United States Patent [19]

Vickstrom et al.

[11] **3,722,473**

[45] **Mar. 27, 1973**

[54] **FLOOR CONSTRUCTION AND MEMBER FOR MAKING SAME**

[75] Inventors: **Donald E. Vickstrom; George F. Swenck,** both of Richmond, Va.

[73] Assignee: **Reynolds Metals Company,** Richmond, Va.

[22] Filed: **Aug. 13, 1971**

[21] Appl. No.: **171,528**

[52] **U.S. Cl.** **119/28**

[51] **Int. Cl.** **E04c 02/42**

[58] **Field of Search** 119/28, 16; 52/177, 588, 669, 52/720, 728

[56] **References Cited**

UNITED STATES PATENTS

3,420,015	1/1969	Costanzo, Jr.	52/180
3,528,391	9/1970	Johnson	119/28
3,555,762	1/1971	Costanzo, Jr.	52/588

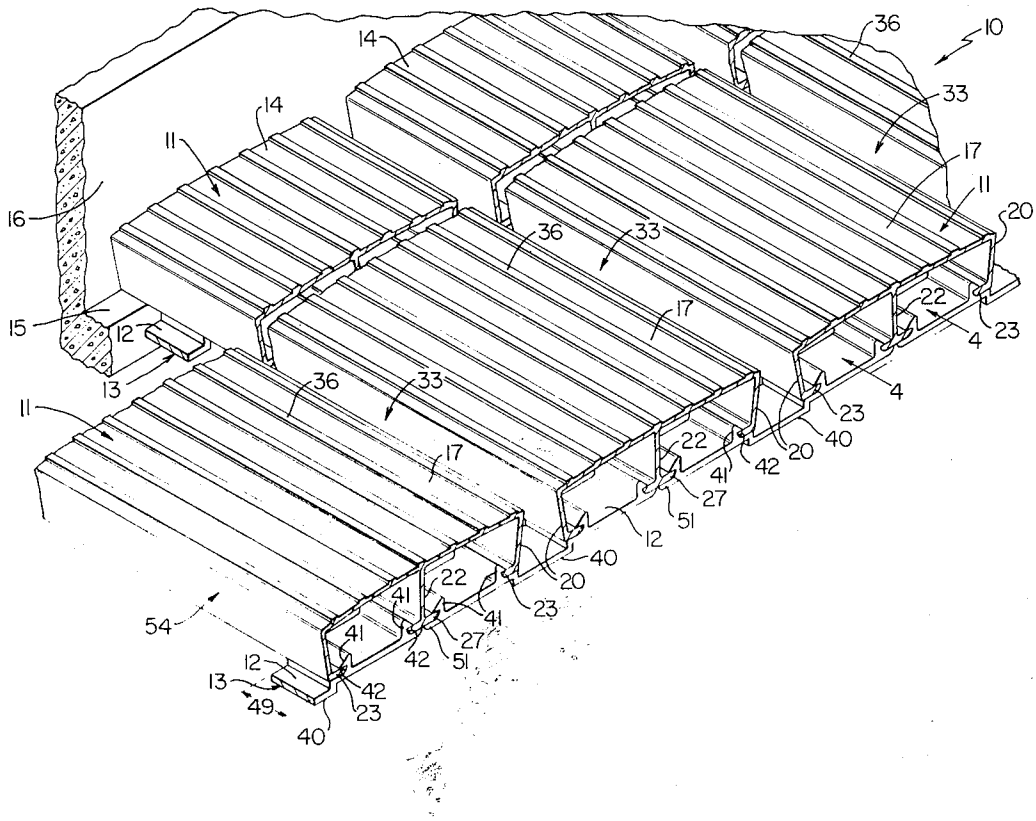
Primary Examiner—Hugh R. Chamblee

Attorney—John F. C. Glenn et al.

