternative variations and step sequences, except where expressly specified to the contrary. It is also to be understood that the specific devices and processes illustrated in the attached drawings, and described in the following specification, are simply exemplary embodiments of the invention. Hence, specific dimensions and other physical characteristics related to the embodiments disclosed herein are not to be considered as limiting.

[0028] The present invention is directed to an insert apparatus 10, as shown in various embodiments in Figs. 1-3, 5 and 7, a method of manufacturing a structural unit 100, a method of installing a plurality of structural units 100 as a wall surface 103 and a method of retrofitting an existing mold 110 for manufacturing such a structural unit 100. As discussed in detail hereinafter, the insert apparatus 10 is particularly effective for use in connection with the mold 110, where the mold 110 is used for manufacturing at least one and typically multiple structural units 100, such as concrete units, as illustrated in Figs. 10-12. The structural unit 100 may be a concrete block, a cinder block, a cement block, a brick, a clay-base unit, a paver, a segmental retaining wall unit, etc. In addition, the mold 110 includes an inner cavity 112, which is adapted to receive a typically liquid and thereafter curable material, such as cement, concrete, aggregate or similar materials.

[0029] In one preferred and non-limiting embodiment, the insert apparatus 10 is for use in connection with the mold 110 for manufacturing one or more structural units 100. In

particular, the insert apparatus 10 includes a carrier 12 that is adapted to operatively engage a portion or part of the mold 110. Further, the insert apparatus 10 includes a face 14, and this face 14 includes one or more design portions 16 thereon. In addition, the face 14 is in operative communication or engagement with the carrier 12. The design portions 16 extend into or out of the inner cavity 112 of the mold 110.

[0030] As best seen in Figs. 1-3, 5 and 7, the face 14 is connected or attached to the carrier 12, and the design portions 16 create a design or indicia that is imprintable (that is impressed or recessed) upon the surface of a structural unit 100. Further, the design portions 16 create this design or indicia on typically a vertical surface of the structural unit 100. While the design portions 16 shown in the various figures of the present application constitute only some shapes or designs, any number of shapes, designs, indicia or other desired faces can be obtained using the insert apparatus 10 and the methods discussed hereinafter. For example, functional impressions or recesses can be formed on the structural unit 100 to produce interlocking units, architectural units or other structural units having similar functional characteristics. Dimensionally, the face 14, and in particular the design portion 20, may produce impressions, recesses or a combination of impressions and recesses on the surface of a structural unit 100.

[0031] In another embodiment, the carrier 12 and the face 14 may be constructed or manufactured as an integral piece. This may be particularly useful in an application where different patterns are not required, and the same insert apparatus 10 can be used in connection with the same mold 110 throughout the process. In this embodiment, the carrier 12, face 14 and design portions 16 are an integral unit.

[0032] In a further embodiment, and as illustrated in Fig. 3, the face 14 may be removably attachable to the carrier 12, and for example, the carrier 12 may be in the form of a substantially T-shaped structure. Accordingly, and in this embodiment, the carrier 12 would have a horizontal wall 18, a vertical wall 20, a first side surface 22, a second side surface 24, a first edge surface 26 and a second edge surface 28. Therefore, multiple faces 14 can be used in connection with such a carrier 12. A first face 14 could be removably attached to the first side surface 22 of the vertical wall 20, and a second face 14 could be removably attached to the second side surface 24 of the vertical wall 20. In this manner, while multiple structural units 100 are being formed, each structural unit 100 can have a different design or indicia applied thereto.

[0033] As discussed above, the face 14 may be removably attachable to the carrier 12. Therefore, a removable attaching means 30 facilitates the releasably attachable functionality

of either one or both of the face surfaces 14 with respect to the carrier 12. In particular, the face 14 would be removably attachable to either the first side surface 22 and/or the second side surface 24. Specifically, it is the removable attaching means 30 that allows the face 14 to engage the carrier 12 in a removable and non-permanent manner. Any removable attaching means 30 is envisioned, such as an attachment device, an adhesive compound, interacting magnetic elements, a flange and groove arrangement, a male/female plug arrangement, an elongated member in operative communication with the carrier 12 and a face 14, a clamp, etc.

[0034] In one preferred and non-limiting embodiment, one or more pins 32 could be provided as the removable attaching means 30. These pins 32 could be insertable through corresponding pin orifices 34 on the carrier 12, and further and aligned pin orifices 36 on the face 14. As shown in Fig. 7, the face 14 would be placed against the first side surface 22 and/or the second side surface 24, and the pins 32 would be inserted through the pin orifices 34 on the carrier 12 and further into the pin orifices 36 on the face 14. These pins 32 would allow the face 14 to be attached to the carrier 12 throughout the process, yet allow the pins 32 to be removed, thereby releasing the face 14 from the carrier 12. Thereafter, a different face 14 could be used in connection with the same carrier 12.

[0035] A mold 110 according to the prior art is illustrated in Fig. 8. This mold is a typical box-like structure, including a first side wall 114, a second side wall 116, a first end wall 118 and a second end wall 120. It is the first side wall 114, the second side wall 116, the first end wall 118 and the second end wall 120 that create the box that is the mold 110. However, the concrete material or similar material is not simply placed into the mold 110. Instead, with respect to the inner surfaces of the walls (114, 116, 118, 120), a side plate element 122 is secured to an inner surface of the first side wall 114 and the second side wall 116. Similarly, a plurality of end plate elements 124 are arranged on the inner surfaces of the first end wall 118 and the second end wall 120.

[0036] It should be noted that this arrangement is for constructing two structural units 100, and any number of side plate elements 122 and end plate elements 124, when used in connection with variously sized and shaped molds 110, will provide for the manufacture of one or multiple variously sized and shaped structural units 100. In the present embodiment, the end plate elements 124 are secured to the first end wall 118 and the second end wall 120 in such a way that each end plate element 124 includes a first end that abuts a side plate element 122 and a free end, which forms a groove 126. In addition, the mold 110 may

include one or more structural unit cavity forms 128, which assists in forming cavities in the structural unit 100 after the material is injected into the inner cavity 112 of the mold 110.

[0037] Returning to the insert apparatus 10, the carrier 12 may include a projection 38 or a groove 40 on a surface of the carrier 12. This projection 38 and/or groove 40 is adapted to mate with a complimentary projection 42 or groove 44 located on a surface within the inner cavity 112 of the mold 110. For example, as seen in Fig. 3, a projection 38 (acting as a flange) may be disposed on the first edge surface 26 and/or the second edge surface 28 of the carrier 12. The projection 38 is configured to mate with the groove 44, which, in this embodiment, is identical to the groove 126 discussed above in connection with the mold 110. Similarly, as shown in Figs. 5-7, the groove 40 may be located on the carrier 12, and specifically the first edge surface 26 and/or the second edge surface 28, and this groove 40 is configured to mate with a projection 42 in the inner cavity.

[0038] In one preferred and non-limiting embodiment, and as illustrated in Figs. 5-7, the groove 40 on the carrier 12 is in the form of an upside-down hemi-pyramidal groove, and the projection 42 of the mold 110 is in the form of a complimentary upside-down hemi-pyramidal projection 42. As seen in Fig. 6, a modified end plate 130 may be provided, and this modified end plate 130 would include the projection 42, which interacts with and frictionally engages the groove 40 on the first edge surface 26 and/or the second edge surface 28 of the carrier 12. In addition, any number of shapes and sizes of projections 38 and grooves 40 on the carrier 12, and complimentary projections 42 and grooves 44 on the mold 110 are envisioned. Further, any manner of attaching the insert apparatus 10 within the mold 110 is also envisioned.

[0039] The carrier 12 may be manufactured from a variety of materials, for example, the carrier 12 may be manufactured from a thermoplastic material, a synthetic material, a plastic, a polymer, wood, a rigid material, etc. Similarly, the face 14 may be manufactured from a variety of materials. For example, the face may be manufactured from a thermoplastic material, a synthetic material, a plastic, a polymer, wood, a rigid material, a flexible material, a foam, a closed-cell foam, etc. In one preferred and non-limiting embodiment, the face 14 is manufactured from a closed-cell polymeric material.

[0040] It is envisioned that a different design portion 16 is disposed upon the face surface 46 of a plurality of faces 14, and each different design portion 16, when produced in a line, create a desired master design 48. For example, see Figs. 10-12. These different design portions 16, and/or the desired master design 48 may be disposed upon the face surfaces 46 of the faces 14 by an automated process. In particular, the automated process may include

the steps of: storing the desired master design 48 on a computing device; positioning a face substrate in operative communication with an etching device, which is in communication with the computing device; and etching, by the etching device, the stored desired master design 48 on the face substrate. Next, the face substrate would be cut into a set of predetermined sized and shaped faces 14 for use in connection with the carrier 12. Therefore, as seen in Figs. 10-12, multiple structural units 100 manufactured in accordance with the present invention can be assembled into a wall 102 (as discussed in detail hereinafter), thereby creating the desired master design 48 on the wall surface 103.

