United States Patent [19]

Bahramian

[11] **3,918,222**

[45] **Nov. 11, 1975**

[54] **PREFABRICATED MODULAR FLOORING AND ROOFING SYSTEM**

[76] Inventor: **Bahram Bahramian,** P.O. Box 15/1114, Tehran, Iran

[22] Filed: **June 3, 1974**

[21] Appl. No.: **475,430**

[52] **U.S. Cl.** **52/227;** 52/745; 29/452; 52/263; 52/301

[51] **Int. Cl.²** **E04G 21/00;** E04C 3/10; B21D 39/00

[58] **Field of Search** 52/251, 252, 253, 263, 52/283, 223, 227–230, 602, 258, 259, 301, 234, 236, 126, 745; 29/452

[56] **References Cited**

UNITED STATES PATENTS

707,924	8/1902	Hennebique	52/690
915,421	3/1909	Eisen	52/252
938,458	11/1909	Brockhausen	52/283
961,683	6/1910	Conzelman	52/252
1,376,152	4/1921	Moore	52/259
1,385,606	7/1921	Christensen	52/227
1,516,074	11/1924	Borg	52/252
2,374,624	4/1945	Schwendt	52/301
2,618,146	11/1952	Ciarlino	52/236
2,677,957	5/1954	Upson	52/230
3,152,421	10/1964	Middendorf	52/223 R
3,495,367	2/1970	Kobayashi	52/602
3,495,371	2/1970	Mitchell	52/236
3,567,816	3/1971	Embree	52/602

FOREIGN PATENTS OR APPLICATIONS

711,449	6/1954	United Kingdom	52/227
1,215,626	12/1970	United Kingdom	52/234
854,940	11/1970	Canada	52/263
1,450,491	7/1966	France	52/126

Primary Examiner—James L. Ridgill, Jr.
Attorney, Agent, or Firm—Jacox & Meckstroth

[57] **ABSTRACT**

A plurality of elongated precast concrete beams or slabs are prestressed longitudinally and arranged in parallel relation to form a waffle-type floor structure. Each of the beams or slabs includes a plurality of longitudinally spaced and laterally extending integral walls through which reinforcing tubes define corresponding openings. The openings in each beam or slab align with corresponding openings in each adjacent beam or slab, and a cable extends through each series of aligned openings. Each cable is post-tensioned and is then attached by cement mortar to the corresponding tubes to provide a modular floor or roof structure which distributes loads generally uniform in all directions. In one embodiment, a series of T-shaped and/or L-shaped precast reinforced slab members may be positioned between each set of adjacent beams and are adapted to rest on bosses projecting outwardly from the opposing sides of the adjacent beams. The slab members have reinforcing tubes defining openings which align with the openings within the beams and which also receive the cables before they are tensioned and cemented to the tubes. In another embodiment, the slabs are supported by a framework of prestressed elongated beams, and the ends of each beam are supported by precast head members mounted on the top of upright columns. The laterally extending post-tensioned cables are attached to loops projecting upwardly from the adjacent beams, and a layer of topping concrete covers the loops and cables on each beam.

