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(57) Abstract

The invention relates to a shuttering system for building construction and, particularly, auxiliary shuttering elements that are adapted to be used in conjunction with main shuttering elements of the shuttering system for forming extended shuttering walls, both the main shuttering elements and the auxiliary shuttering elements being of a synthetic plastic material. The auxiliary shuttering elements include primary auxiliary shuttering elements and secondary auxiliary shuttering elements, the primary elements including left hand and right hand elements for inter-engagement and locking together with the opposite sides of the main shuttering elements of the shuttering system. The configuration of the secondary auxiliary shuttering elements is variable and is determined by the configuration of special building formations to be provided for by the shuttering system, e.g. wall corners, door openings, window openings, or the like.

(56) Documents cited: EP - 399114, DE-J: "PASCAL-RASTERSCHALUNG", DE-2531463
US -3447771, FR-2 429 885, DE-2 460 867, AP-100



ABSTRACT

The invention relates to a shuttering system for building construction and, particularly, auxiliary shuttering elements that are adapted to be used in conjunction with main shuttering elements of the shuttering system for forming extended shuttering walls, both the main shuttering elements and the auxiliary shuttering elements being of a synthetic plastic material. The auxiliary shuttering elements include primary auxiliary shuttering elements and secondary auxiliary shuttering elements, the primary elements including left hand and right hand elements for inter-engagement and locking together with the opposite sides of the main shuttering elements of the shuttering system. The configuration of the secondary auxiliary shuttering elements is variable and is determined by the configuration of special building formations to be provided for by the shuttering system, e.g. wall corners, door openings, window openings, or the like.



THIS INVENTION relates to shuttering for building construction.

A shuttering system which includes the use of a plurality of modular synthetic plastic shuttering elements that include complementary inter-engagement and locking formations along opposite sides thereof for inter-engaging and locking the elements together to form a shuttering wall defining a shuttering surface, is known. The individual shuttering elements used in such a system generally comprise a rectangular, usually square, planar shuttering wall having peripheral side walls projecting in one direction from opposite side edges of the said wall, inter-engagement and locking formations defined along opposite sides of the element permitting similar elements to be inter-engaged and locked together in a configuration in which the shuttering walls form an extended continuous planar shuttering surface.



One major problem associated with a shuttering system of the above kind is that it does not make provision for the construction of special building formations such as for corners between walls to be constructed, door openings, window openings, and other special building formations. Accordingly, it is an object of this invention to alleviate, at least partially, current problems experienced in this regard in association with shuttering systems of the kind defined.

It must be understood that within this specification hereinafter, any reference to a shuttering system and to a shuttering element must be interpreted as a reference to a system and an element of the type as defined above. Also, any reference to special building formations must be interpreted as a reference to building formations of the general type referred to above and which are commonly encountered within a building structure.

According to the invention there is provided a primary auxiliary shuttering element for use in a shuttering system which includes the use of a plurality of modular synthetic plastic shuttering elements that have complementary inter-engagement and locking formations along opposite sides thereof, whereby similar elements can inter-engage one another and be locked together for forming an extended shuttering surface for a shuttering structure, the primary auxiliary shuttering element comprising a synthetic plastic rectangular body defining a rectangular shuttering wall and two side walls projecting in



the same direction from the shuttering wall along opposite longitudinal sides thereof, one side wall incorporating inter-engagement and locking formations that are complementary to the inter-engagement and locking formations of a shuttering element of the shuttering system to enable the primary auxiliary element to be engaged and locked together with a shuttering element of the shuttering system, and the other side wall comprising a planar wall having at least one aperture therein that can enable engagement of the primary auxiliary shuttering element with any selected one of a group of secondary shuttering elements that can serve to form desired formations within a complete shuttering structure for forming special building formations.

The rectangular body may have reinforcing wall formations extending between the side walls thereof for enhancing the rigidity of the body. The reinforcing wall formations may include an end wall extending between the side walls at each end of the side walls. The said opposite end walls may incorporate complementary inter-engagement and locking formations whereby similar primary auxiliary shuttering elements can inter-engage one another and be locked together in an adjacent end-to-end relationship with respect to one another and while inter-engaged and locked together with shuttering elements of the shuttering system.

The effective length of the rectangular body forming the primary auxiliary shuttering element may be equal to the corresponding dimension of a shuttering element of the

shuttering system with which the rectangular body can be inter-engaged and locked together. The width of the rectangular body may be determined by predetermined dimensions of a building system for which the shuttering system is to be used, thereby accommodating standard building dimensions of the building system.

The configuration of the inter-engagement and locking formations incorporated by the said one side wall of the rectangular body of the primary auxiliary shuttering element may be determined by the configuration of the formations on a side of a shuttering element of the shuttering system with which the body is to cooperate. As such, it is anticipated that two configuration primary auxiliary shuttering elements will be provided, one element being adapted to be inter-engaged and locked together with one side of a shuttering element of the shuttering system and the other element being adapted to be inter-engaged and locked together with the other side of the shuttering element of the shuttering system.

The aperture in the said other side wall of the rectangular body may be disposed to be aligned with an aperture in a wall of a secondary auxiliary shuttering element, permitting a locking element to pass through the said aligned apertures and engage the walls through which the apertures pass for releasably locking together the primary and secondary auxiliary shuttering elements. According to a preferred embodiment of the invention, the aperture in the said other side wall of the rectangular body is a key-hole



type aperture that can be aligned with a similar configuration aperture in a wall of a secondary auxiliary shuttering element, permitting a key-type locking element to slidably pass therethrough and through rotation engage the remote faces of the walls of the primary and secondary auxiliary shuttering elements through which the apertures pass for releasably locking these auxiliary shuttering elements together. Preferably, the said other side wall of the rectangular body may have at least two apertures formed therein in spaced locations.

