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(51) INT CL:
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(56) Documents Cited:
GB 2470090 A **GB 2246148 A**
GB 2156874 A **GB 2148965 A**

(58) Field of Search:
INT CL **E04B**
Other: **EPODOC, WPI**

(54) Title of the Invention: **Floor assembly**
Abstract Title: **Floor assembly with cavity wall**

(57) A floor assembly consists of a plurality of structural beams (23) for spanning a gap between opposing supporting walls, a plurality of edge blocks (220) for construction in the inner leaf (213) of a cavity wall as a course of blocks at the same level as the structural beams (23), and a plurality of insulation blocks (231) for inter-engagement with the edge blocks (220) and the structural beams (23). Each structural beam (23) has an upwardly facing projecting ledge and similarly each edge block (220) has an upwardly facing protruding ledge (220a). To ensure inter-engagement of the insulation blocks (231) with the structural beams (23) and the edge blocks (220), each of the insulation blocks (231) has a downwardly facing ledge (231a), this ensures that the insulation blocks (231) abut directly against the inner leaf (213) of the cavity wall thereby reducing cold spots adjacent the cavity wall. To further improve insulation values one or more insulation sheets (232) may be used to overlie the upper surfaces of the insulation blocks (231) and the structural beams (23). With this floor assembly rapid and efficient construction remains possible whilst maintaining and often improving upon insulation values for existing flooring assembly systems.

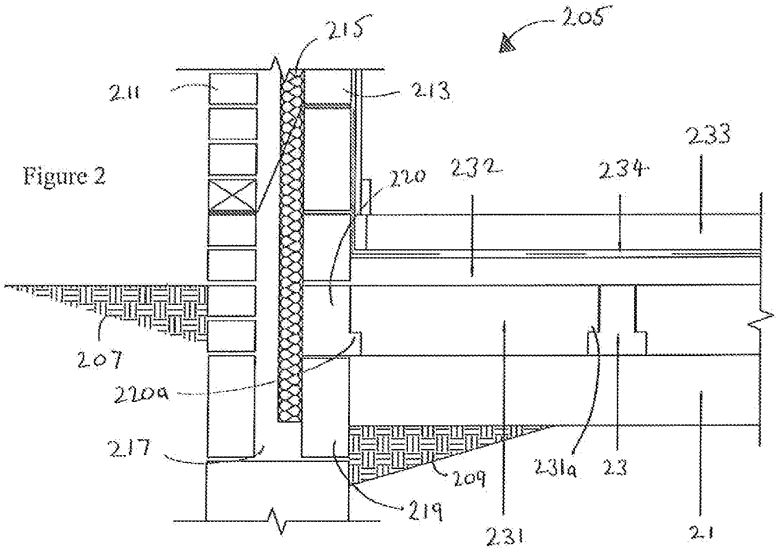


Figure 2

GB 2499230 A

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

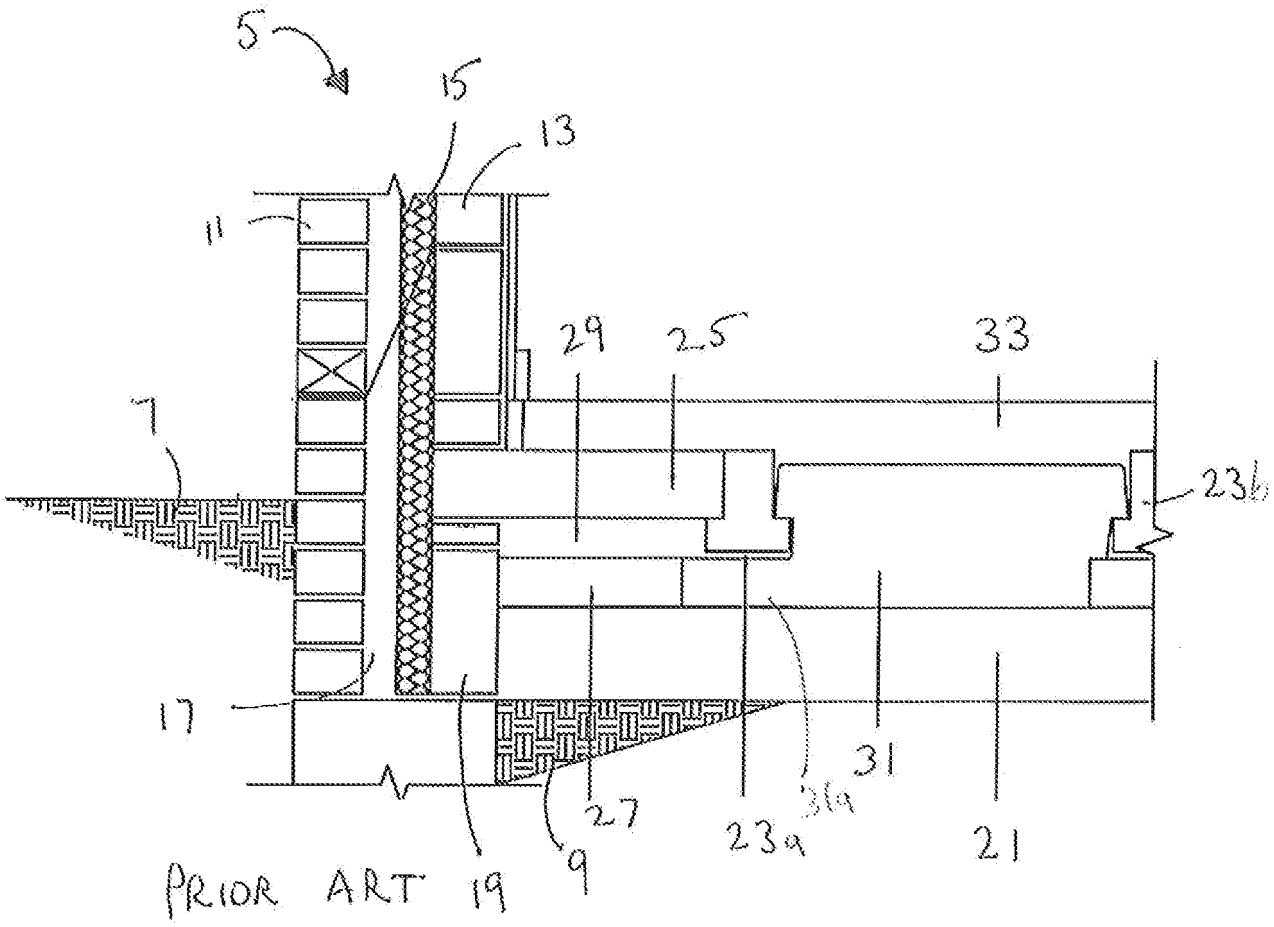
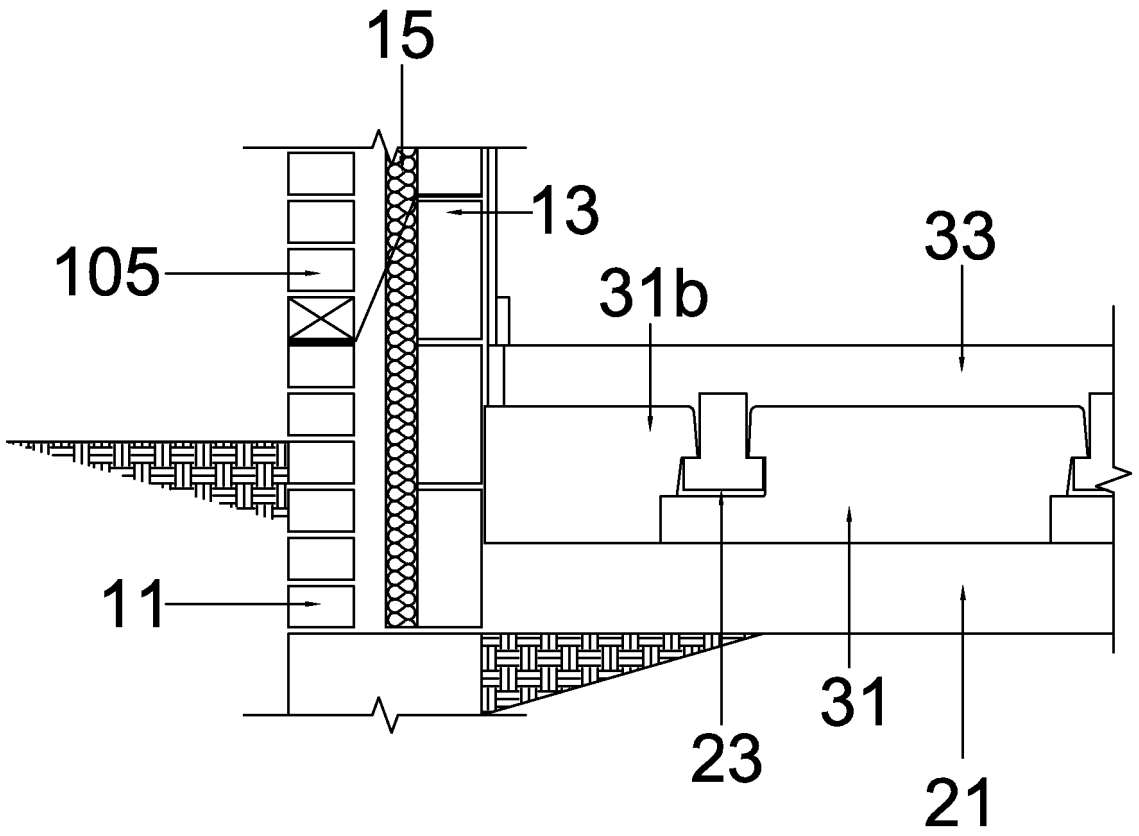