4 Claims, 12 Drawing Figures

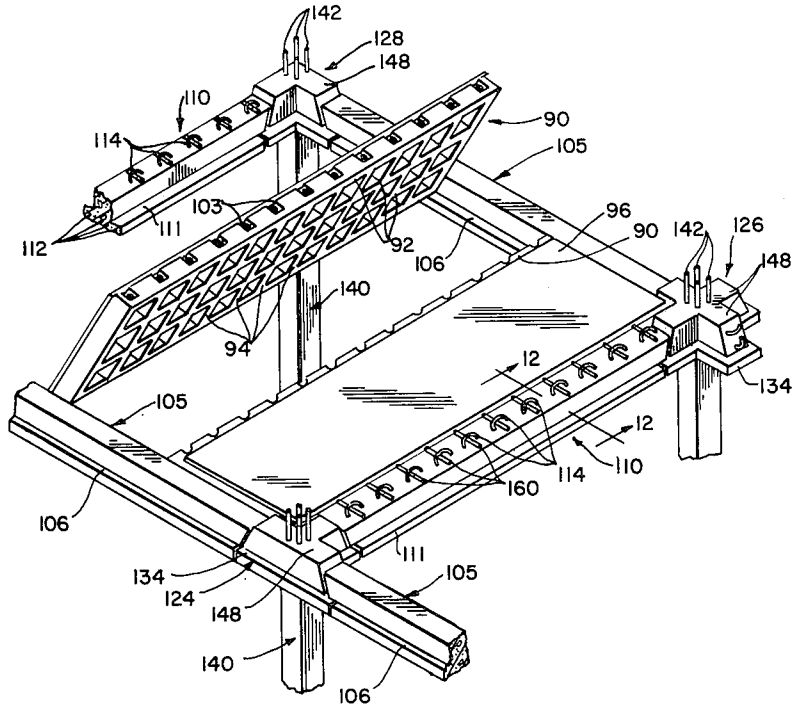


FIG-1

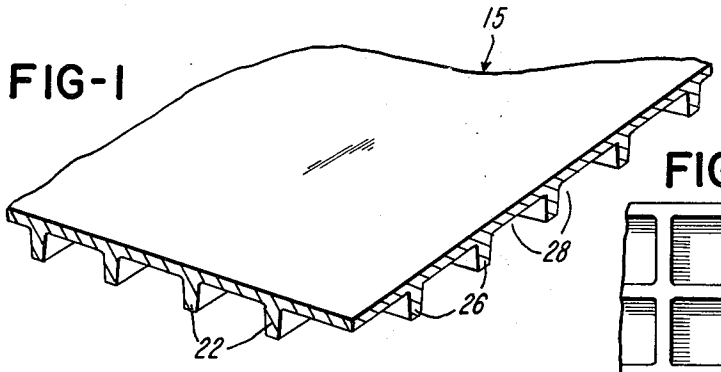


FIG-2

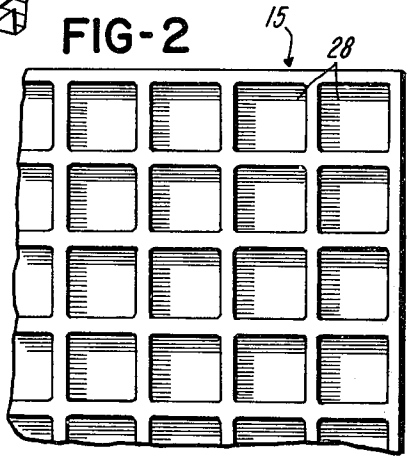


FIG-3

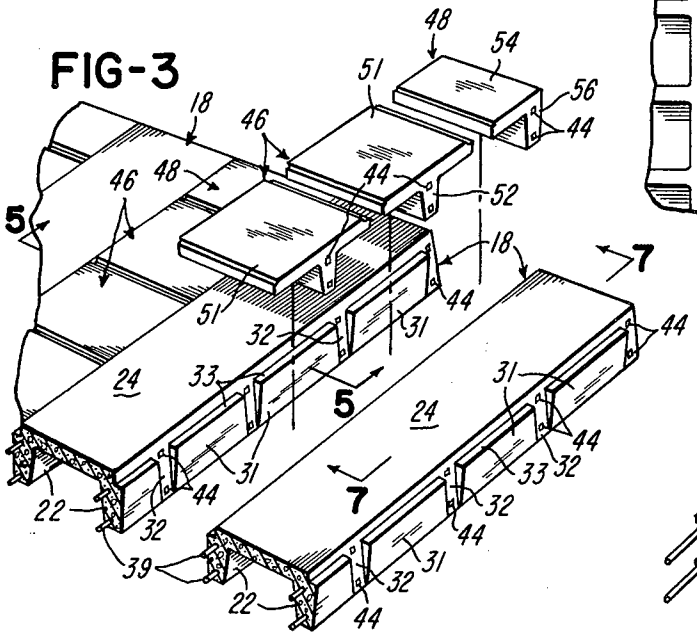