[0041] In operation, and according to the present method of manufacturing a structural unit 100, the carrier 12 is engaged within the mold 110. Further, the carrier 12 already includes or is in operative engagement with one or more faces 14. As seen in Fig. 9 and as occurs in a typical process, a pallet 140 is placed on a conveyor 142, and the conveyor 142 transports the pallet 140 to a position directly underneath the mold 110. However, according to the present invention, the insert apparatus 10 is specifically positioned with respect to the mold 110, such that when the pallet 140 is moved up toward the mold 110, thereby forming a bottom surface of the mold 110, the insert apparatus 10 is appropriately engaged within the mold 110. When the insert apparatus 10 is constructed as illustrated in Fig. 3, where the carrier 12 includes projections 38, the insert apparatus 10 is positioned such that these projections 38 engage the grooves 126 of the mold 110 when the pallet 140 is engaged with the mold 110. After the pallet 140 is engaged, and the insert apparatus 10 is in place, the concrete, cement, or similar material is placed into the inner cavity 112 of the mold 110, as schematically illustrated by arrow A in Fig. 9.

[0042] It is envisioned that, according to the prior art and typical processes, a block machine (not shown) can be used to compact and assist in forming a structural unit 100 after the concrete or similar material has been placed into the inner cavity 112 of the mold 110. Similarly, a vibration apparatus may also be used to help in settling, consolidating, compacting and condensing the material, as is known in the art. After the insert apparatus 10 is placed in the mold 110, the process according to the prior art proceeds accordingly. After the concrete unit is consolidated, compacted and condensed, the pallet 140 is vertically dropped down, carrying with it the newly-formed structural unit 100, having a design portion 104 disposed thereon. It is envisioned, at this point, that the structural unit 100 will be dropped down together with the insert apparatus 10, which is still adhered to or attached to the structural unit 100 or units. It is envisioned that the carrier 12 may be removed mechanically (or by hand) from the insert apparatus 10 at this point in the process or at some

later point. Further, the face 14 may be disengaged from the carrier 12 and a new face 14 replaced thereon. In addition, the structural unit 100 may be further cured before subsequent use and the face 14 may be removed at this point.

[0043] It is often necessary for the insert apparatus 10 to be removably engaged with the mold 110 for effective creation of the structural unit 100. Therefore, it is also envisioned that one or multiple modified end plates 130, as discussed above, can be introduced at any one or more locations within the mold 110. Due to the shape of the projection 42 on the modified end plate 130, and the complimentary groove 40 on the carrier 12 (see Figs. 5 and 6), the upside-down hemi-pyramidal shape maximizes the centering capability as the pallet 140 lifts the insert apparatus 10 up into the mold 110. Specifically, due to the shape of the projection 42 on the modified end plate 130, the insert apparatus 10 would have some room for error in the initial positioning, and this error would be overcome and the insert apparatus 10 engaged within the mold 110 upon complete engagement. Any number of shapes and projections to achieve such centering and alignment capabilities are envisioned. In one preferred embodiment, the face 14 and the design portion 16 are manufactured from a foam material. The foam material would be particularly suitable to this process, since such a material would not bind with the concrete or similar material as it cures. However, any material of construction of the insert apparatus 10 is envisioned. Further, while the mold 110 of Fig. 8 has been shown and described, any number of molds 110 can be used. In addition, the insert apparatus 10 may be top loaded or bottom loaded (as described) according to the user and the arrangement of the equipment in the process.

[0044] In another aspect of the present invention, a presently existing mold 110 may also be retrofitted for forming the desired structural units 100. For example, the insert apparatus 10, the carrier 12 and/or the face 14 can take the place of any one or more of the side plate elements 122 and the end plate elements 124. Further, any vertical surface that is removable and replaceable, may be replaced with an appropriately sized and shaped insert apparatus 10, carrier 12 and/or face 14 for forming a design or indicia on any one or more of the vertical faces of the structural unit 100. Due to the easy engagement and appropriate size of the insert apparatus 10, the present invention is particularly adaptable to suit any of a variety of design considerations and options. This provides the user with the maximum amount of flexibility in choosing the designs to satisfy a consumer's needs. Therefore, the present invention is useful in both mass production of structural units 100, as well as special order units.

[0045] As discussed above, the insert apparatus 10 may be formed as an integral insert including the carrier 12 and the face 14. In this preferred and non-limiting embodiment, the

carrier 12 would engage at least a portion of the mold 110, and the carrier 12 would include the face 14 as a face portion or integral portion of the carrier 12. As discussed above, the face 14 would include one or more design portions 16 extending into or out of the inner cavity 112 of the mold 110. Accordingly, this integrated carrier 12 and face 14 (with design portions 16) could be engaged with and fit into a pre-existing mold 110 for use in constructing the structural unit 100, as discussed in detail above.

[0046] Turning now to the method of installing a plurality of structural units 100, a step in the method and various end results are illustrated in Figs. 10-12. In this method, the structural units 100 having the structural unit design portions 104 disposed thereon are manufactured in accordance with the methods discussed above. Any one or more of the structural units 100 may include the design portions 104. In installation, mortar 106 is applied to a surface of the structural unit 100, typically at the top surface and/or the bottom surface, and a successive structural unit 100 is placed on this mortar surface, thereby eventually forming the wall 102 with the wall surface 103 having the above-discussed desired master design 48 disposed thereon. In addition, in order to provide a more complete desired master design 48, additional mortar 106 is placed on portions of a mortar joint 108 between two structural units 100. The mortar 106 that is placed in these mortar joints 108 joins the design portions 104 of adjacent structural units 100 and completes a more detailed desired master design 48. This desired master design 48 would not include gaps in the design due to the requirement of having these mortar joints 108.

[0047] A different design portion 104 may be disposed upon the face surface of the structural units 100, and each different design portion 104, when arranged and aligned to a predetermined position, create the desired master design 48. In this manner, a projecting or relief design may be formed on the wall surface 103 of the wall 102. The wall 102 may be a retaining wall, a structural wall, a room wall, an architectural wall, an aesthetic wall, etc.

[0048] In this manner, an insert apparatus 10 is provided for forming a design or indicia upon one or more vertical faces of the structural unit 100, typically a concrete or cement unit. In addition, the present invention provides a method of manufacturing a structural unit 100 having a design portion 104 on the structural unit 100, and this process is adaptable, flexible and more simple in operation than the prior art processes. Still further, the present invention provides a method of retrofitting an existing mold 110 for manufacturing such structural units 100. During the typical bottom loading and unloading process, the design or indicia formed on the structural unit 100 would not be removed or distorted in any way, since the insert apparatus 10 is ejected along with the structure 100. Further, the insert apparatus 10 does not

use complicated machinery and extensive labor to successfully employ. Also provided is a method of installing a plurality of structural units 100 as a wall 102 having a wall surface 103. When built in accordance with this method, a desired master design 48 is displayed, and this method provides new and unexpected results in the fields of masonry and design architecture.

[0049] This invention has been described with reference to the preferred embodiments. Obvious modifications and alterations will occur to others upon reading and understanding the preceding detailed description. It is intended that the invention be construed as including all such modifications and alterations.

THE INVENTION CLAIMED IS:

1. An insert apparatus for a mold for manufacturing at least one structural unit, the insert apparatus comprising:
a carrier configured to operatively engage at least a portion of the mold; and
a face having at least one design portion and in at least one of operative communication and integral with the carrier;
wherein the at least one design portion extends into or out of an inner cavity of the mold.
2. The insert apparatus of claim 1, wherein the structural unit is at least one of a cinder block, a cement block, a brick, a concrete block, a clay-based unit, a paver and a segmental retaining wall unit.
3. The insert apparatus of claim 1, wherein the carrier is in the form of a substantially T-shaped structure having a substantially horizontal wall and a substantially vertical wall with a first side surface, a second side surface, a first edge surface and a second edge surface.
4. The insert apparatus of claim 3, wherein at least one face is removably attached to at least one of the first side surface and the second side surface.
5. The insert apparatus of claim 3, wherein at least one face is removably attached to at least one of the first side surface and the second side surface by a removable attaching means.
6. The insert apparatus of claim 5, wherein the removable attaching means is at least one of an attachment device, an adhesive compound, interacting magnetic elements, a flange and groove arrangement, a male/female plug arrangement and an elongated member in operative communication with the carrier and the face.
7. The insert apparatus of claim 1, wherein the carrier includes at least one of a projection and a groove positioned on a surface thereof and configured to mate with a complimentary groove and projection located on an inner surface of the mold.