Figure 1(a)



25 02 13

PRIOR ART
Figure 1(b)

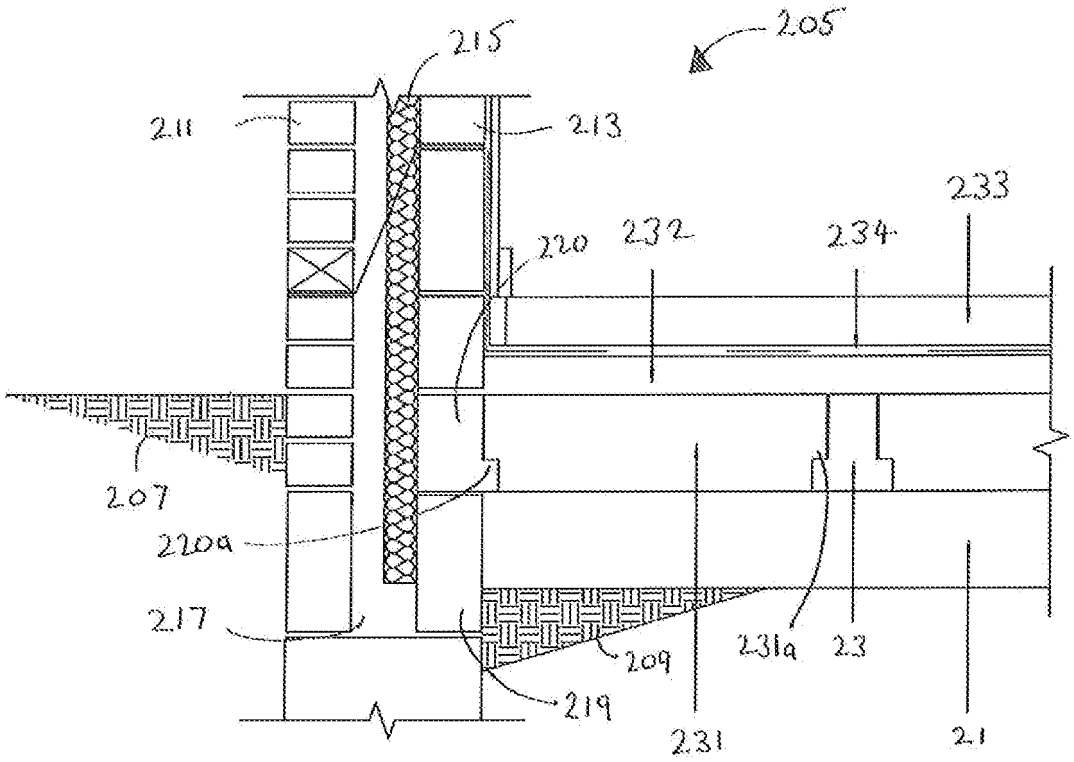

205
215
211
213
233
220
232
234
207
220a
217
209
231a
23
219
231
21

Figure 2

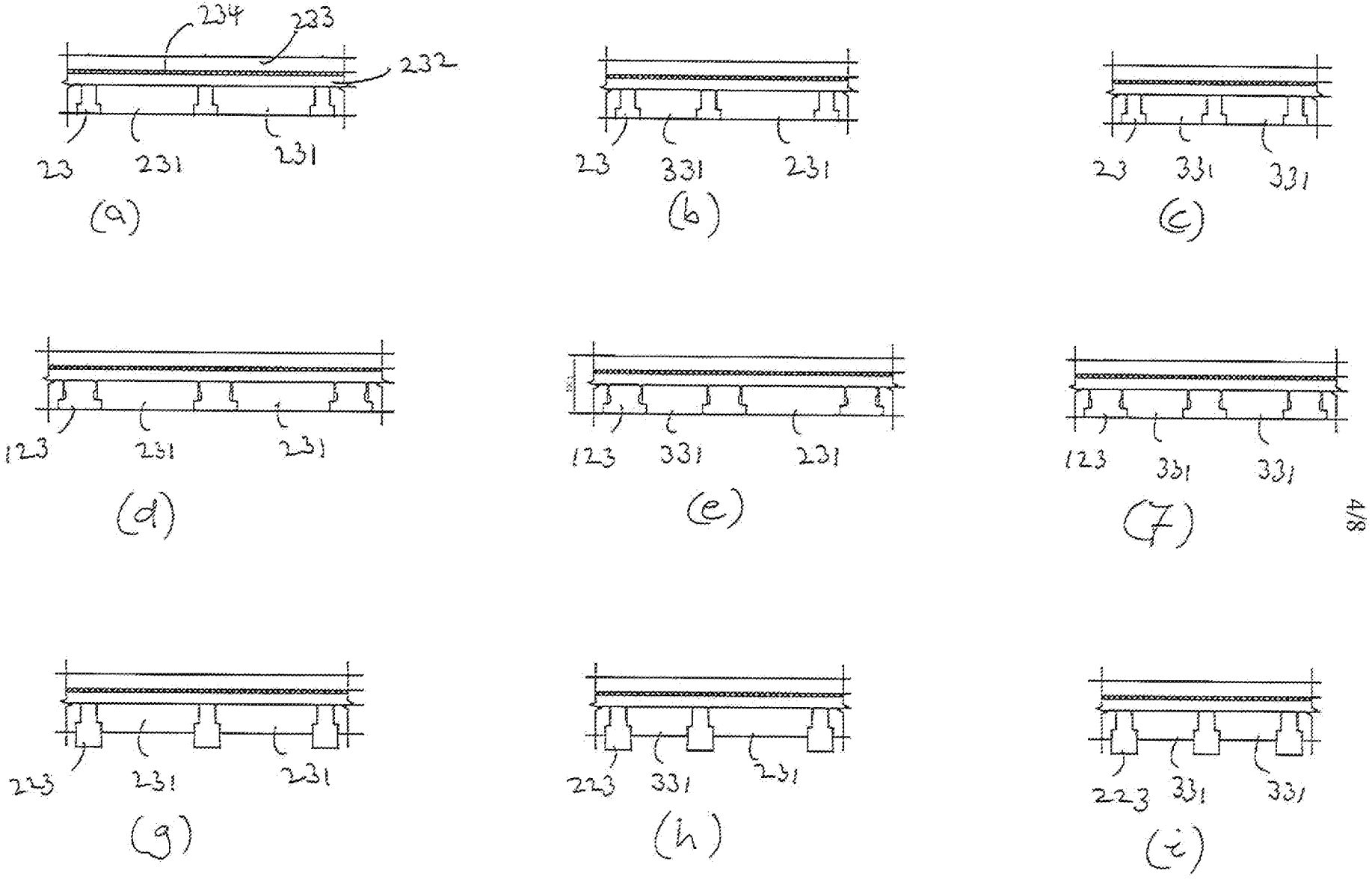

234
233
232
23
231
231
(a)
23
331
231
(b)
23
331
331
(c)
123
231
231
(d)
123
331
231
(e)
123
331
331
(f)
223
231
231
(g)
223
331
231
(h)
223
331
331
(i)