FIG-4

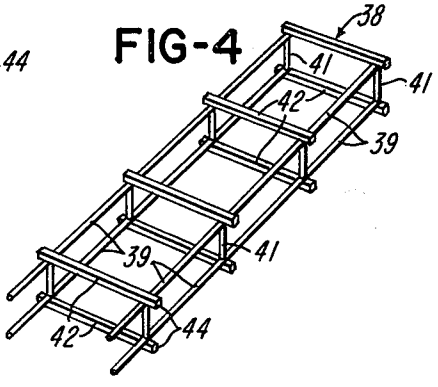


FIG-5

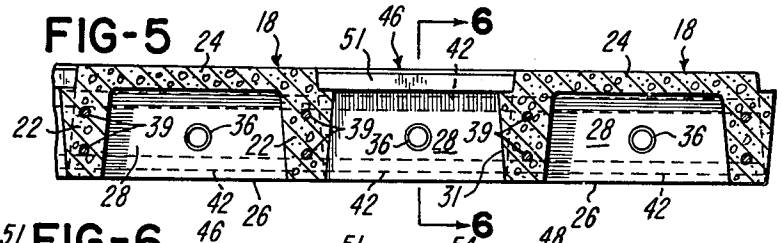


FIG-9

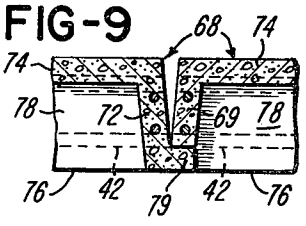


FIG-6

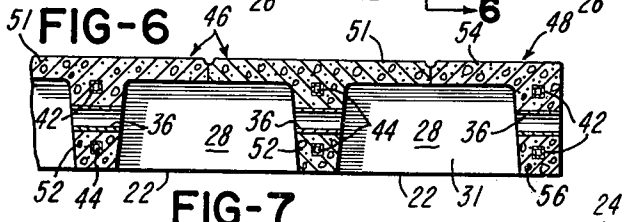