[57] **ABSTRACT**

An improved floor construction for an animal enclosure is provided and employs a plurality of substantially E-shaped channel members each having a bight defining a top load-carrying wall and having three substantially vertical walls defined by a pair of downwardly extending side walls with an intermediate wall arranged between the side walls. Each channel member also has a pair of inwardly directed side fastening flanges each extending inwardly toward the other from the lower edge of an associated side wall and a central fastening flange adjoining the lower edge of the intermediate wall. Each channel member is made of a resilient material which enables the lower ends of an associated pair of its walls to be relatively spread apart at a location adjacent a set of associated fastening legs provided on an associated connector used to connect the channel member to an adjacent member and upon releasing the spread walls the normal resiliency of the channel member causes such walls to return to their initial positions so that their fastening flanges are hooked around the associated fastening legs. The three substantially vertical walls of each channel member provide improved support for its top wall and enable the forming of a floor construction of maximum area using a minimum amount of material for channel members and connectors.

14 Claims, 4 Drawing Figures



PATENTED MAR 27 1973

3,722,473

SHEET 1 OF 2

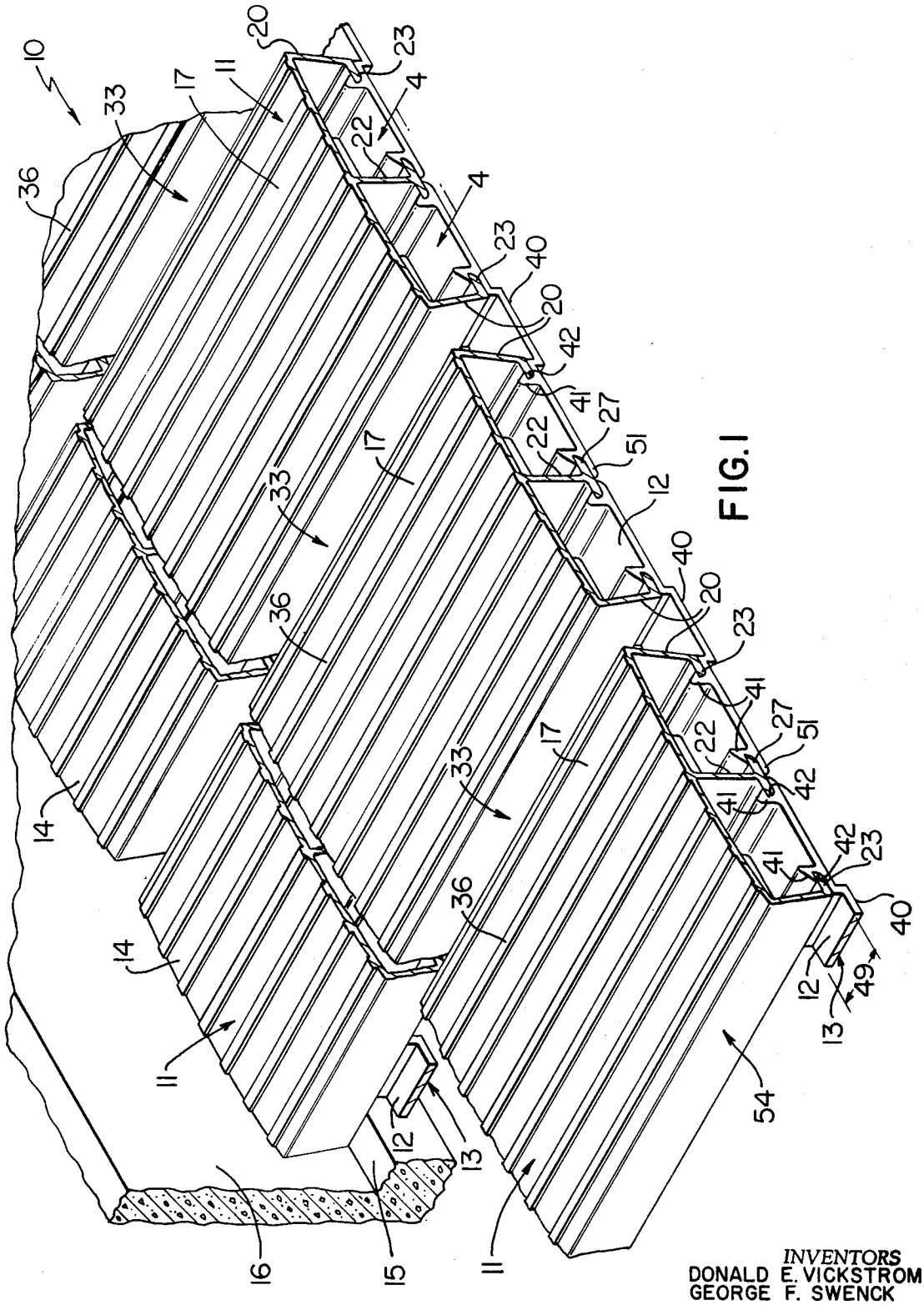


FIG. 1

INVENTORS
DONALD E. VICKSTROM
GEORGE F. SWENCK
BY Glenn, Palmer, Lyne, Gibbs & Thompson
THEIR ATTORNEYS