Figure 3

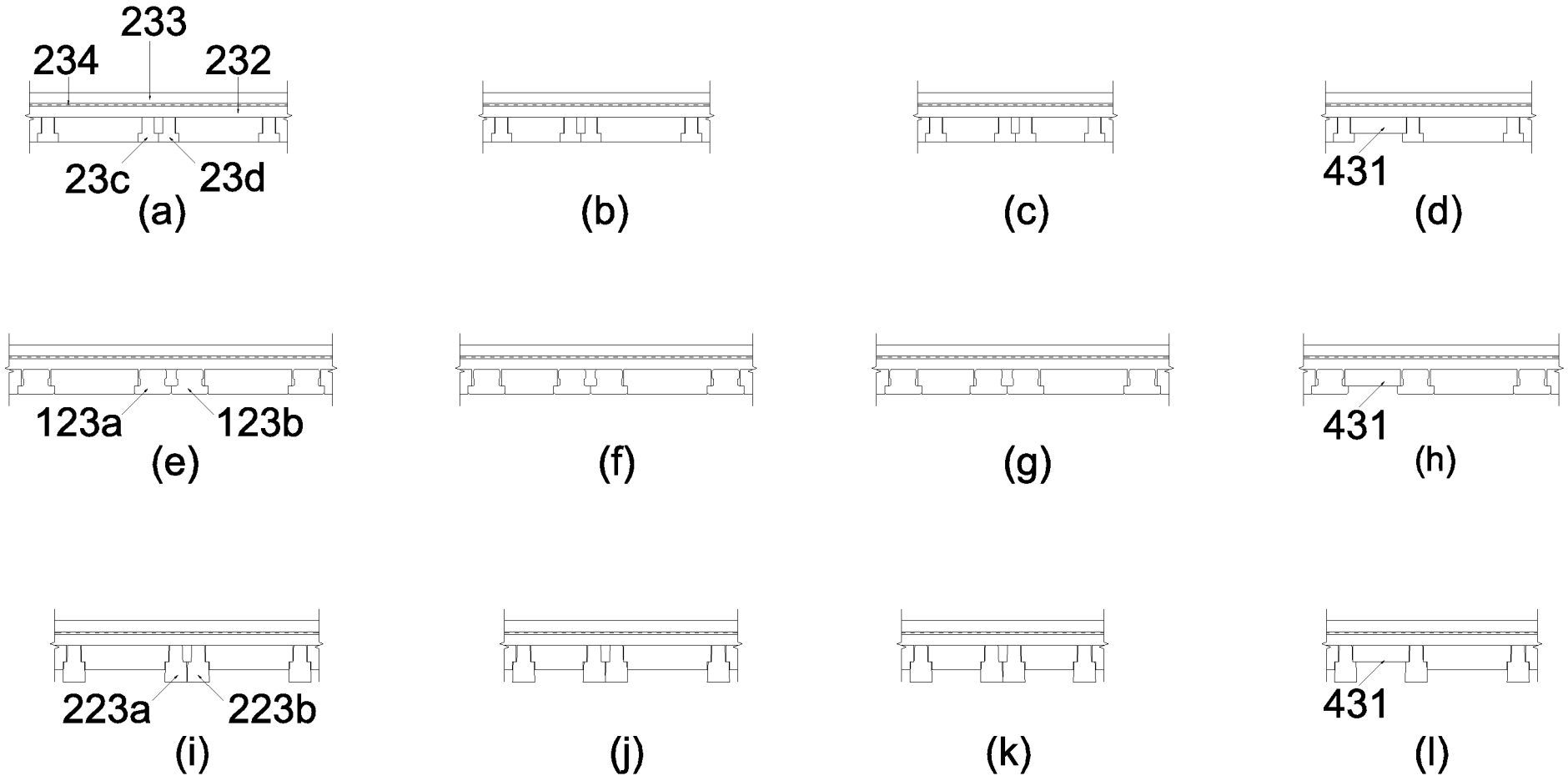

233
234
232
23c
23d
(a)
(b)
(c)
431
(d)
123a
123b
(e)
(f)
(g)
431
(h)
223a
223b
(i)
(j)
(k)
431
(l)

Figure 4

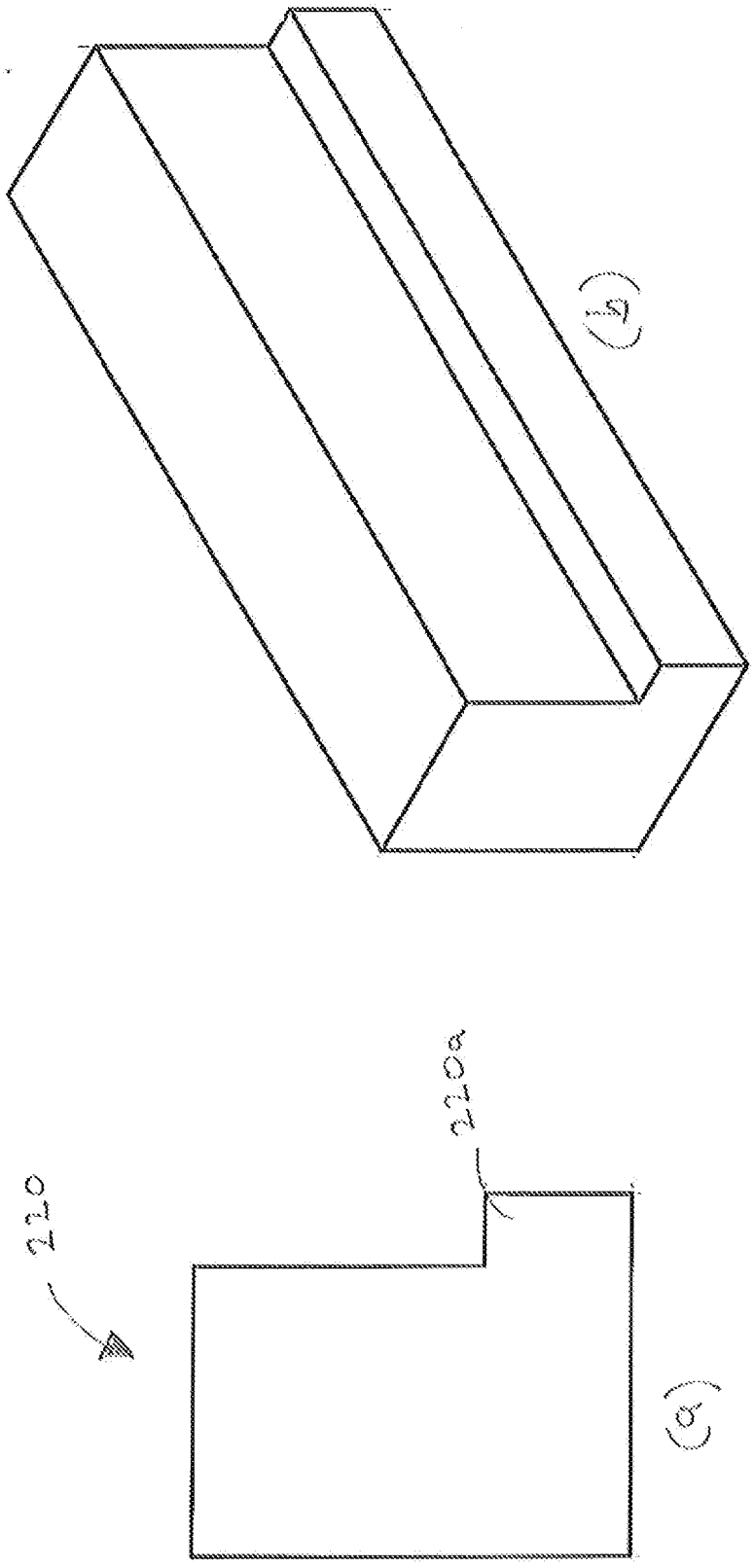
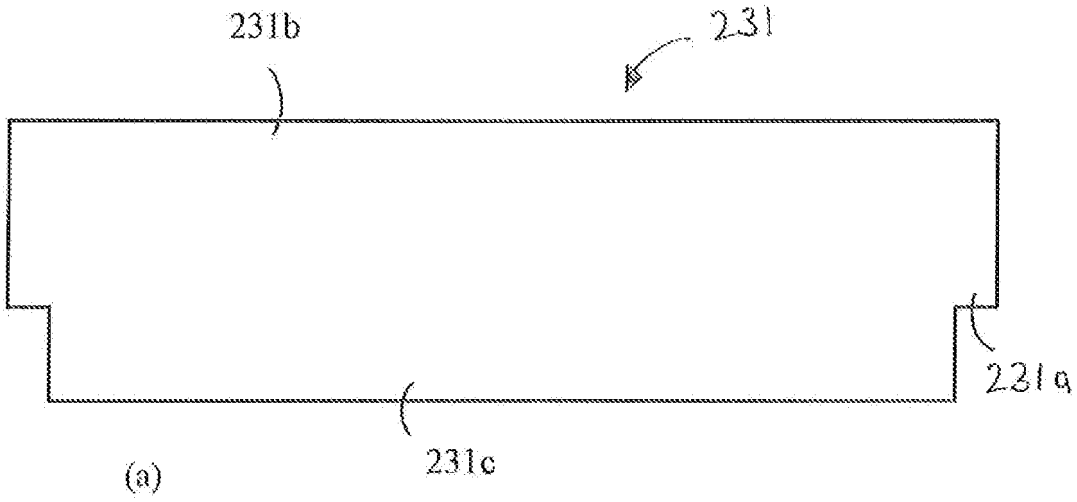