FIG-8

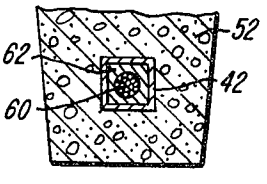


FIG-7

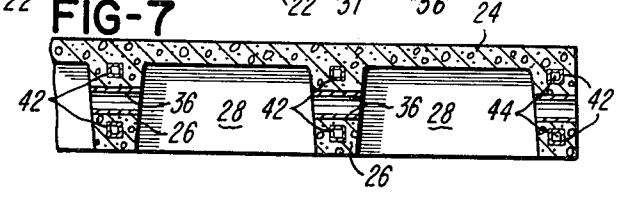


FIG. 10

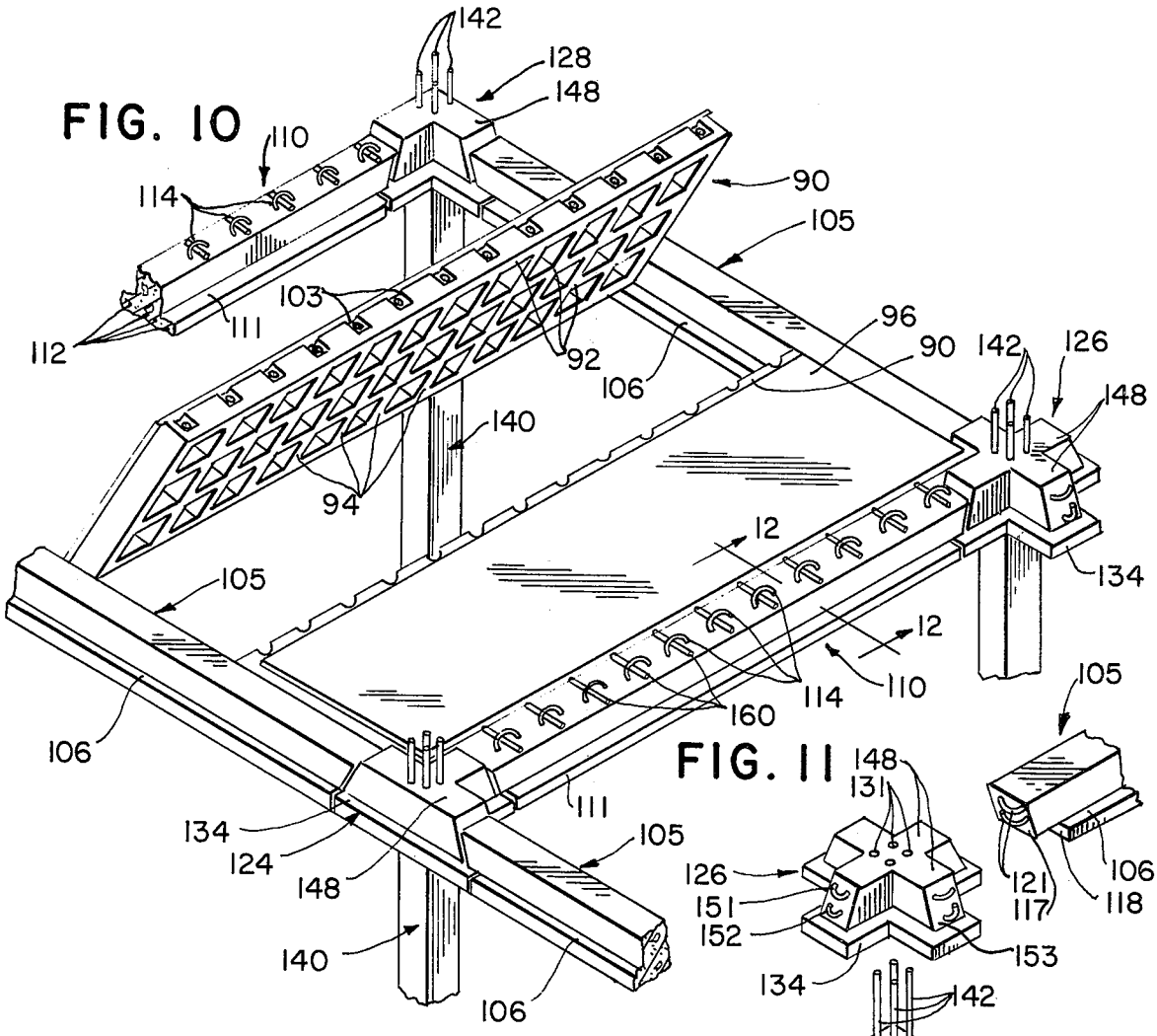
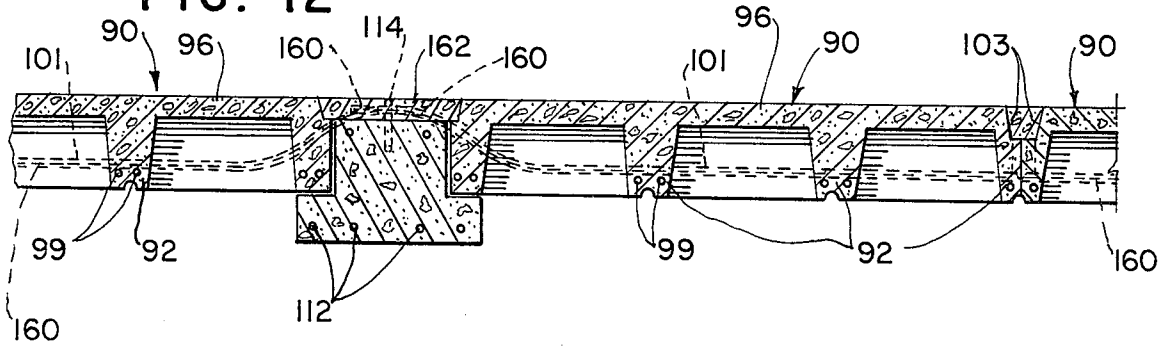