8. The insert apparatus of claim 7, wherein the projection and groove of at least one of the carrier and the inner surface of the mold is in the form of an upside-down hemi-pyramid.

9. The insert apparatus of claim 7, wherein the groove of the carrier is in the form of an upside-down hemi-pyramidal groove, and the projection of the inner surface of the mold is in the form of a complimentary upside-down hemi-pyramidal projection.

10. The insert apparatus of claim 1, wherein the carrier is manufactured from at least one of a thermoplastic material, a synthetic material, plastic, a polymer, wood and a rigid material.

11. The insert apparatus of claim 1, wherein the face is manufactured from at least one of a thermoplastic material, a synthetic material, plastic, a polymer, wood, a rigid material, a flexible material, a foam and a closed-cell foam.

12. The insert apparatus of claim 1, wherein the carrier and the face are manufactured as an integral unit.

13. The insert apparatus of claim 1, wherein a different design portion is disposed upon the face surface of each of a plurality of faces, wherein each different design portion, when produced and aligned, create a desired master design.

14. The insert apparatus of claim 13, wherein at least one of the different design portion and the desired master design are disposed upon the faces by an automated process.

15. The insert apparatus of claim 14, wherein the automated process includes the steps of:

storing the desired master design on a computing device;

positioning a face substrate in operative communication with an etching device, which is in communication with the computing device; and

etching, by the etching device, the stored desired master design on the face substrate.

16. The insert apparatus of claim 15, further comprising the step of cutting the face substrate into a set of predetermined sized and shaped faces for use in connection with the carrier.

17. A method of manufacturing a structural unit having a design disposed upon at least one side surface of the unit, the method including the steps of:

(a) engaging a carrier within at least a portion of a mold, the carrier in operative communication with a face having at least one design portion extending into or out of an inner cavity of the mold;

(b) placing material into the inner cavity of the mold, such that at least a portion of at least one side of the inner cavity comprises the face;

(c) at least one of compacting, consolidating and condensing the material, thereby forming the structural unit; and

(d) removing the structural unit from the mold.

18. The method of claim 17, wherein the engaging step further comprises the steps of:

positioning the carrier and face underneath the inner cavity of the mold; and moving the carrier up and into engagement with at least a portion of the inner cavity of the mold.

19. The method of claim 18, further comprising the steps of:

placing the carrier and face on a pallet element;

placing the pallet element on a conveyor unit; and

conveying the pallet, and thereby the carrier and face, to a predetermined position underneath the inner cavity of the mold.

20. The method of claim 19, wherein the removing step further comprises the steps of:

disengaging and moving the pallet element down from the inner cavity of the mold, thereby disengaging and moving the structural unit, carrier and face therewith; and

conveying the pallet element on the conveyor unit to a further predetermined location.

21. The method of claim 17, further comprising the step of separating at least one of the carrier and the face from the structural unit.

22. The method of claim 17, further comprising the step of curing the structural unit.

23. The method of claim 17, wherein the material is at least one of concrete, cement and an aggregate.

24. The method of claim 17, wherein the structural unit is at least one of a cinder block, a cement block, a brick, a concrete block, a clay-based unit, a paver and a segmental retaining wall unit

25. A structural unit produced using the method of claim 17.

26. A method of installing a plurality of structural units as a wall surface, the method including the steps of:

providing a plurality of structural units, at least a portion of the plurality of structural units having a design portion at least one of extending from and recessed within a face surface of the structural unit;

successively applying mortar to a surface of the structural unit and positioning a successive structural unit on the mortared surface, thereby forming a wall with a wall surface having a desired master design thereon; and

applying additional mortar to at least one mortar joint between at least two structural units, the additional mortar effectively joining the design portions between the at least two structural units, thereby providing a more complete desired master design on the wall surface.

27. The method of claim 26, wherein a different design portion is disposed upon the face surface of each of the plurality of structural units, wherein each different design

portion, when arranged and aligned to a predetermined position, create the desired master design.

28. The method of claim 26, wherein the material forming the structural unit is at least one of concrete, cement and an aggregate.

29. The method of claim 26, wherein the structural unit is at least one of a cinder block, a cement block, a brick, a concrete block, a clay-based unit, a paver and a segmental retaining wall unit

30. A wall formed by the method of claim 26.

31. The wall of claim 30, wherein the wall is at least one of a retaining wall, a structure wall, a room wall, an architectural wall and an aesthetic wall.

32. A method of retrofitting an existing mold for manufacturing a structural unit having a design applied on at least one side of the unit, the mold having an inner cavity and at least one side comprising a plate element removably attached thereto, the method comprising the steps of:

(a) detaching and removing the plate element from the side of the inner cavity of the mold;

(b) providing an insert apparatus including a carrier in operative communication with a face having at least one design portion disposed thereon; and

(c) engaging the carrier in place of the removed plate element, wherein the at least one design portion of the face extends into or out of the inner cavity of the mold.

33. The method of claim 32, wherein the carrier includes at least one of a projection and a groove positioned on a surface thereof and configured to mate with a complimentary groove and projection located on an inner surface of the mold.

34. The method of claim 33, wherein the projection and groove of at least one of the carrier and the inner surface of the mold is in the form of an upside-down hemi-pyramid.

35. The method of claim 33, wherein the groove of the carrier is in the form of an upside-down hemi-pyramidal groove, and the projection of the inner surface of the mold is in the form of a complimentary upside-down hemi-pyramidal projection.

36. In a mold for manufacturing a structural unit having a design applied on at least one side of the unit, the mold having an inner cavity, the improvement comprising an insert configured to operatively engage at least a portion of the mold, the insert comprising a carrier having a face portion with at least one design portion extending into or out of the inner cavity of the mold.

37. An insert for a mold for manufacturing at least one structural unit, the insert comprising a carrier configured to operatively engage at least a portion of the mold and having a face portion with at least one design portion extending into or out of the inner cavity of the mold.