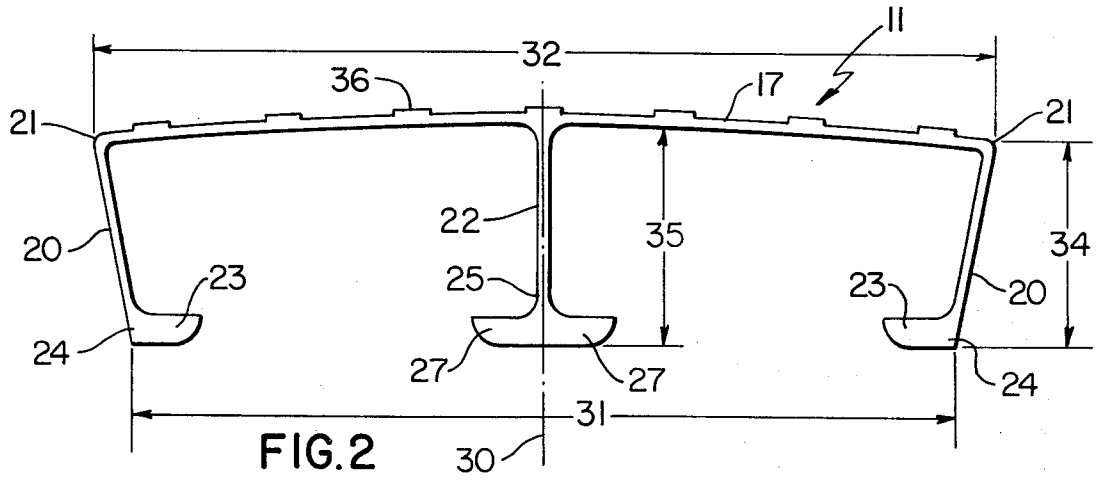


FIG. 2

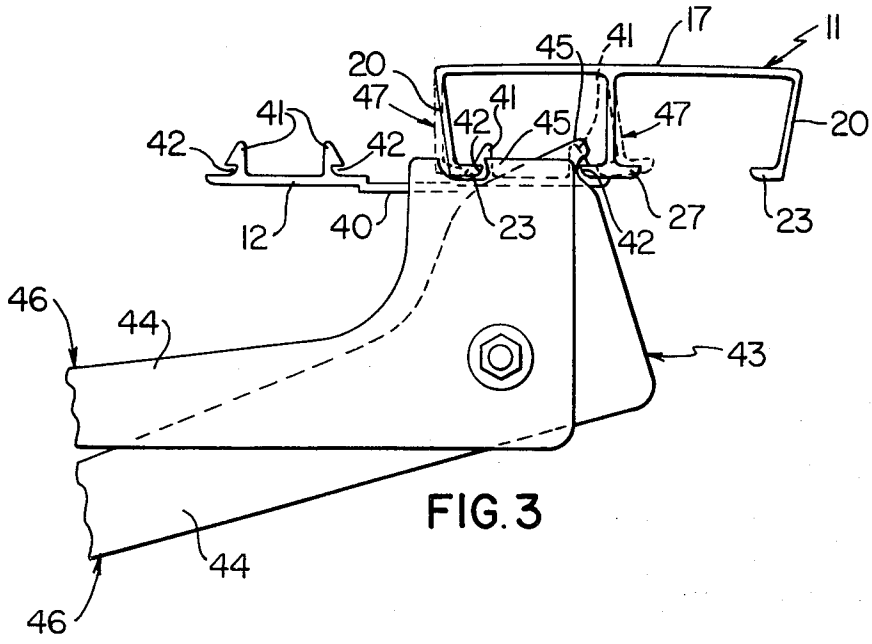


FIG. 3

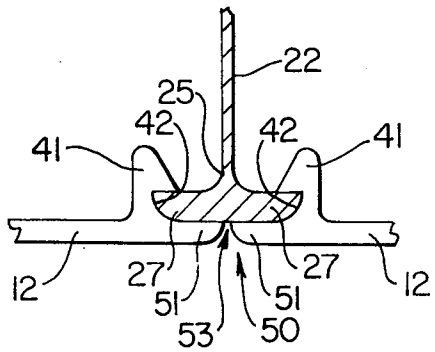


FIG. 4

INVENTORS
DONALD E. VICKSTROM
GEORGE F. SWENCK

BY Glenn, Palmer, Lyne, Gibbs & Thompson

THEIR ATTORNEYS

FLOOR CONSTRUCTION AND MEMBER FOR MAKING SAME

BACKGROUND OF THE INVENTION

In providing floor constructions or floors for animal enclosures used to raise animals in confinement, and using light weight channel members, see U.S. Pat. NO. 3,528,391, for example, it is necessary that such floors be easy to construct and maintain, are economical, provide adequate support for animals while assuring satisfactory movement thereon, and allow materials such as spilled food, animal wastes, and the like, to flow easily through each floor into an associated pit or tank arranged therebeneath to receive such materials. Further, in using channel members to define a floor construction it is desirable that a minimum number of connecting devices or connectors be employed to hold the channel members together in spaced relation yet without compromising the structural integrity of the floor construction.

SUMMARY

This invention provides an improved floor construction particularly adapted for an animal enclosure and a roughly E-shaped channel member for making same which is of improved strength.

The floor construction employs a plurality of E-shaped channel members each having a bight defining a top load carrying wall and three substantially vertical walls defined by a pair of downwardly extending side walls with an intermediate wall arranged between the side walls. Each channel member also has a pair of inwardly directed side fastening flanges each extending inwardly toward the other from the lower edge of an associated side wall and a central fastening flange adjoining the lower edge of the intermediate wall. Each channel member has a width between the lower edges of its side walls which is no greater than the width of its top load carrying wall and is made of a resilient material which enables the lower ends of an associated pair of its walls to be relatively spread apart at a location adjacent a set of associated fastening legs provided on an associated connector used to connect the channel member to an adjacent member and upon releasing the spread walls the normal resiliency of the channel member causes such