Further according to the invention, the rectangular body of the primary auxiliary shuttering element may define at least one locating formation for locating a link rod whereby opposing shuttering walls of a shuttering structure, forming a part of the shuttering system, can be held in a spaced configuration. The said locating formation may be adapted particularly to cooperate with a formation of a shuttering element of the shuttering system with which the primary auxiliary shuttering element is intended to be used.

The primary auxiliary shuttering element of the invention may be adapted particularly to cooperate with a secondary auxiliary shuttering element for forming a formation within a shuttering structure of the shuttering system that can provide for any one of a corner formation, a window opening, a door opening, or any other special building formation of a building structure. As such, the invention extends also to a secondary auxiliary

shuttering element that is adapted to cooperate with a primary auxiliary shuttering element in accordance with the present invention, for forming a formation within a shuttering structure of the shuttering system with which the primary auxiliary shuttering element is adapted to be used, in order to provide for the formation of a special building formation.

The invention is now described, by way of examples, with reference to the accompanying diagrammatic drawings, in which:

Figure 1 shows a rear view of a first embodiment of a primary auxiliary shuttering element, for use in a shuttering system, in accordance with the invention;

Figure 2 shows a side view of the auxiliary shuttering element of Figure 1;

Figure 3 shows a cross-sectional end view of the auxiliary shuttering element of Figure 1 along line III-III of Figure 1;

Figure 4 shows a rear view of a second embodiment of a primary auxiliary shuttering element, for use in a shuttering system, in accordance with the invention;

Figure 5 shows a side view of the auxiliary shuttering element of Figure 4;

Figure 6 shows a cross-sectional end view of the auxiliary shuttering element of Figure 4 along line VI - VI of Figure 4;

Figure 7 shows a side view from one side of a first embodiment of a secondary auxiliary shuttering element, in accordance with the invention;

Figure 8 shows a side view from another side of the secondary auxiliary shuttering element of Figure 7;

Figure 9 shows a cross-sectional end view of the secondary auxiliary shuttering element of Figure 7 along line IX - IX of Figure 7;

Figure 10 shows an elevational front view of a locking element for use in conjunction with auxiliary shuttering elements, in accordance with the invention, on a larger scale than that of the shuttering elements;

Figure 11 shows a cross-sectional end view of the locking element of Figure 10;

Figure 12 shows a plan view of the locking element of Figure 10;

Figure 13 shows a rear side view of a second embodiment of a secondary auxiliary shuttering element, in accordance with the invention;

Figure 14 shows a cross-sectional end view of the auxiliary shuttering element of Figure 13 along line XIV-XIV of Figure 13, and

Figure 15 illustrates in cross-sectional end view the operative configuration of some of the elements shown in the drawings.

Referring initially to Figures 1 to 6 of the drawings, a first embodiment of a primary auxiliary shuttering element, in accordance with the invention, is designated generally by the reference numeral 10 in Figures 1 to 3, whereas a second embodiment of a primary auxiliary shuttering element, in accordance with the invention, is designated generally by the reference numeral 12 in Figures 4 to 6.

The auxiliary shuttering element 10 comprises a substantially rectangular body defining a rectangular shuttering wall 14 and two side walls 16 projecting in the same direction from the shuttering wall 14 along opposite longitudinal sides thereof.

Similarly, the auxiliary shuttering element 12 comprises a substantially rectangular body defining a rectangular shuttering wall 18 and two side walls 20 projecting in the same direction from the shuttering wall 18 along opposite longitudinal sides thereof.

For both the auxiliary shuttering elements 10 and 12, reinforcing walls 21 are provided between their side walls 16 and 20, respectively.

The two primary auxiliary shuttering elements 10 and 12 are both of a synthetic plastic material and are particularly adapted to cooperate with modular synthetic plastic shuttering elements of a shuttering system that include complementary inter-engagement and locking formations along opposite sides thereof for inter-engaging and locking the elements together to form a shuttering surface. The said shuttering elements used in such a system generally comprise a rectangular, usually square, planar shuttering wall having peripheral side walls projecting in one direction from opposite side edges of the said wall, inter-engagement and locking formations defined along opposite sides of the element permitting similar elements to be inter-engaged and locked together in a configuration in which the shuttering walls form an extended continuous planar shuttering surface.

The primary auxiliary shuttering elements 10 and 12 are essentially left hand and right hand side auxiliary shuttering elements that can engage onto opposite sides of shuttering

elements of the type described above. The side wall 16.1 of the auxiliary shuttering element 10 has inter-engagement and locking formations 22 that can cooperate with complementary formations on one side of the shuttering elements of a shuttering system of the type described above, whereas the side wall 20.1 of the auxiliary shuttering element 12 has inter-engagement and locking formations 24 that can cooperate with complementary formations defined on the other side of such a shuttering element. In essence, therefore, the formations 22 will cooperate with the formations 24, if it is required to inter-engage and lock together auxiliary shuttering elements 10 and 12 adjacent one another.

It will be understood that the configuration of the formations 22 and 24 are determined by the complementary formations of shuttering elements of a shuttering system with which the auxiliary shuttering elements are to cooperate and as the exact configuration of these formations therefore are greatly variable, this is not described in any further detail herein.