1/2

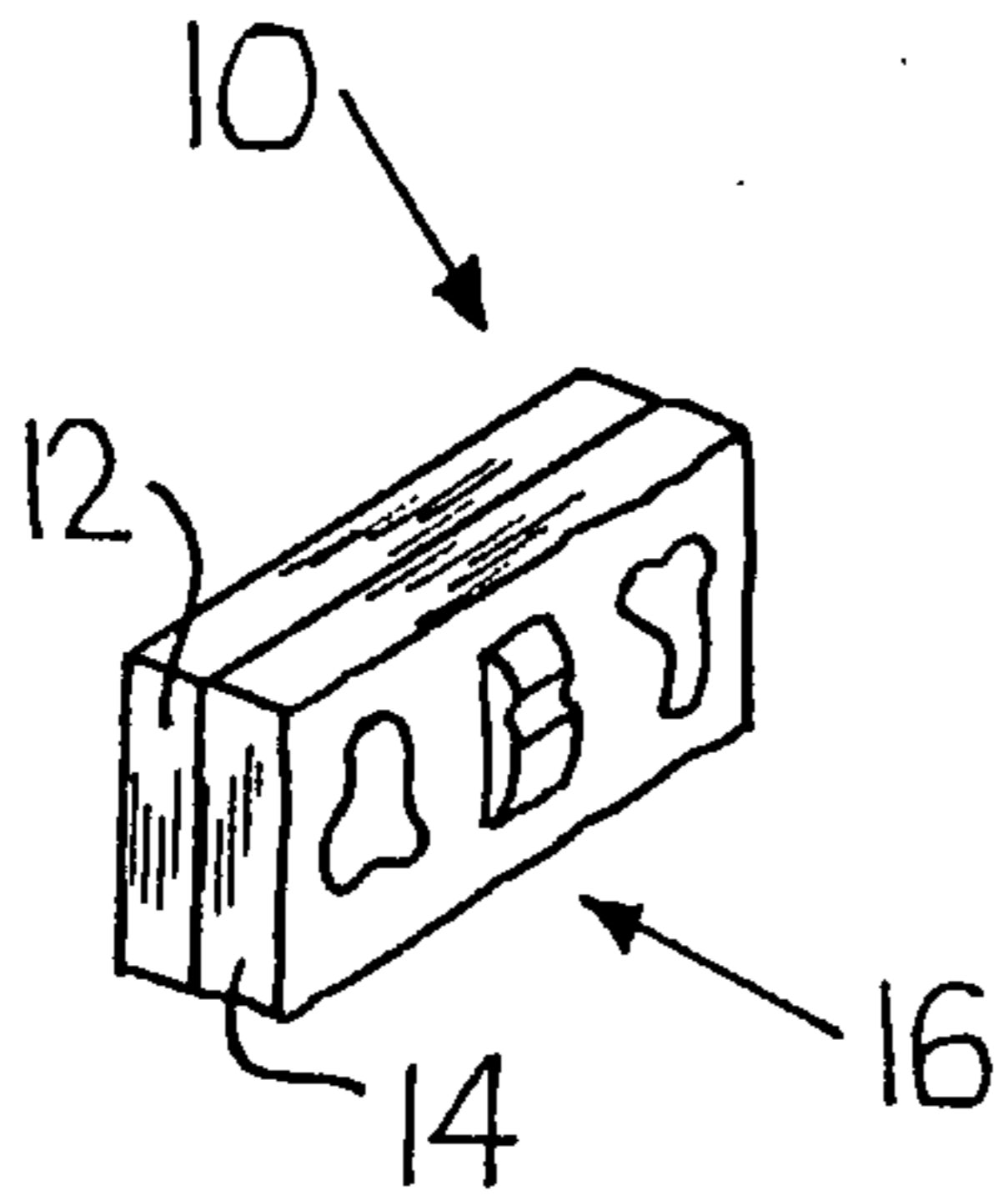


Fig. 1

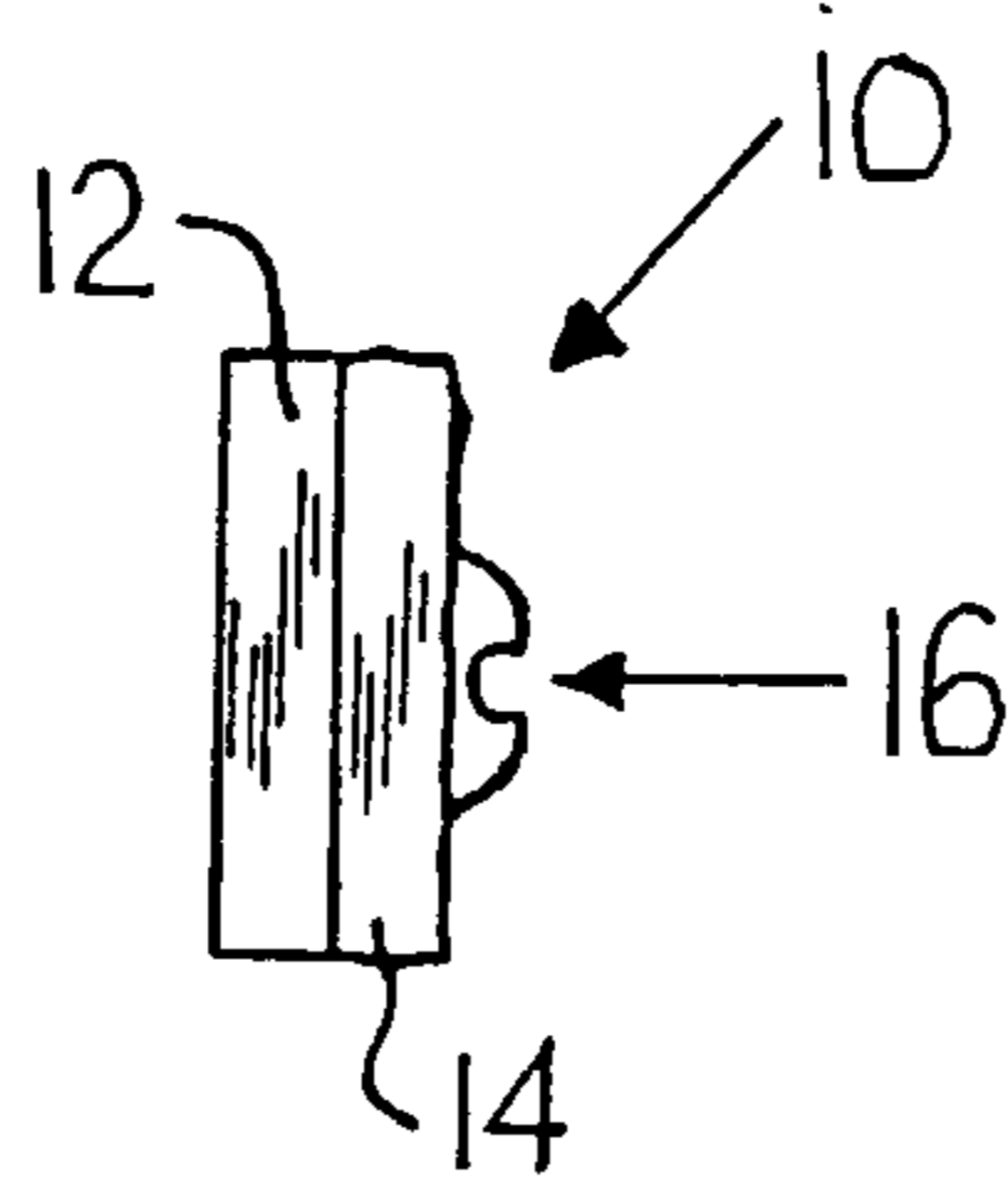


Fig. 2

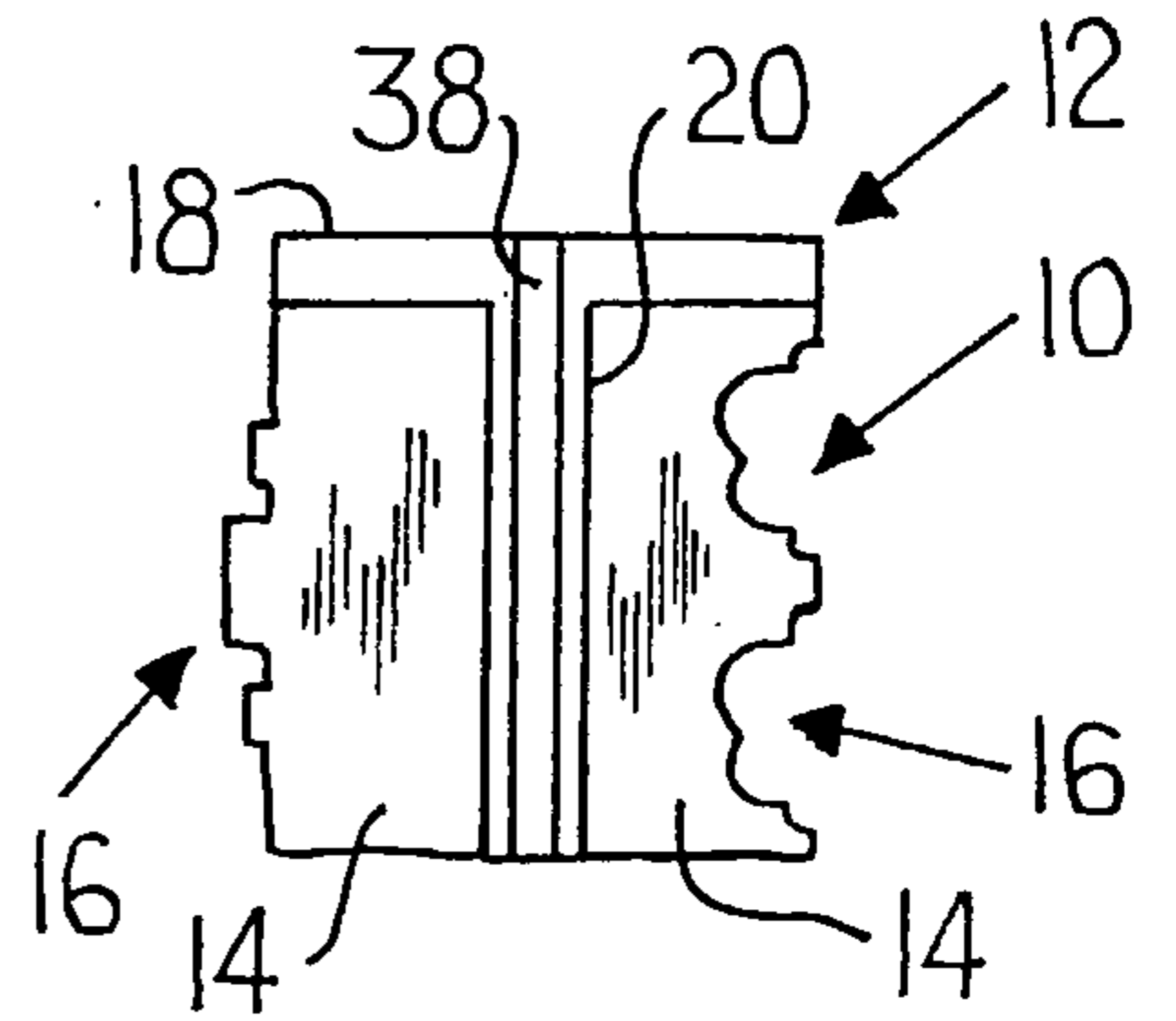