Figure 5



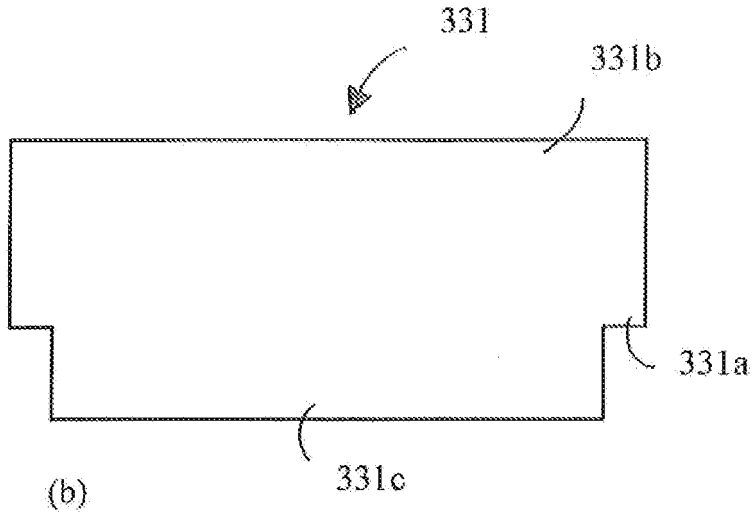


Figure 6

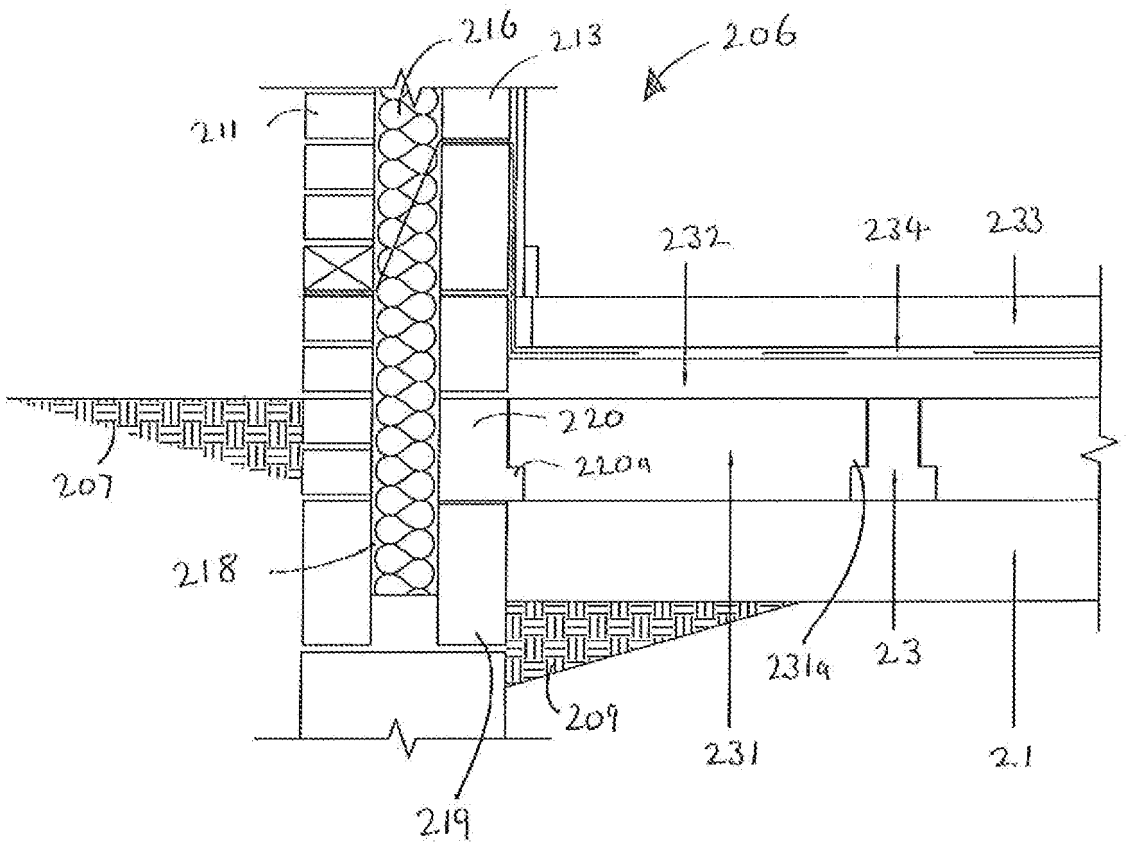

216
213
206
211
232
234
233
220
220a
207
218
231a
23
209
231
21
219

Figure 7

FLOOR ASSEMBLY

The present invention relates to floor assemblies in particular floor assemblies suitable for the ground floors of buildings. The invention also relates to methods for constructing such floor assemblies.