The opposite side walls, 16.2 and 20.2 respectively, of the auxiliary shuttering elements 10 and 12, constitute planar walls, each having two spaced key hole-type apertures 26 formed therein, the apertures 26 being formed to cooperate with similar apertures of secondary auxiliary shuttering elements, for locking the primary auxiliary shuttering

elements 10 and 12 into engagement with secondary auxiliary shuttering elements, as will be described in more detail hereinafter.

An aperture 28 formed in the primary auxiliary shuttering element 10 as shown in Figure 1 is provided to cooperate with link rods whereby opposing shuttering walls of a shuttering system can be engaged and held in a predetermined spaced configuration with one another, for defining a space that can be filled with a settable material, the configuration of this aperture 28 again being greatly variable and not forming an essential part of the present invention, except insofar as this aperture is of an equivalent configuration to apertures provided in shuttering elements of a shuttering system of the type herein envisaged. The primary auxiliary shuttering element 12 as shown in Figure 4 defines a formation 29 for the same purpose, i.e. a formation that can cooperate with a formation, equivalent to the formation 28, of a shuttering element.

It will be understood that by forming a complete shuttering wall defining a planar shuttering surface by means of shuttering elements of a shuttering system of the type herein envisaged and by inter-engaging and locking primary auxiliary shuttering elements 10 and 12 along one side of such a complete shuttering wall, the outer surfaces of the shuttering walls 14 and 18 of the elements 10 and 12 will be co-planar with the shuttering surface defined by the shuttering elements, thus forming an effective extension of the said shuttering surface. Also, the side walls 16.2 and 20.2 of the auxiliary shuttering elements 10 and 12 will remain exposed for the attachment of secondary

auxiliary shuttering elements, as described hereafter. In order to prevent transverse displacement of the elements 10 and 12 when longitudinally aligned and locked together with shuttering elements of a shuttering system of the type defined, a flange formation 31 at one end and a complementary recess 33 at the other end of each element 10 and 12 are provided. Alternatively, engagement and locking formations equivalent to the formations 22 and 24 may be provided at the opposite ends of the elements 10 and 12.

A first embodiment of a secondary auxiliary shuttering element, which is particularly adapted for forming wall corners within a complete shuttering system, is shown in Figures 7 to 9 and is designated generally by the reference numeral 30.

The secondary auxiliary shuttering element 30 comprises two longitudinal side walls 32, both the side walls having key hole-type apertures 34 formed therein, which are the equivalent of the apertures 26 defined in side walls of the primary auxiliary shuttering elements 10 and 12. The dimensions of the said side walls 32, and particularly the height thereof, are the equivalent of the side walls 16.2 and 20.2 of the elements 10 and 12, so that when these walls abut one another, the apertures 34 will be aligned with the apertures 26 of such abutting walls. Flange formations 35 and recesses 37 equivalent to the formations 31 and 33 respectively of the elements 10 and 12 also are provided at opposite ends of the element 30.

As is particularly apparent from Figure 9 of the drawings, the secondary auxiliary shuttering element 30 can act as a connecting formation between shuttering walls that are disposed at 90° to one another, a locking element as shown in Figures 10 to 12 being provided for locking such shuttering walls with respect to the secondary auxiliary shuttering element 30 in the manner described hereafter. Equivalent secondary auxiliary shuttering elements to the element 30 clearly can provide for different angles between shuttering walls and the exact configuration of corners formed can also be greatly varied by such equivalent elements. Typically, provision can also be made for round and bevelled corners. As is clear from Figures 10 to 12, which are drawn on a larger scale than the scale used for the shuttering elements 10, 12 and 30, the locking element, generally designated by the reference numeral 40, is a key-like element that can be pushed through registering apertures 26 and 34 in elements 10, 12 and 30 respectively, and upon rotation through 90° can engage the said walls and thereby hold them together. The exact mode of operation of the locking element 40 is clearly apparent from the drawings and, therefore, is not described in further detail herein. By varying the length of the locking element 40, provision can also be made for engaging and locating any other components between the walls of auxiliary elements locked together by elements 40. Typical components located in this way may include crack-inducers, and the like.

With shuttering walls of a shuttering system inter-engaged with secondary auxiliary shuttering elements 30 via primary auxiliary shuttering elements 10, 12 and forming a 90° angle with respect to each other, secondary auxiliary shuttering elements 50 as shown in Figures 13 and 14 can be clipped on to the shuttering elements 30, the shuttering elements 50 defining shuttering walls 52 that define outer surfaces that will form an effective extension of the outer surfaces defined by the walls 14 and 18 of shuttering elements 10 and 12. As such, the surfaces 52 of elements 50 will form effective extensions of the shuttering surface of extended shuttering walls forming a complete shuttering structure. The formation of corners for the shuttering system is thus provided for, particularly internal corners. The configuration of the element 50 can be varied in various different respects to provide different configuration corners. Figure 15 illustrates specifically the use of the elements 10, 12 30 and 50 in their operative configuration forming an internal corner for shuttering for a wall using shuttering elements of a shuttering system of the type herein envisaged, a part of one shuttering element of the shuttering system being indicated by the reference numeral 60.

By utilising alternative embodiments of secondary auxiliary shuttering elements that can cooperate with primary auxiliary shuttering elements 10, 12, provision can be made for external corners and for any other special building formations that have to be accommodated within a shuttering system utilising shuttering elements as proposed herein. It will be understood that the primary auxiliary shuttering elements 10, 12 will be

used as an intermediate element between the shuttering elements of the shuttering system and desired secondary auxiliary shuttering elements, which will in particular define the required formations to be defined by a shuttering system.