Fig. 3

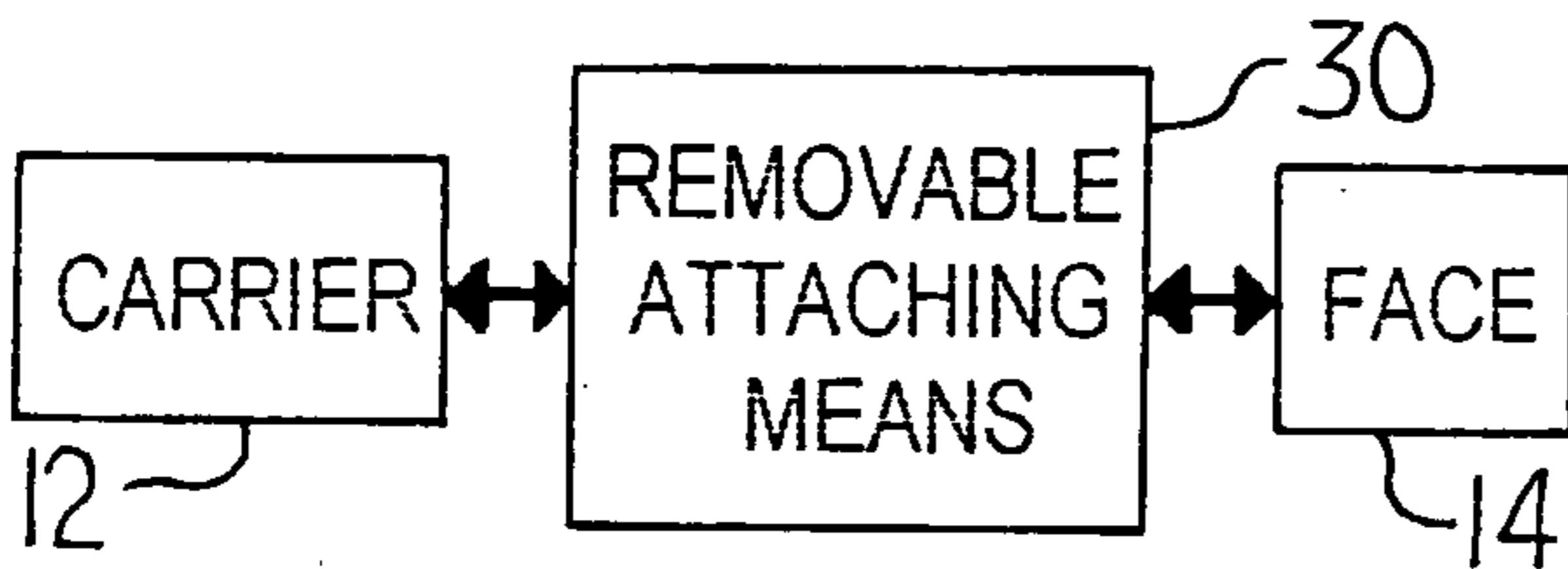


Fig. 4

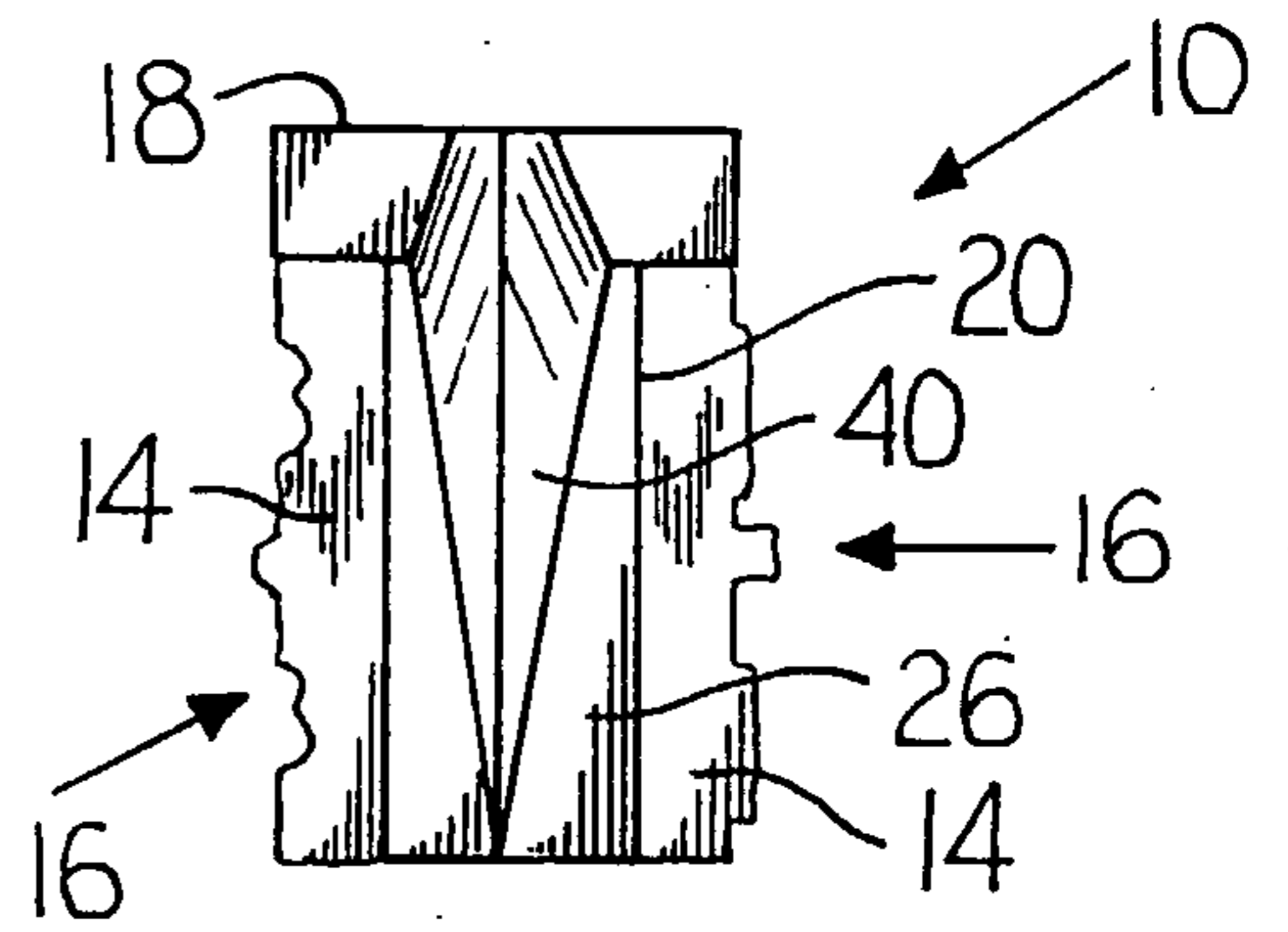


Fig. 5

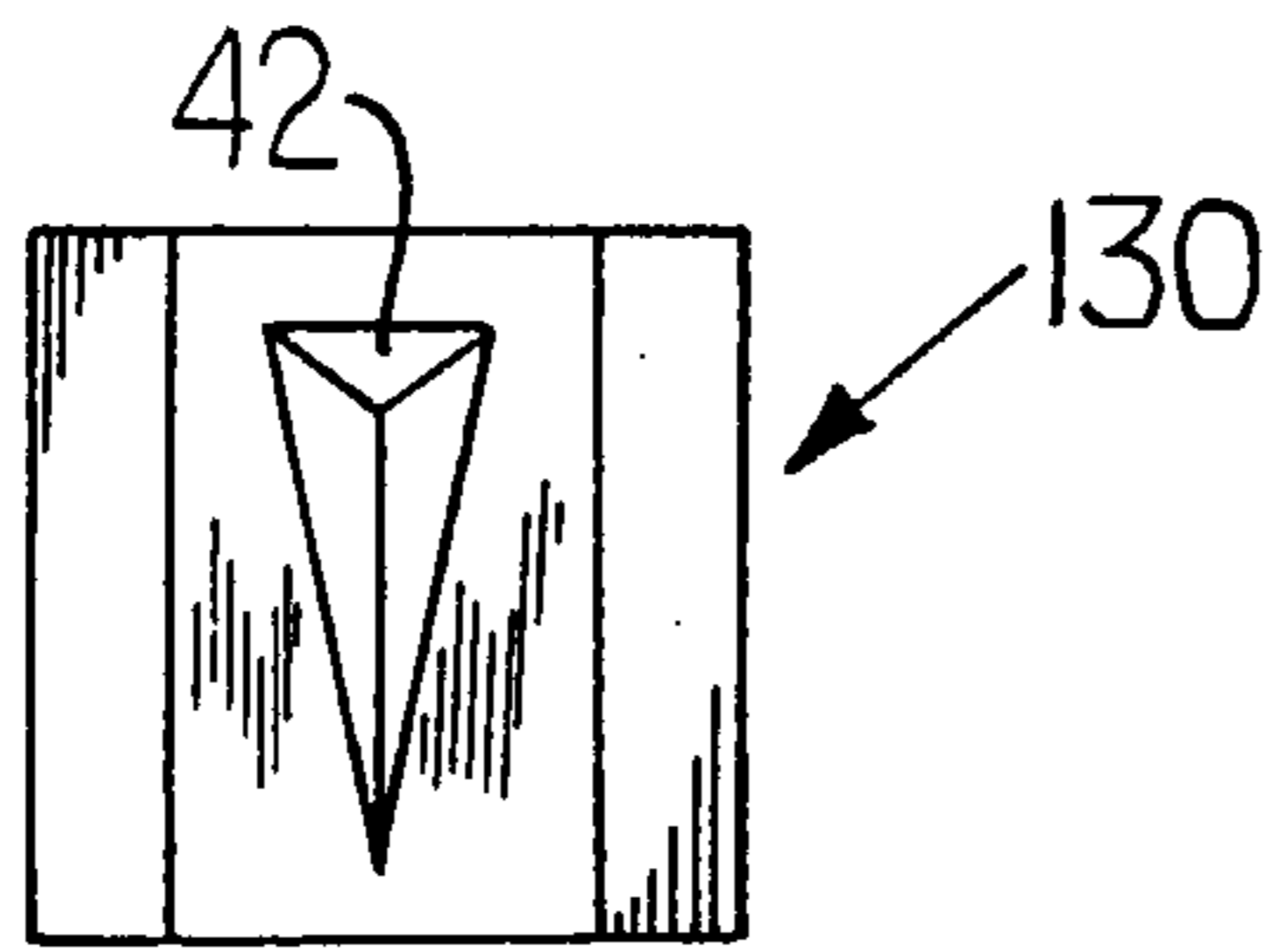