A beam and block floor assembly is a known method of constructing a floor for a building. In such assemblies, substantially parallel structural beams are supported on supporting walls and blocks are supported between each pair of beams. At the edge of the floor assembly, it is usual for spacer building blocks to be supported on a coursing block protruding from the wall and the nearest structural beam. Unfortunately, a disadvantage of this method of construction is that the insulation of the portion of the floor abutting the wall is relatively poor because of the presence of generally non-insulating blocks spanning the gap between the edge wall and the first structural beam.

It is known to use insulating blocks between the structural beams in order to reduce heat loss through the floor of a building. Such insulating blocks may be, for example, polystyrene. Generally, the structural beams of the floor are supported above a ventilated void and insulation blocks are placed underneath the beams and also between the beams. Although generally very successful, such insulated flooring suffers from disadvantages in certain circumstances. In particular, it can be sometimes be difficult to assemble insulation blocks because of the need to ensure that some insulation is placed under the structural beams. This is achieved in a number of flooring assemblies by having insulation blocks with protruding toes so that in position the toe is positioned under the structural beams. This can, however, lead to problems where beams are close together or the gap between adjacent structural beams has to be modified either in order to support structural walls placed upon the floor or to accommodate service pipes, bay windows and other irregularities in the floor of a building. It is possible to clip additional, relatively small, insulation blocks under the structural beams, however this can result in delays to a build and requires that the positioning and insertion of the insulation blocks is planned in advance.

It is an aim of the present invention to provide an improved floor assembly which enables rapid and efficient construction whilst maintaining and improving upon existing insulation values of flooring assembly.

The present invention accordingly provides a floor assembly comprising,

a. a plurality of structural beams spanning a gap between supporting walls, each structural beam comprising a ledge provided at its base on each side thereof,

b. at least one course of edge blocks, each edge block of the course comprising a ledge provided on one side thereof, the course of edge blocks spaced from the nearest structural beam and arranged so that the ledges of the edge blocks face the ledge on the near side of the nearest structural beam,

c. a plurality of insulation blocks supported in position on the ledges of the edge blocks and the nearest structural beam, and

d. an insulation sheet situated over the insulation blocks and structural beams.

The great benefit of such a floor assembly is that the insulation blocks placed between (and generally directly abutting) the wall of the floor assembly reduce heat loss when the building is constructed with an increase in thermal insulation (measured by U value).

Subject to local ground conditions, it may be advantageous for the assembly to include a membrane.

Generally, the floor assembly will further comprise a concrete topping over the insulation sheet and/or optional membrane. The concrete topping will normally be poured on to the top of the floor assembly and tamped subsequently.

Generally, it is preferred if at least some of the insulation blocks are supported in position on the ledges of adjacent structural beams. This is advantageous because it ensures that not only is the side of the floor nearest the wall supplied with insulation blocks but the remainder of the floor may also be supplied by insulation blocks.

Generally, the structural beams and course or courses of edge blocks will be substantially parallel extending across the floor.

Generally, the floor assembly is such that the insulated sheet is substantially level once in position.

Preferably, the ledge of the edging block or blocks will protrude between 10% and 50 % of the total width (i.e. including the ledge) of the edging block, preferably between 15% and 25%.

One of the ways in which this may be achieved is wherein the insulation blocks are shaped so that the top surfaces are substantially level and flush with the top surfaces of the structural beams when in position. This also has a further advantage in that when the floor is being constructed, there are no protruding portions of the structural beams (which may occur in known systems) reducing trip hazards for the work-force.

Generally, it is advantageous if one or more of the insulation blocks is shaped so that their top surfaces are substantially level and flush with the top surfaces of the structural beams when in position. This is particularly advantageous because it ensures an easier construction of the floor by insertion of the insulation blocks. It also means that it is easier to cut the blocks in order to take account of relatively narrow gaps between structural beams or between the edge blocks and the nearest structural beams. It is also easier to take account of the irregularities in the floor plan, for example bays into bay windows and service pipes by merely cutting the insulation block without the need to ensure that the insulation block is cut in a particular way so that it may fulfil its function. Generally, because of the preferable symmetry of the insulation blocks, there is less wastage of blocks and fewer unusable cut portions of blocks.

Generally, it is preferred if one or more of the insulation blocks is shaped so that it is substantially symmetrical along a plane of symmetry substantially parallel to the structural beams and/or edge blocks once the insulation block is in position.

In a particular preferred embodiment, there are substantially no insulation blocks situated underneath the structural beams of the floor. This is

advantageous because insertion of insulation blocks under structural beams can sometimes be difficult in tight situations and avoiding the need for such insulation blocks under structural beams thereby tends to increase the speed and efficiency of the build. It is preferred if the insulation blocks and the insulation sheet comprise a polymeric material.

The most preferred polymeric material comprises polystyrene in particular expanded polystyrene.

Generally, the structural beams will comprise concrete, in particular pre-stressed concrete.

In floor assemblies according to the present invention it is usual for the structural beams and the course of edge blocks to be supported above a ventilated void.

The thermal performance on the whole floor is dramatically affected where multiple beams are placed adjacent to each other. In assemblies according to the invention, there is reduced thermal loss where there are multiple beams close to each other because of the insulation sheet. Furthermore, the assembly according to the invention removes the need for additional insulation to be pinned or clipped below the beams where there are multiple beams adjacent to each other. The result is a robust and consistent floor installation and improved thermal performance.

In a second aspect, the present invention provides a method of constructing a floor assembly, the method comprising

a. constructing supporting walls
b. arranging a plurality of structural beams to span the gap between the supporting walls, each structural beam comprising a ledge provided at its base on each side thereof,
c. constructing at least one course of edge blocks, each edge block comprising a ledge provided on one side thereof, the course of edge blocks spaced from the nearest structural beam and arranged so that the ledges of the edge blocks face the ledge on the near side of the nearest structural beam

d. supporting a plurality of insulation blocks in position on the ledges of the edge blocks and the nearest structural beam, and

e. placing an insulation sheet over the insulation blocks and the structural beams

Usually, structural beams will be arranged by using beam spacing blocks to ensure the spacing between the beams is correct and consistent.

Embodiments of the invention will now be described with reference to the accompanying drawings in which

Figure 1 illustrates prior art floor assemblies.

Figure 2 illustrates a floor assembly according to the present invention with partial insulation in the cavity wall.

Figures 3 and 4 illustrate block arrangements for insulation block situated between adjacent structural beams.

Figure 5 illustrates an embodiment of the edge block used in the invention.

Figure 6 illustrates embodiments of insulation blocks as used in the invention.