Alternative embodiments of secondary auxiliary shuttering elements can particularly provide for the location of shuttering formations for forming wall openings, door openings, vent openings, and the like, whereas still further different embodiment second auxiliary shuttering elements can conceivably provide for the location of roof support members whereby a roof structure can be effectively linked to walls formed by means of the shuttering system herein envisaged.

By utilising primary auxiliary shuttering elements 10, 12, it is also envisaged that complete shuttering walls of a shuttering system can be pre-assembled and be connected together by locking elements 40, the simple removal of the locking elements 40 thus permitting disassembly of a complete shuttering system with complete shuttering walls remaining intact and being removed in one piece, having overall dimensions that can be conveniently handled. Primary auxiliary shuttering elements 10, 12 thus render the use of shuttering elements of a shuttering system as herein envisaged very much more versatile, permitting remote assembly of extended parts of shuttering structures that can then be assembled on site by the mere use of locking elements 40 in association with the primary auxiliary shuttering elements 10, 12 and/or different configuration secondary

auxiliary shuttering elements as will be determined by formations required within the shuttering system. The configuration of secondary auxiliary shuttering elements clearly is unlimited, being determined by application only and having the common feature that they can cooperate directly or indirectly, with primary auxiliary shuttering elements as described above.

CLAIMS

1. A primary auxiliary shuttering element for use in a shuttering system which includes the use of a plurality of modular synthetic plastic shuttering elements that have complementary inter-engagement and locking formations along opposite sides thereof whereby similar elements can inter-engage one another and be locked together for forming an extended shuttering surface for a shuttering structure, the primary auxiliary shuttering element comprising a synthetic plastic rectangular body defining a rectangular shuttering wall and two side walls projecting in the same direction from the shuttering wall along opposite longitudinal sides thereof, one side wall incorporating inter-engagement and locking formations that are complementary to the inter-engagement and locking formations of a shuttering element of the shuttering system to enable the primary auxiliary shuttering element to be engaged and locked together with a shuttering element of the shuttering system, and the other side wall comprising a planar wall having at least one aperture therein that can enable engagement of the primary auxiliary shuttering element with any selected one of a group of secondary auxiliary shuttering elements that can serve to form desired formations within a complete shuttering structure for forming special building formations.
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2. A primary auxiliary shuttering element as claimed in Claim 1, in which the rectangular body has reinforcing wall formations extending between the side walls thereof for enhancing the rigidity of the body.
 3. A primary auxiliary shuttering element as claimed in Claim 2, in which the reinforcing wall formations include an end wall extending between the side walls at each end of the side walls.
 4. A primary auxiliary shuttering element as claimed in Claim 3, in which the opposite end walls incorporate complementary inter-engagement and locking formations whereby similar primary auxiliary shuttering elements can inter-engage one another and be locked together in an adjacent end-to-end relationship with respect to one another and while inter-engaged and locked together with shuttering elements of the shuttering system.
 5. A primary auxiliary shuttering element as claimed in any one of the preceding claims, in which the effective length of the rectangular body is equal to the corresponding dimension of a shuttering element of the shuttering system with which the rectangular body can be inter-engaged and locked together.
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6. A primary auxiliary shuttering element as claimed in any one of the preceding claims, in which the width of the rectangular body is determined by predetermined dimensions of a building system for which the shuttering system is to be used, thereby accommodating standard building dimensions of the building system.
 7. A primary auxiliary shuttering element as claimed in any one of the preceding claims, in which the configuration of the inter-engagement and locking formations incorporated by the said one side wall of the rectangular body is determined by the configuration of the formations on a side of a shuttering element of the shuttering system with which the body is to cooperate.
 8. A primary auxiliary shuttering element as claimed in any one of the preceding claims, in which the aperture in the said other side wall of the rectangular body is disposed to be aligned with an aperture in a wall of a secondary auxiliary shuttering element, permitting a locking element to pass through the said aligned apertures and engage the walls through which the apertures pass for releasably locking together the primary and secondary auxiliary shuttering elements.
 9. A primary shuttering element as claimed in Claim 8, in which the aperture in the said other side wall of the rectangular body is a keyhole type aperture that can be aligned with a similar configuration aperture in a wall of a secondary auxiliary
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shuttering element, permitting a key-type locking element to slidably pass therethrough and through rotation engage the remote faces of the walls of the primary and secondary auxiliary shuttering elements through which the apertures pass for releasably locking these auxiliary shuttering elements together.

10. A primary auxiliary shuttering element as claimed in Claim 8 or Claim 9, in which the said other side wall of the rectangular body has at least two apertures formed therein in spaced locations.
11. A primary auxiliary shuttering element as claimed in any one of the preceding claims, in which the rectangular body defines at least one locating formation for locating a link rod whereby opposing shuttering walls of a shuttering structure, forming a part of the shuttering system, can be held in a spaced configuration.
12. A primary auxiliary shuttering element as claimed in any one of the preceding claims, which can cooperate with a secondary auxiliary shuttering element for forming a formation within a shuttering structure of the shuttering system that can provide for any one of a corner formation, a window opening, a door opening, or any other special building formation of a building structure.



13. A secondary auxiliary shuttering element that is adapted to cooperate with a primary auxiliary shuttering element as claimed in any one of Claims 1 to 12, for forming a formation within a shuttering structure of the shuttering system with which the primary auxiliary shuttering element is adapted to be used in order to provide for the formation of a special building formation.

Dated this 30 Day of September 1992.