Fig. 6

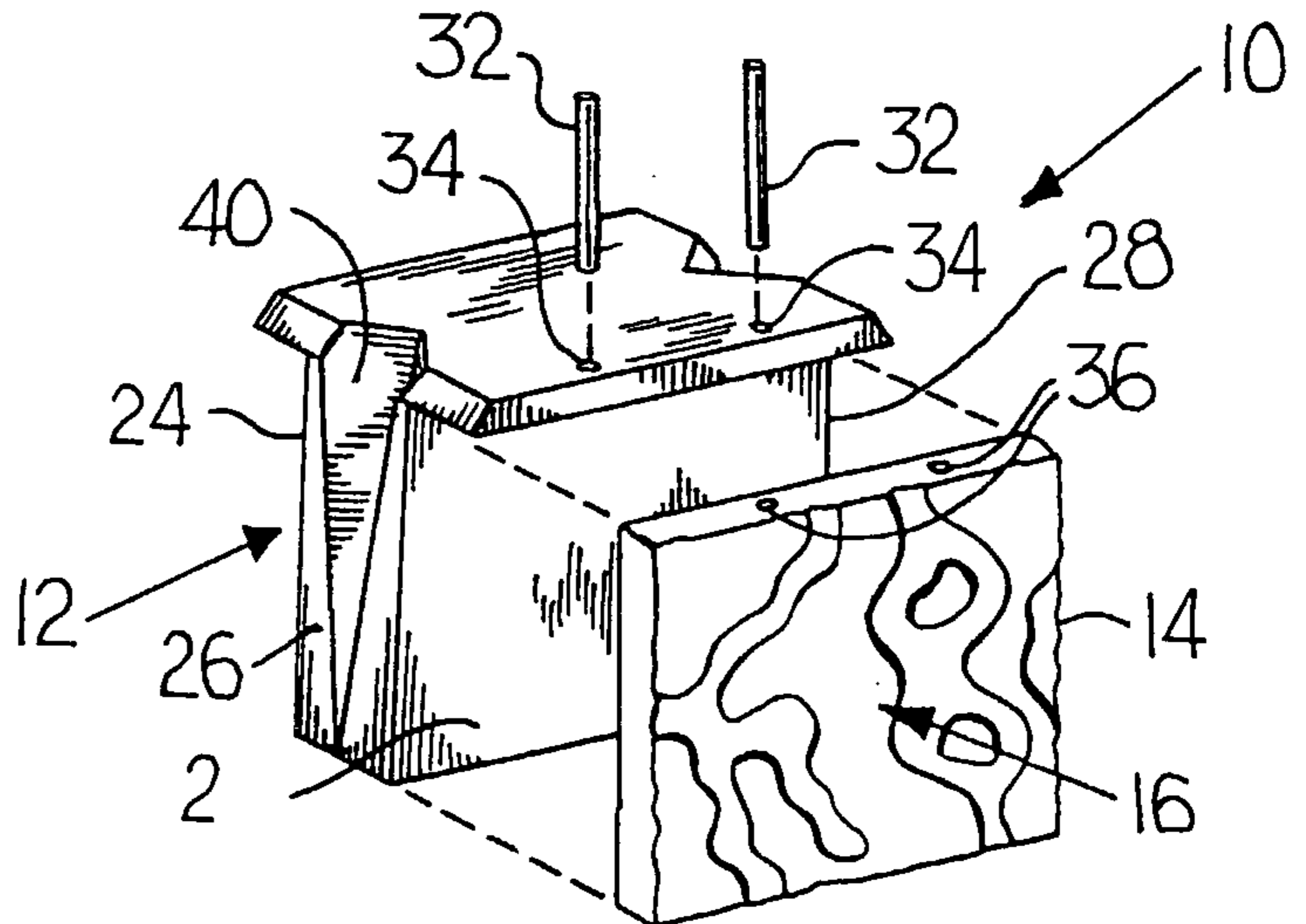


Fig. 7

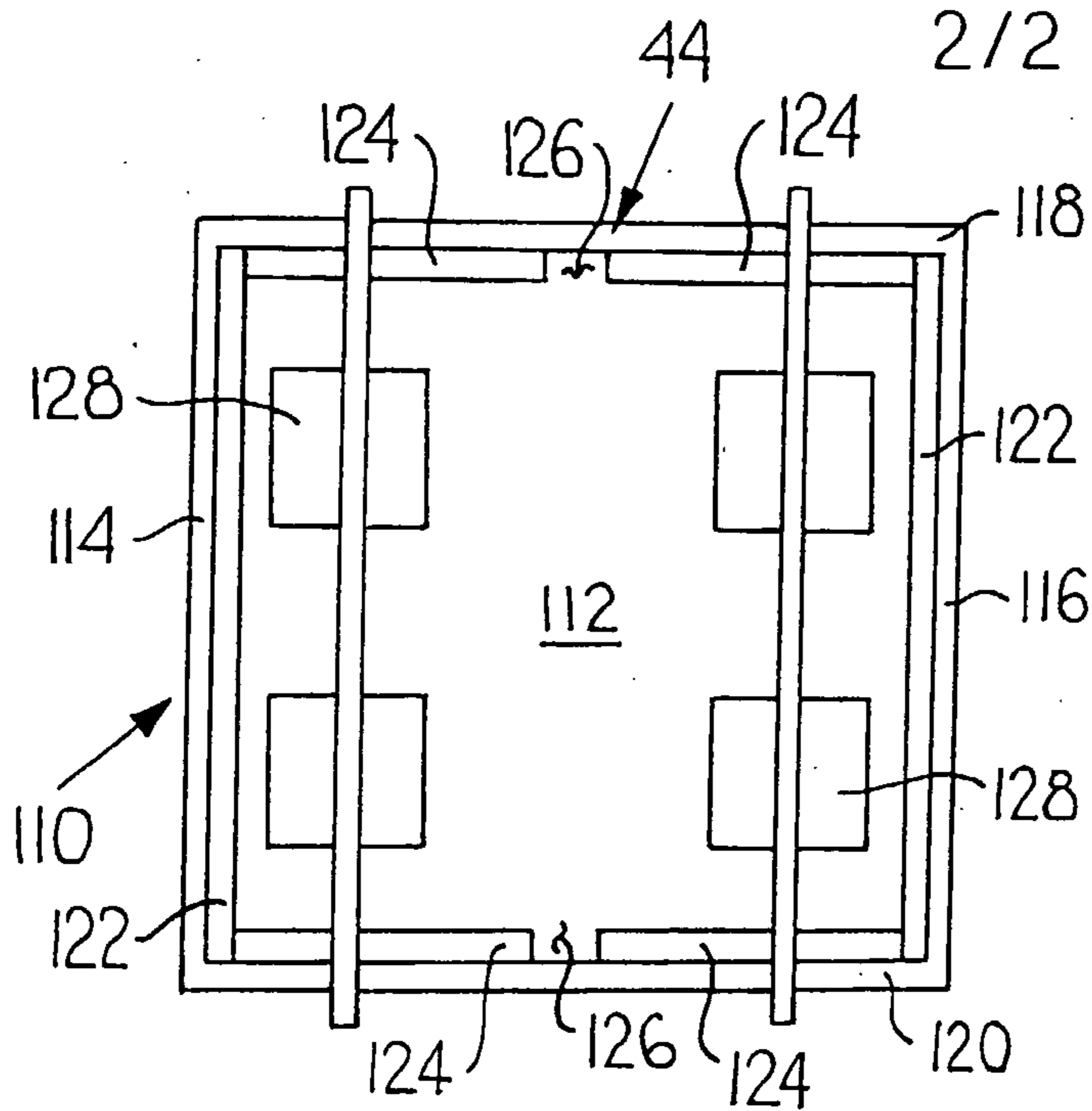


Fig. 8
(Prior Art)