walls to return to their initial positions so that their fastening flanges are hooked around the associated fastening legs. The three substantially vertical walls of each channel member provide improved support for its top wall and enable the forming of a floor construction of maximum area using a minimum amount of material for channel members and connectors.

Other details, uses, and advantages of this invention will become apparent as the following description of the exemplary embodiments thereof presented in the accompanying drawings proceeds.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view with parts in cross section and parts broken away particularly illustrating a section of one exemplary embodiment of a floor construction of this invention and illustrating a plurality of identical substantially E-shaped members and connectors used in making same;

FIG. 2 is an end view of a typically substantially E-shaped member comprising the floor construction of FIG. 1 wherein such member has a pair of side walls adjoining opposite sides of a top load-carrying wall and an intermediate wall arranged between the side walls;

FIG. 3 is an end view with parts broken away illustrating one technique for relatively spreading apart an associated pair of walls of the member of FIG. 2 at a location adjacent a set of associated fastening legs provided on a connector to fasten such walls to the connector; and

FIG. 4 is an enlarged fragmentary end view taken on the line 4—4 of FIG. 1.

DESCRIPTION OF ILLUSTRATED EMBODIMENTS

Reference is now made to FIG. 1 of the drawings which illustrates one exemplary embodiment of the floor construction of this invention which is designated generally by the reference numeral **10**. The floor construction **10** is comprised of a plurality of substantially E-shaped, as viewed from an end thereof, channel members **11** which are suitably fastened together in side-by-side relation by a plurality of bottom connector-spacer members or connectors **12**. The construction and arrangement of the channel members **11** and connectors **12** is such that a floor construction is provided which is particularly adapted for use in raising domestic animals such as poultry, swine, cattle, and the like, in confinement, and the structural details of each channel member **11** and connector **12** will be described in detail subsequently.