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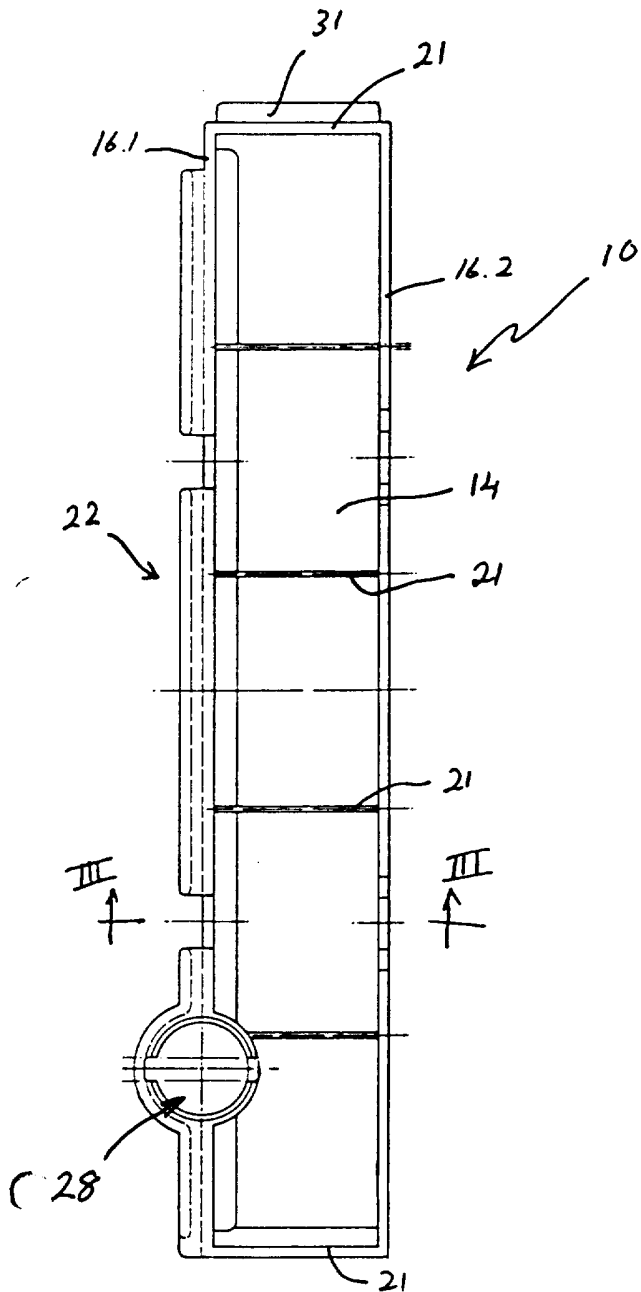