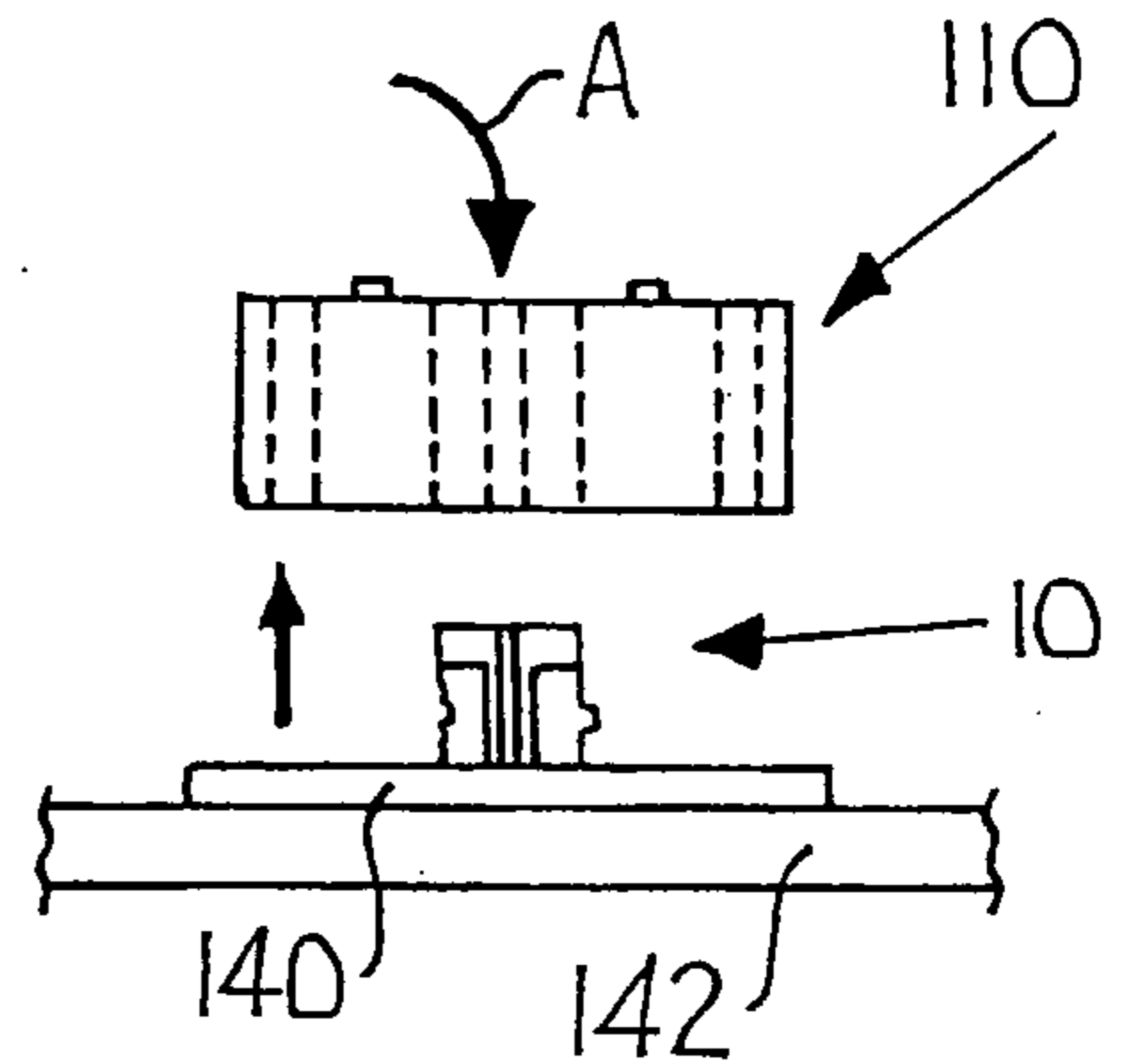


Fig. 9

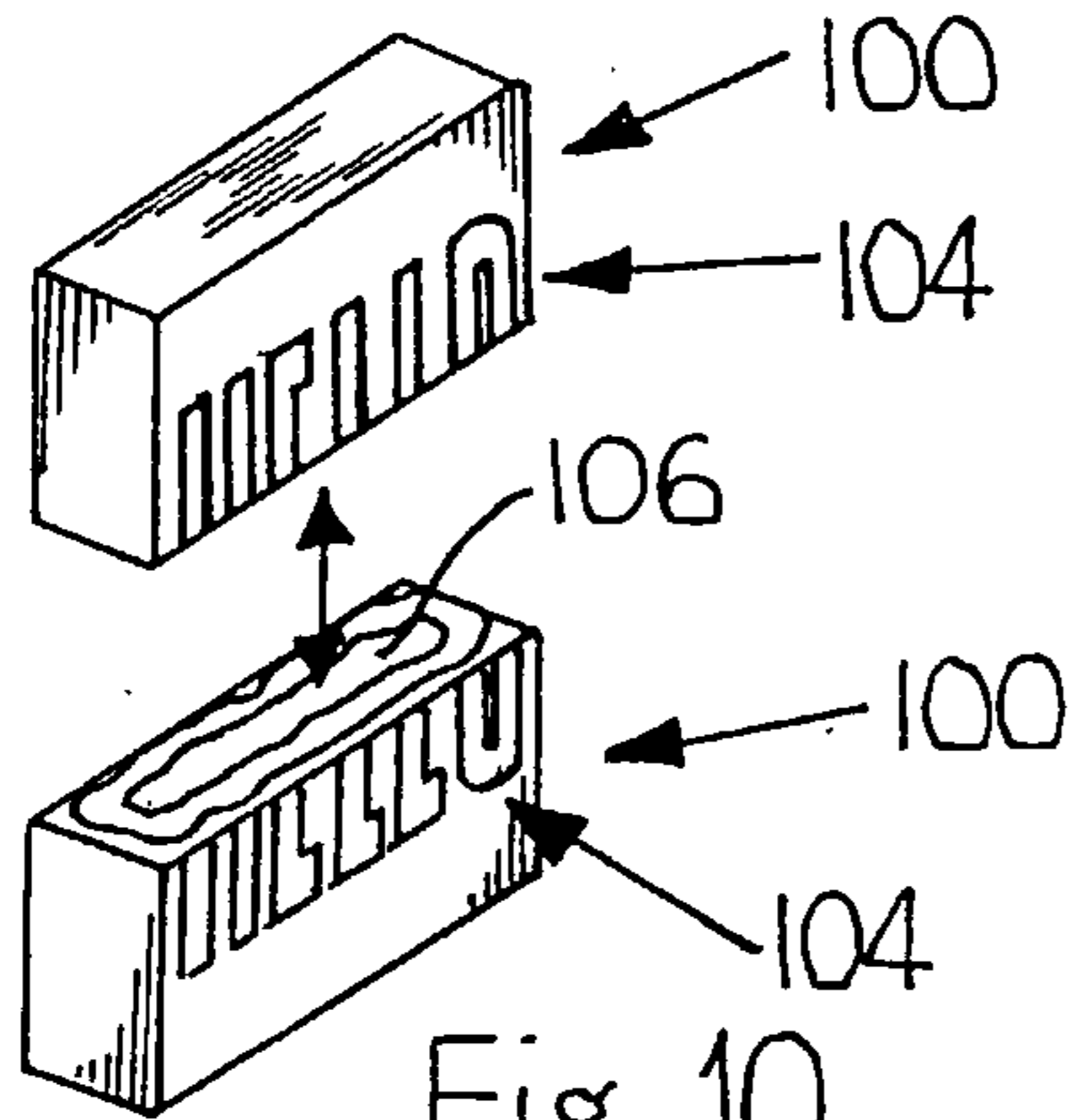


Fig. 10