The channel members or members **11** may be of extended length and such length will vary depending on the intended use for a particular floor construction **10** and the members **11** employ sets **13** of connectors **12** at spaced intervals along their lengths. The connectors **12** of each set **13** are arranged in substantially end-to-end relation across one entire dimension of a floor construction **10** made using elongated members **11**.

The floor construction **10** preferably has the opposite end portions **14** of its channel members **11** supported on a suitable supporting structure comprising the animal enclosure and, in this example, each end portion **14** of each member **11** is supported on an associated ledge **15** of a supporting wall **16** which is shown in this example as a concrete wall. The members **11** and hence structure **10** is supported in position over a suitable conventional pit, tank, or trough-like structure (not shown) which is adapted to receive any material, such as animal wastes which drop through the floor construction **10** between members **11** and each pit may be cleaned of any accumulation therein using known techniques.

As previously stated, each member **11** is substantially E-shaped as viewed either from an end or in cross section and in a typical floor construction is rotated clockwise 90° from the normal upright position of the letter E. Each E-shaped member **11** has a bight defining a top load-carrying wall **17** and has a pair of downwardly extending side walls **20** adjoining opposite side edges **21** of the top wall **17**, see FIG. **2**. An intermediate wall **22** adjoins the top wall **17** and is arranged mid-way between the side walls **20**.

Each member 11 also has a pair of inwardly directed side fastening flanges 23 each extending inwardly toward the other from the lower edge portion 24 of an associated side wall. The member 11 also has a central or intermediate fastening flange adjoining a lower edge portion 25 of the intermediate wall 22 and the fastening flange is comprised of a pair of flange portions each designated by the reference numeral 27 which are positioned in a symmetrical manner on opposite sides of wall 22 and more exactly on opposite sides of a central plane 30 through the intermediate wall 22. Because the intermediate wall 22 of this example is arranged midway between the side walls 20, the plane 30 bisects the channel member 11 longitudinally.

The side walls 20 extend downwardly from the top load-carrying wall 17 of member 11 in a converging manner whereby the channel member 11 has a width, at 31, between the lower edges of its side wall 20 which is no greater than the width, indicated at 32, of the top load carrying wall 17. In this example, the width 31 is substantially less than the width 32 and each immediately adjacent pair of channel members 11, see FIG. 1, has a downwardly diverging passage 33 defined therebetween by an associated set of side walls 20 whereby each diverging passage 33 assures easy flow of materials such as animal wastes through the floor construction 10.

The top load-carrying wall 17 of member 11 has an arcuate configuration which is outwardly convex. In addition, each side wall 20 has a vertical height indicated at 34 which is less than the vertical height 35 of the intermediate or central leg or wall 22 of the E-shaped member; and, the construction of member 11 is such that the bottom surface of flanges 23 and 27 are substantially coplanar so that they may be easily supported on an associated planar ledge 15. The convex configuration of the top wall 17 together with the arrangement of walls 20 and 22 assure that each member 11 may carry a maximum load yet require less material thickness for such top wall.

Each member 11 has non-skid means 36 provided on its top load-carrying wall 17 and such non-skid means provide a better walking surface for the floor construction. The non-skid means of this example are in the form of upwardly extending projections 36 defined as an integral part of the top wall 17.

As previously indicated, the floor construction 10 comprises a plurality of connectors 12 which are employed to fasten channel members 11 together alongside each other in spaced relation, see FIGS. 1 and 3. Each connector 12 has a base portion 40 and sets of upwardly and outwardly extending fastening legs 41 with each leg 41 defining a laterally open recess 42 which receives an associated fastening flange of member 11 therewithin.

The connector 12 may be made from any suitable material and by any suitable technique including, though not limited to, extrusion, punching, roll forming, combinations of these process, etc. Each connector 12 may be made of small width, indicated at 49, and cooperates with other connectors 12 of a floor construction to hold the members 11 in an upright manner and in spaced relation. The weight of the members 11 and loads supported by floor construction 10 are carried by associated structures, such as ledges 15, and as previously indicated.