FIG 1

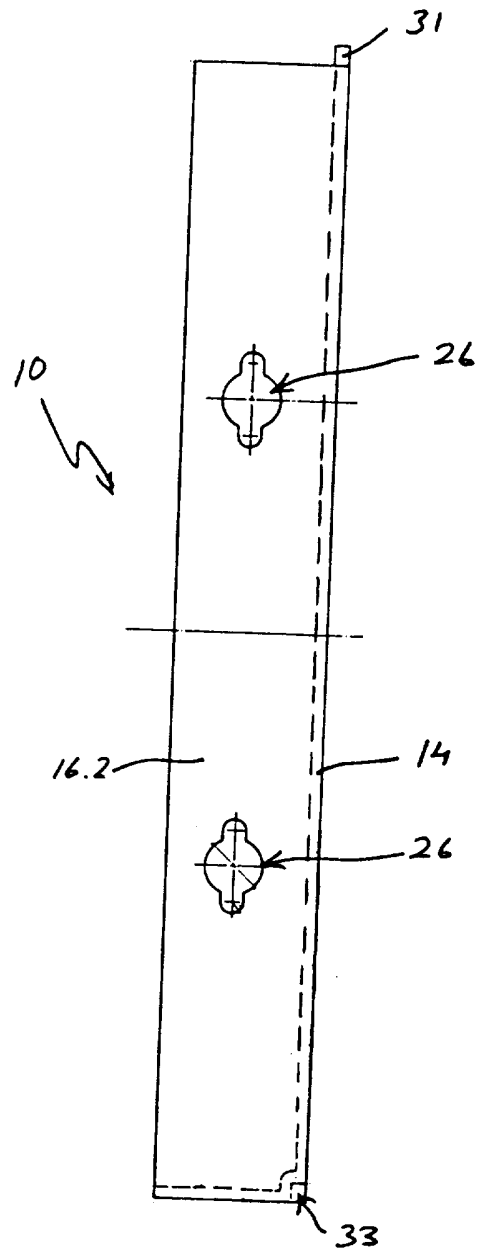


FIG 2

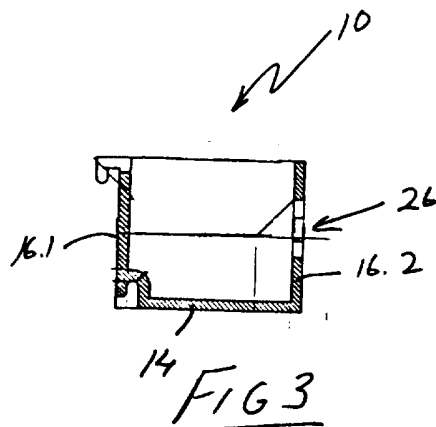
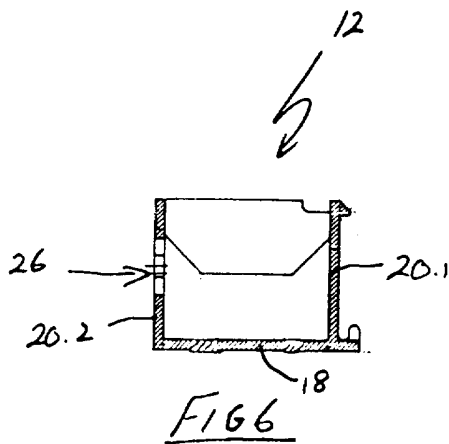
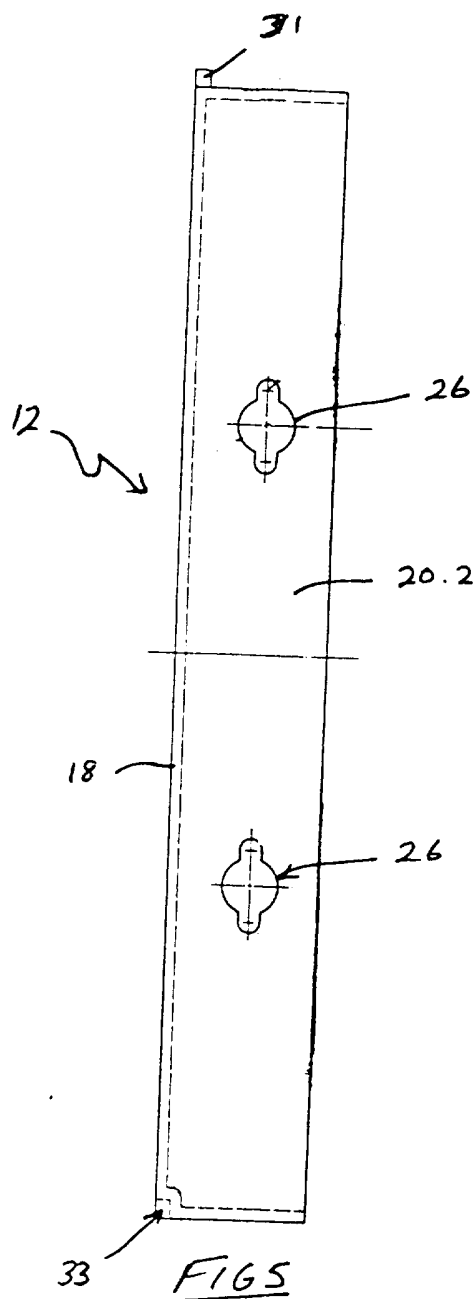
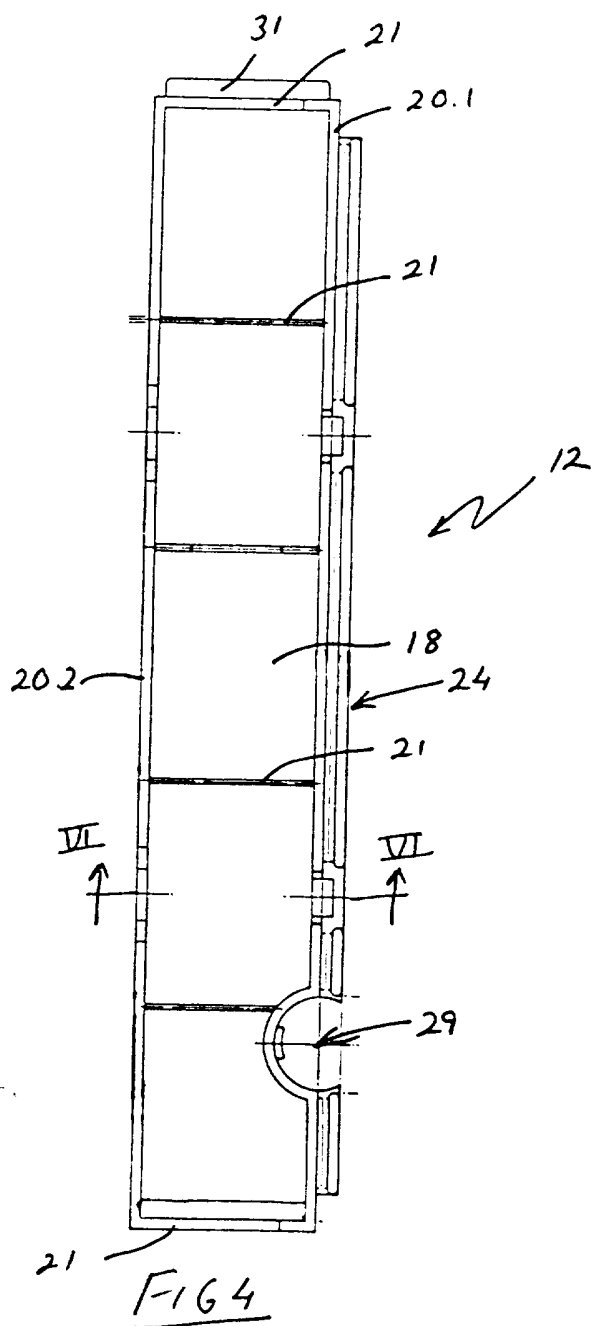