Figure 7 illustrates a floor assembly according to the present invention with full insulation in the cavity wall.

List of Reference Numerals

5	floor assembly (prior art)
7	ground level
9	foundation ground level
11	external leaf of bricks
13	internal leaf of blocks
15	partial cavity insulation
17	cavity
19	lower block
21	ventilated void
23	structural beam

23a	structural beam closest to cavity wall
23c	structural beams
23d	structural beams
25	spacer building block
27	additional insulation block
29	air void
31	insulation block
31a	toe portion of insulation block
31b	cut insulation block
33	concrete topping
105	floor assembly (prior art)
123	structural beam
123a	structural beams
205	floor assembly (of the invention)
207	ground level
209	foundation ground level
211	external leaf of bricks
213	internal leaf of blocks
215	partial fill cavity insulation
217	cavity
219	lower block
220	edge block
220	ledge of edge block
223	structural beam
223a	structural beams
223b	structural beams
231	insulation block
231a	ledge of insulation block
231b	upper portion of insulation block
231c	lower portion of insulation block
232	insulation sheet
233	concrete topping

234 membrane
331 narrow insulation block
331a ledge of narrow insulation block
331b upper portion of narrow insulation block
331c lower portion of narrow insulation block
431 simple insulation block

Figure 1 illustrates a portion of a floor assembly 5 according to the prior art. The floor assembly 5 is situated on foundation ground level 9 below normal ground level 7. The perimeter of the floor assembly consists of a cavity wall comprising an external leaf of courses of bricks 11 and internal leaf of courses of building blocks 13 with partial fill cavity insulation 15 in the cavity 17. The foundations, including lower block 19 define a ventilated void 21 below the floor. Structural beams 23a and 23b span the gap above the ventilated void 21 and are generally parallel to each other and to the cavity wall 11, 13. The structural beam 23a closest to the cavity wall is spaced from the cavity wall by building block 25 (e.g. of aerated concrete) which protrudes from the inner leaf 13 of the cavity wall. Between adjacent structural beams 23a, 23b insulation blocks 31 are placed. Such insulation blocks 31 comprise a toe portion 31a which is designed to fit under the structural beams 23a, 23b. Generally, where additional insulation is required additional insulation blocks 27 are clipped to insulation blocks 31 using clips (not shown). In the portion of the floor assembly illustrated in Figure 1a, there is also an air void 29. The floor is finished with poured concrete topping 33.

Figure 1b also illustrates a portion of a prior art floor assembly 105 comprising a cavity wall containing outer leaf 11 of brick and inner leaf 13 of building blocks with insulation 15 between the leaves. The floor assembly 105 also comprises structural beams 23 and between the structural beams 23 are insulation blocks 31 with toe portions. For the areas of the floor assembly adjacent the wall, a cut insulated block 31b is installed.

There are often difficulties in assembly of prior art floor assemblies owing to the asymmetry of the insulation blocks 31 and the need to either cut

the insulation blocks which may result in poorly supported blocks or to add additional insulation by clipping or pinning small insulation blocks 27 to the larger insulation blocks 31.

Figure 2 illustrates a portion of a floor assembly 205 according to the present invention. The floor assembly shown in Figure 2 also abuts a cavity wall comprising outer leaf 211 of bricks and inner leaf 213 of building blocks with partial fill cavity insulation 215 in cavity 217. The external ground level 207 is higher than the foundation ground level 209. At the bottom of the foundation above foundation ground level 209 there is a course of lower blocks 219 to the appropriate level for the beams and edge block 220. Edge block 220 has a protruding ledge 220a which faces one of the protrusions on the structural beam 23 and is intended to support an insulation block 231. Because of the design of the insulation block 231 and edge block 220, the insulation block 231 abuts directly against the inner leaf 213 of the cavity wall. This reduces cold spots adjacent the cavity wall. The insulation block 231 is generally wider at the top than the bottom, having ledges 231a adapted to abut and be supported by ledges 220a on edge block 220 and ledges on structural beams 23. The insulation block 231 is generally symmetrical along a plane of symmetry roughly parallel to the structural beams (when in position) and this greatly simplifies the use of the insulated blocks because it means that cutting of the block (e.g. to fit smaller spaces or to accommodate irregularities in the floor plan or service pipes) is much simpler. In order to improve insulation values an insulation sheet 232 is placed above insulation blocks 231 and structural beams 23. In practice, a number of sheets would be used to cover the whole surface of the floor. A benefit of the assembly is that the insulation sheets 232 may abut right up to the wall and cover the whole surface of the floor because of the design of insulation block 231, by which the top surface of the insulation blocks 231 is generally level and flush with the structural beams top surface 23. Consequently, the insulation sheet 232 is generally level above the insulation blocks 231 and structural beams 23.

Subject to the ground conditions, optionally, a membrane 234 may be placed above the insulation sheets before concrete topping 233 is formed.

Figure 3(a) to (i) illustrate various ways in which insulation blocks may be arranged between different forms of structural beams 23, 123 or 223. Generally, insulation blocks 231, or narrow insulation blocks 331 may be used in various combinations in order to provide suitable insulation between the structural beams 23, 123 or 223.

Figure 4(a) to (l) illustrate further arrangements of insulation blocks and structural beams especially where structural beams 23c and 23d or 123a, 123b or 223a, 223b are close together. Such beams would be positioned close together in a floor in order to provide greater support if, for example, a partition wall needed to be built directly above the beams. Previously, beams close together provided difficulties because the asymmetric insulation blocks would not fit easily underneath the close together beams. In the present invention the insulation sheet 232 covers the beams and insulation blocks improving the insulation even when beams are close together.

Occasionally, simple (e.g. rectangular box-shape) insulation blocks 431 (which do not have ledges 231a as in block 231) may be used if necessary.

Figure 5 illustrates (a) a section through edge block 220 used in floor assembles according to the invention. Edge block 220 had ledge 220a which protrudes about 20% of the total width of edge block 220. Figure 5(b) illustrates the edge block 220 in isometric view. The edge block 220 is generally of aerated concrete or other suitable building material.