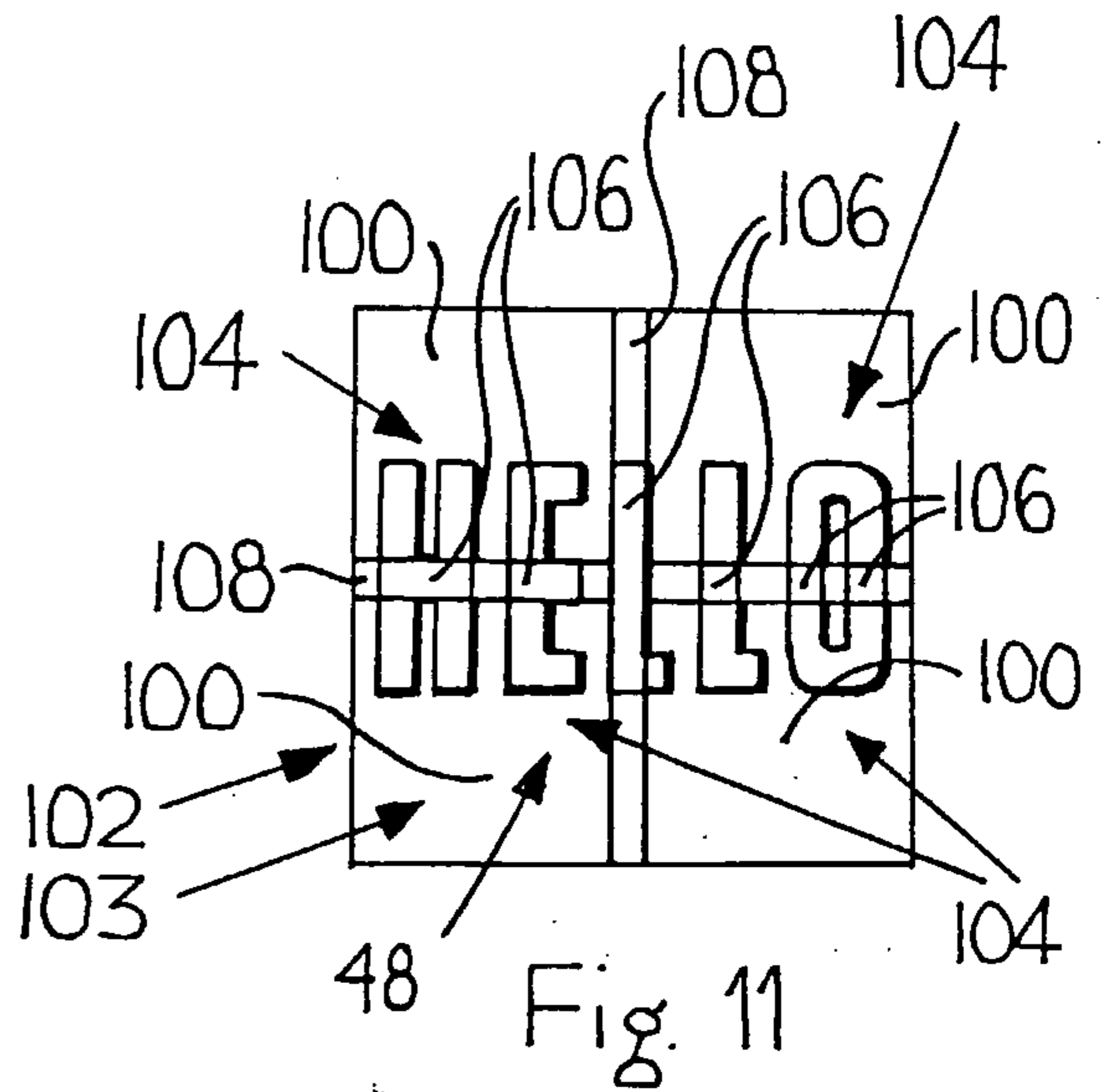


Fig. 11

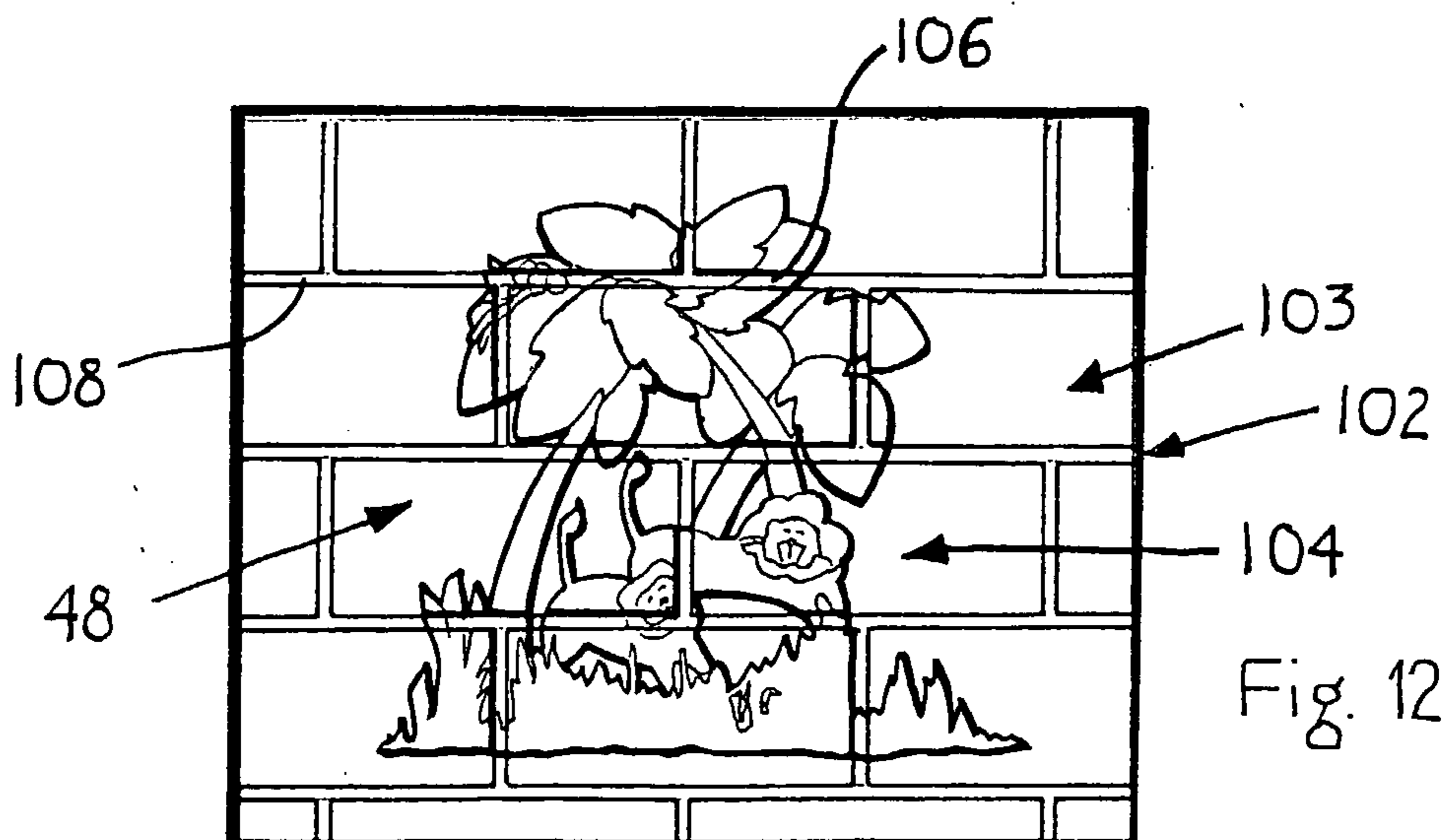


Fig. 12