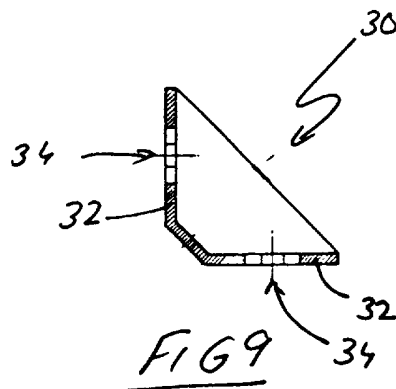
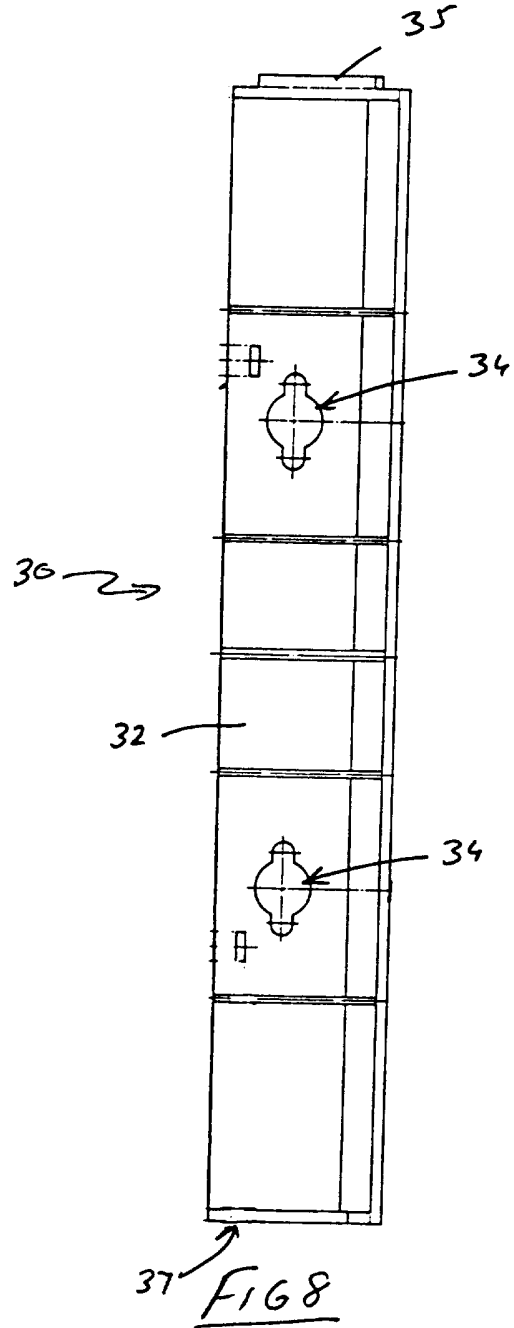
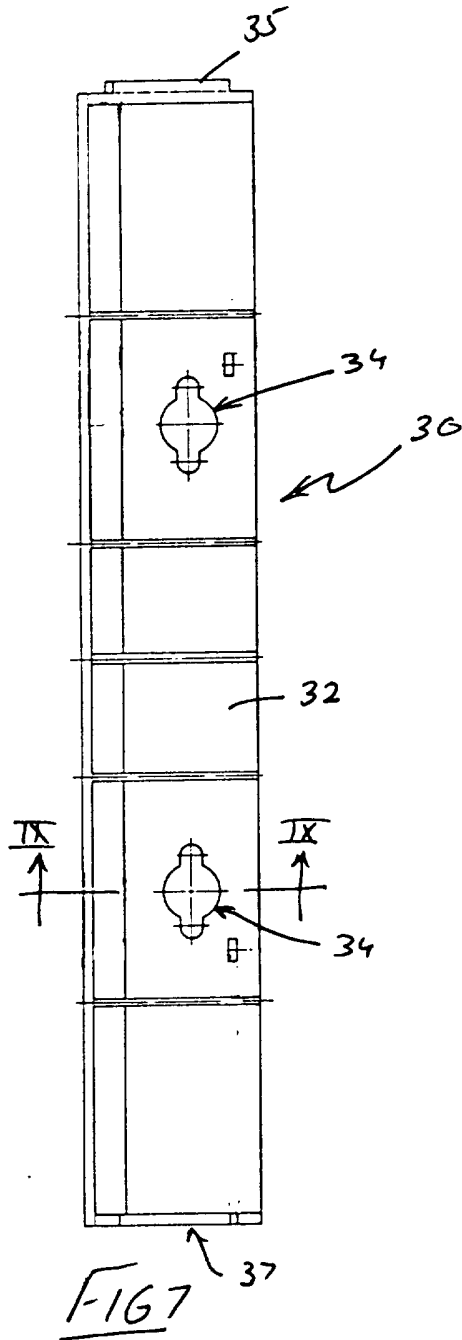
FIG 3

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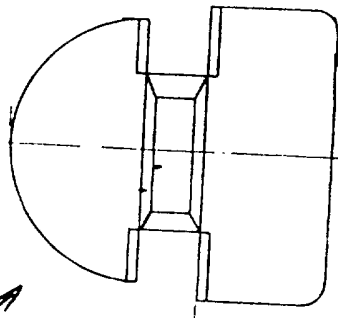