The members 11 are made of a resilient material (preferably a metal alloy) which provides normal resiliency therefor. This enables the lower or bottom end portions of an associated pair of its substantially vertical walls 20 and 22 to be relatively spread apart at a location adjacent a set of associated fastening legs 41 provided on an associated connector 12 and upon releasing such spread walls, the normal resiliency of the channel member 11 causes the spread walls to return to their initial positions with the fastening flanges 23 and 27, for example, hooked around the associated fastening legs 41 to hold each member 11 in an upright manner.

Any suitable tool or technique may be employed for relatively spreading apart the vertical walls of a member 11 so that its fastening flanges may be hooked or placed in grasping engagement around associated fastening legs. For example, a special spreading tool 43, see FIG. 3, may be employed which has a pair of pivoted levers 44 each having a contoured end portion 45. The tool 43 may be used to easily relatively spread apart a side wall 20 and intermediate wall 22 of a typical member 11 merely by inserting such tool into the position shown by solid lines in FIG. 3 and then moving the pivoted levers 44 toward each other as indicated by the double arrows 46 whereupon the contoured portions 45 engage associated fastening flanges 23 and 27 to thereby urge such fastening flanges and their associated walls 20 and 22 respectively outwardly or apart as indicated by the dotted lines at 47. The connector 12 may then be moved in position and upon releasing the levers 44 the fastening flanges 23 and 27 will, in essence, be received within associated laterally open recesses 42 and in grasping contact against the fastening legs 41. During the use of the tool 43 it will be appreciated that such tool is axially spaced along an associated member 11 so as not to interfere with the placement of a connector 12 into position.

In addition to providing a floor construction 10 which requires a minimum amount of structural material in members 11 for a given floor area, the use of members 11 allows a plurality of connectors 12 to be arranged in aligned end-to-end relation, see FIGS. 1 and 4, and without requiring that portions of the connectors be overlapped. It will be appreciated that if a connector, such as connector 12, were to be used to connect substantially inverted U-shaped members instead of E-shaped members, after connecting a first pair of U-shaped members alongside each other, it would be necessary upon connecting a second connected pair of U-shaped channel members to the first pair to arrange another connector 12 so that two of its legs 41 would be connected to a member of the first pair and two of its legs connected to a member of the second pair.

However, with the use of E-shaped channel members 11 and connectors 12, it will be seen that the connectors 12 may be arranged in aligned end-to-end spaced relation as shown at 50 in FIG. 4, and with ends 51 of each immediately adjacent pair of connectors arranged beneath the intermediate leg 22 of an E-shaped channel member. It will also be appreciated that there is sufficient space, indicated at 53, between the ends of the connectors 12 to assure that each connector 12 may be fastened in position in an unobstructed manner.

In the process of completing a floor construction 10 a plurality of connectors 12 are fastened in end-to-end

relation along the full transverse dimension of such floor construction. In placing the first connector **12** in position it will be appreciated that both walls **22** and **20** of a channel member **11** will be spread apart as shown by dotted lines in FIG. 3. However, upon fastening another member **11** in position one of the vertical walls such as the intermediate wall **22**, for example, is prevented from being spread apart by that portion of the connector **12** previously fastened in position. However, the member **11** is constructed so that only a side wall **20** may be spread sufficiently whereby such side wall and the intermediate wall **22** are relatively spread. For example, in the outermost member shown at **54** in FIG. **1** the outer side wall **20** and wall **22** are relatively spread apart by spreading the outer side wall **20** only thereof, rather than such side wall and the intermediate wall **22**.

Each member **11** may be made of any suitable material and using any suitable manufacturing technique. However, the members **11** are preferably made by extrusion process of a metallic material containing aluminum; and, the various walls, fastening flanges, non-skid ridges, etc., are defined as a single integral unitary construction.

The members **11** comprising floor construction **10** are shown in this example as having a comparatively small vertical height with such members in their normal assembled positions. However, the height of such members may be varied and either increased or decreased depending upon the intended application of the members **11** and a floor construction made using such members.