Figure 6(a) illustrates insulation blocks 231 according to the present invention. The insulation blocks 231 are wider at the top 231b than the bottom 231c and have a ledge 231a protruding approximately 20 to 25 mm (specifically 22.5 mm) and arranged so as abut and to support the insulation blocks 231 in position on the ledges 220a of the edge block 220 or structural beams 23, 123, 223. Generally the insulation blocks 231 would be 500-560 mm top width (specifically 530 mm) and 450-500 mm (specifically 485 mm) in bottom width. The total depth of the insulation block 231 is approximately

125-175 mm, specifically 150 mm. The area of such an insulation block is 0.0773 m^2.

Figure 6(b) illustrates narrow insulation blocks 331 according to the present invention. The narrow insulation blocks 331 are wider at the top 331b than the bottom 331c and have a ledge 331a protruding approximately 20 to 25 mm (specifically 22.5 mm) and arranged so as abut and to support the narrow insulation blocks 331 in position on the ledges 220a of the edge block 220 or structural beams 23, 123, 223. Generally the narrow insulation blocks 331 would be 300-360 mm top width (specifically 340 mm) and 250-310 mm (specifically 295 mm) in bottom width. The total depth of the narrow insulation block 331 is approximately 125-175 mm, specifically 150 mm. The area of the narrow insulation block 331 is 0.0488 m^2.

Figure 7 illustrates a portion of a floor assembly 206 according to the present invention. The floor assembly shown in Figure 7 also abuts a cavity wall comprising outer leaf 211 of bricks and inner leaf 213 of building blocks with full fill cavity insulation 216 in cavity 218. The external ground level 207 is higher than the foundation ground level 209. At the bottom of the foundation above foundation ground level 209 there is a course of blocks 219 to the appropriate level for the beams and edge block 220. Edge block 220 has a protruding ledge 220a which faces one of the protrusions on the structural beam 23 and is intended to support an insulation block 231. Because of the design of the insulation block 231 and edge block 220, the insulation block 231 abuts directly against the inner leaf 213 of the cavity wall. This reduces cold spots adjacent the cavity wall. The insulation block 231 is generally wider at the top than the bottom, having ledges 231a adapted to abut and be supported by ledges 220a on edge block 220 and ledges on structural beams 23. The insulation block 231 is generally symmetrical along a plane of symmetry roughly parallel to the structural beams (when in position) and this greatly simplifies the use of the insulated blocks because it means that cutting of the block (e.g. to fit smaller spaces or to accommodate irregularities in the floor plan or service pipes) is much simpler. In order to improve insulation values an insulation sheet 232 is placed above insulation

blocks 231 and structural beams 23. In practice, a number of sheets would be used to cover the whole surface of the floor. A benefit of the assembly is that the insulation sheets 232 may abut right up to the wall and cover the whole surface of the floor because of the design of insulation block 231, by which the top surface of the insulation blocks 231 is generally level and flush with the structural beams top surface 23. Consequently, the insulation sheet 232 is generally level above the insulation blocks 231 and structural beams 23.

Subject to the ground conditions, optionally, a membrane 234 may be placed above the insulation sheets before concrete topping 233 is formed.

CLAIMS

1. A floor assembly comprising,
   a. a plurality of structural beams spanning a gap between supporting walls, each structural beam comprising a ledge provided at its base on each side thereof,
   b. at least one course of edge blocks, each edge block of the course comprising a ledge provided on one side thereof, the course of edge blocks spaced from the nearest structural beam and arranged so that the ledges of the edge blocks face the ledge on the near side of the nearest structural beam,
   c. a plurality of insulation blocks supported in position on the ledges of the edge blocks and the nearest structural beam, and
   d. an insulation sheet situated over the insulation blocks and structural beams.

2. A floor assembly as claimed in claim 1, further comprising a membrane situated over the insulation sheet.

3. A floor assembly as claimed in either claim 1 or claim 2, further comprising a concrete topping over the insulation sheet and/or optional membrane.

4. A floor assembly as claimed in any one of the preceding claims, wherein at least some of the insulation blocks are supported in position on the ledges of adjacent structural beams.

5. A floor assembly as claimed in any one of the preceding claims, wherein the structural beams and course or courses of edge blocks are substantially parallel.

6. A floor assembly as claimed in any one of the preceding claims, wherein the insulated sheet is substantially level once in position

7. A floor assembly as claimed in any one of the preceding claims, wherein the insulation blocks are shaped so that their top surfaces are substantially level and flush with the top surfaces of the structural beams when in position.

8. A floor assembly as claimed in any one of the preceding claims, wherein one or more of the insulation blocks is shaped so that it is substantially symmetrical along a plane of symmetry substantially parallel to the structural beams and/or edge blocks once the insulation block is in position.

9. A floor assembly as claimed in any one of the preceding claims, wherein one or more of the insulation blocks comprises projections on at least two sides thereof, the projections being adapted to abut the ledges on the edge blocks and/or structural beams thereby supporting the insulation block.

10. A floor assembly as claimed in any one of the preceding claims, wherein the insulation blocks and/or the insulation sheet comprise a polymeric material.

11. A floor assembly as claimed in claim 10, wherein the polymeric insulation blocks comprise polystyrene.

12. A floor assembly as claimed in any one of the preceding claims, wherein the structural beams comprise concrete.

13. A floor assembly as claimed in any one of the preceding claims, wherein the structural beams and course of edge blocks are supported above a ventilated void.

14. A method of constructing a floor assembly, the method comprising

a. constructing supporting walls

b. arranging a plurality of structural beams to span the gap between the supporting walls, each structural beam comprising a ledge provided at its base on each side thereof,

c. constructing at least one course of edge blocks, each edge block comprising a ledge provided on one side thereof, the course of edge blocks spaced from the nearest structural beam and arranged so that the ledges of the edge blocks face the ledge on the near side of the nearest structural beam

d. supporting a plurality of insulation blocks in position on the ledges of the edge blocks and the nearest structural beam, and

e. placing an insulation sheet over the insulation blocks and the structural beams.

Application No: GB1202281.0 **Examiner:** Eleanor Wade

Claims searched: 1 to 14 **Date of search:** 8 June 2012

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
A	-	GB2148965 A Trent Concrete Floors
A	-	GB2156874 A Redpath Dorman Long
A	-	GB2470090 A Darrington
A	-	GB2246148 A Richard Lees Ltd

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^{X} :

Worldwide search of patent documents classified in the following areas of the IPC

E04B

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI

International Classification:

Subclass	Subgroup	Valid From
E04B	0005/04	01/01/2006