FIG 10

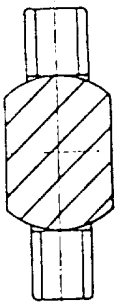


FIG 11

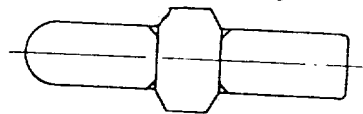


FIG 12

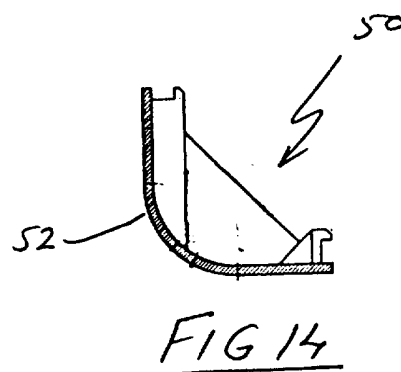
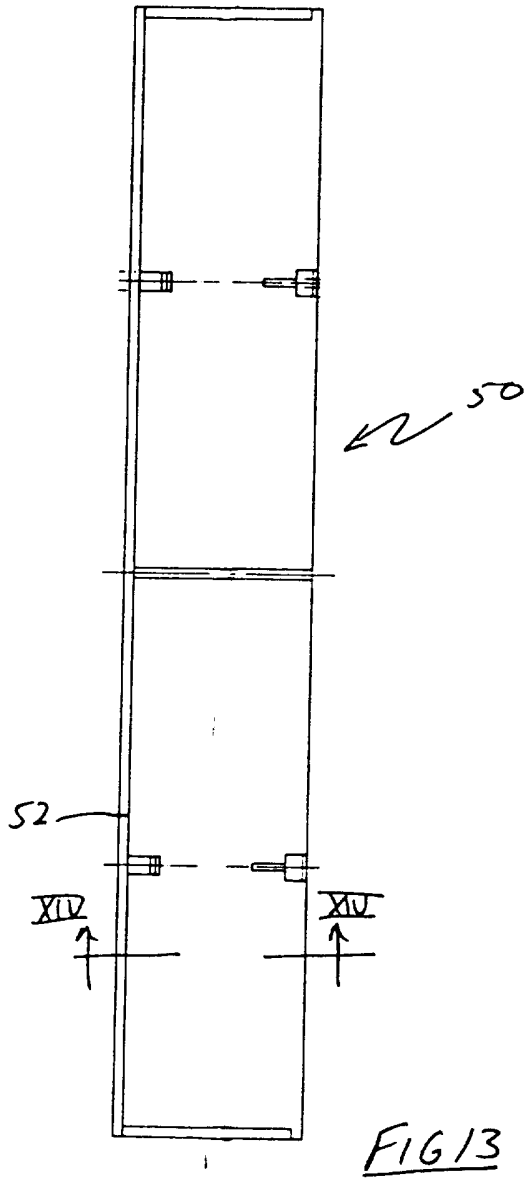
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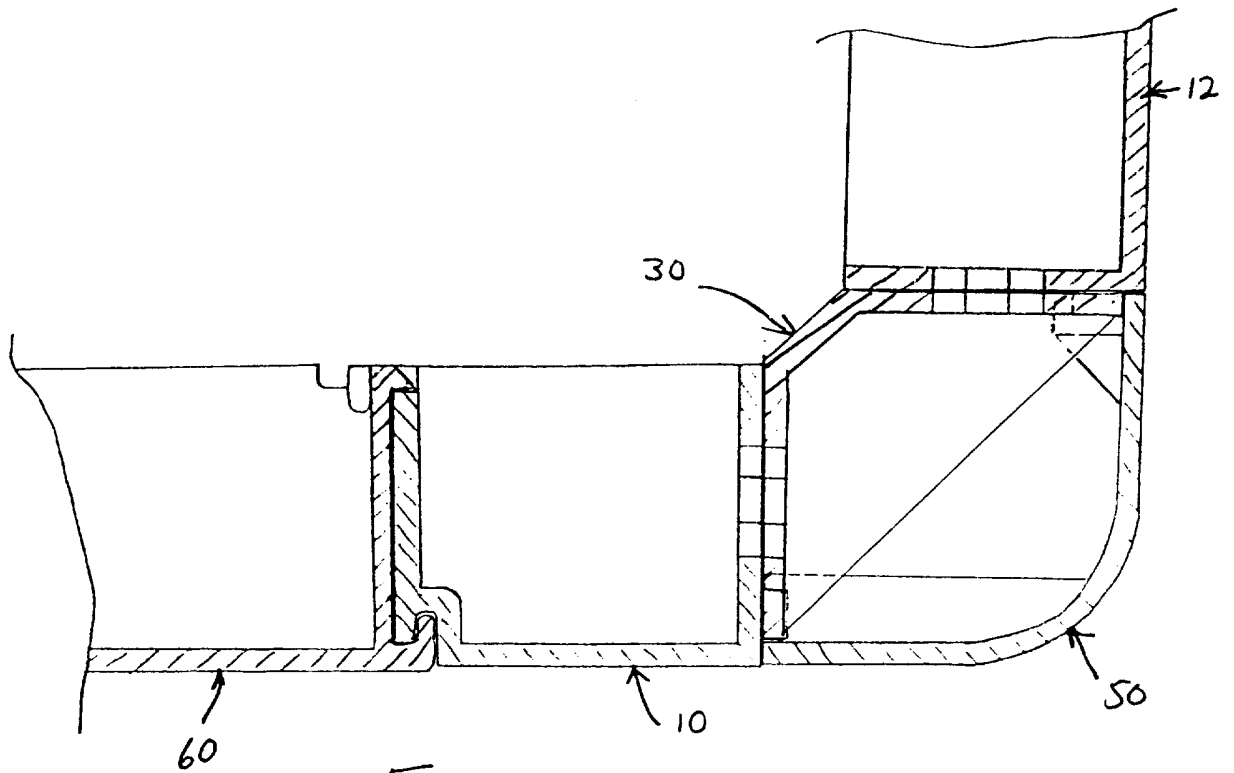


FIG 15

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