While present exemplary embodiments of this invention, and methods of practicing the same, have been illustrated and described, it will be recognized that this invention may be otherwise variously embodied and practiced within the scope of the following claims.

What is claimed is:

1. A floor construction comprising, a plurality of substantially E-shaped channel members arranged in parallel spaced relation; each E-shaped channel member comprising a bight defining a top load-carrying wall, a pair of downwardly extending side walls adjoining said top load-carrying wall, an intermediate wall arranged between said side walls, a pair of inwardly directed side fastening flanges each adjoining and extending inwardly toward the other from the lower edge portion of an associated side wall, and an intermediate fastening flange adjoining the lower edge portion of said intermediate wall, each channel member having a width between the lower edges of its side walls which is no greater than the width of its top load-carrying wall; and a plurality of connectors fastening said channel members together, each connector having a base portion and sets of upwardly and outwardly extending fastening legs, each leg having a recess with an associated fastening flange received therewithin, each channel member being made of a resilient material which provides a normal resiliency therefor and holds its fastening flanges within recesses of associated fastening legs and in grasping contact against the associated fastening legs so that each channel member is fastened in position and held in spaced relation from immediately adjacent members by its fastening flanges.

2. A floor construction as set forth in claim **1** in which each channel member has non-skid means provided on its top wall.

3. A floor construction as set forth in claim **1** in which each channel member has its top wall defined as an outwardly convex top wall provided with non-skid means as an integral part thereof.

4. A floor construction as set forth in claim **1** in which each channel member has its side and intermediate fastening flanges provided with bottom surfaces arranged in a common plane enabling each channel member to be supported on an associated planar support.

5. A floor construction as set forth in claim **1** in which each channel member has a width between the lower edges of its side walls which is substantially less than the width of its top load-carrying wall to thereby define a downwardly diverging passage between each immediately adjacent pair of said channel members.

6. A floor construction as set forth in claim **1** in which each of said channel members and each of said connectors is made as a single unitary structure of a metallic material.

7. A floor construction as set forth in claim **1** in which said plurality of connectors are arranged in sets placed at spaced intervals transverse said elongated members and the connectors in each set are arranged in aligned end-to-end relation along a rectilinear path.

8. A substantially E-shaped channel member for use in a floor construction, said channel member comprising a bight defining a top load-carrying wall, a pair of downwardly extending side walls, an intermediate wall arranged between said side walls, a pair of inwardly directed side fastening flanges each extending inwardly toward the other from the lower edge of an associated side wall, and an intermediate fastening flange adjoining the lower edge of said intermediate wall, said channel member having a width between the lower edges of said side walls which is no greater than the width of said top load-carrying wall, said channel member being made of a resilient material which enables the lower ends of an associated pair of its walls to be relatively spread apart at a location adjacent a set of associated fastening legs provided on an associated connector used to connect said channel member together with an associated channel member and upon releasing said associated walls the normal resiliency of said channel member causes said associated walls to return to their initial positions with the fastening flanges comprising said associated walls hooked around said fastening legs so that said channel member is adapted to be fastened and held in position against its associated connector by its fastening flanges.

9. A channel member as set forth in claim **8** in which said intermediate wall adjoins said top wall and said non-skid means comprise a plurality of upwardly extending projections provided as an integral part of said top wall.

10. A channel member as set forth in claim **8** in which said intermediate wall adjoins the central portion of said top wall and is arranged vertically therebeneath and said walls and flanges comprise a single unitary structure.

11. A channel member as set forth in claim **10** in which said intermediate wall has a vertical height which

is greater than the vertical height of each of said side walls and said top wall has an outwardly convex configuration which provides added strength and rigidity therefor for a given thickness of material.

12. A channel member as set forth in claim **10** in which said side and intermediate fastening flanges have bottom surfaces arranged in a common plane.

13. A channel member as set forth in claim **10** and having a width between the lower edges of its side walls which is substantially less than the width of its top load-carrying wall to thereby define said member having downwardly converging side walls.

14. A channel member as set forth in claim **10** in which said intermediate fastening flange comprises two flange portions symmetrically positioned on opposite sides of said intermediate wall.

* * * * *