FIG. 11

FIG. 12



PREFABRICATED MODULAR FLOORING AND ROOFING SYSTEM

BACKGROUND OF THE INVENTION

In the construction of a concrete floor or roof for a building structure, it is common to use a plurality of elongated precast and prestressed concrete modules or beams which are positioned in side-by-side parallel relation on a steel frame or support structure. This modular floor or roof assembly eliminates the need for erecting forms and pouring or casting a concrete floor at the building site. However, the weight of each of these concrete modules or beams is supported entirely by one set of opposite sides of the frame on which the end portions of the beam rest. The same side of the frame must also support the load on each beam since the load distribution by each beam is only in one direction which is longitudinally of the beam.

When it is desirable for the weight of a floor or roof structure and the load supported thereby, to be distributed substantially uniformly to the four sides of the frame structure, that is, a two-directional distribution of the load, it is common to erect a set of forms and to cast a concrete floor or roof which has both laterally and longitudinally extending reinforcing beams. When the forms are removed, the crossing beams form a waffle-like appearance from the underneath side of the floor or roof. However, it has been found that the erecting of the forms and the casting of a reinforced concrete floor having a waffle-like bottom surface, requires substantially more time and labor than does the assembly of precast and prestressed concrete modular beams on the supporting frame of the building structure.

SUMMARY OF THE INVENTION

The present invention is directed to an improved prefabricated modular flooring or roofing system and a method for producing the same. The flooring and roofing system of the invention provides for a substantially uniform distribution of the weight of each floor or roof and the load supported thereby to the frame or walls extending around the periphery of the floor or roof. That is, the modular floor and roof system of the invention provides for a two-way or X-Y distribution of the load to the four walls bordering the floor or roof. As another important feature, the roof and floor system of the invention eliminated the need for erecting forms and provides for a simplified and rapid construction of the floor or roof.

In accordance with one of the illustrated embodiments of the invention, a plurality of precast elongated concrete beams are positioned in parallel relation on an outer supporting frame structure. Each of the beams is reinforced by longitudinally extending reinforcing rods and/or prestressed cables which are connected by laterally extending reinforcement tubes. The reinforcing tubes extend laterally through corresponding longitudinally spaced intermediate walls of each beam member, and the openings defined by the tube of each beam aligned with a corresponding opening within each adjacent beam.

A steel cable extends through each series of aligned openings within the beams and are tensioned and cemented to the corresponding reinforcing tubes to provide a floor or roof structure which is reinforced or prestressed in the longitudinal direction of the beams and

is post-tensioned in a direction normal to the parallel beams. The sides of the precast modular beams are formed with outwardly projecting bosses for supporting intermediately spaced precast concrete slabs which are also reinforced by tubes defining openings for receiving the cables.

In another embodiment, each precast floor slab has a waffle-type configuration, and a plurality of the slabs are supported in parallel adjacent relation by a frame formed of precast beams. The ends of the beams are supported by precast head members which mount on corresponding support columns, and the post-tension cables are connected to the corresponding beams by a topping layer of concrete poured onto the beams. Other features and advantages of the invention will be apparent from the following description, the accompanying drawing and the appended claims.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a fragmentary perspective view of a completed concrete floor constructed in accordance with the present invention;

FIG. 2 is a fragmentary bottom view of the floor shown in FIG. 1;

FIG. 3 is a fragmentary perspective view of the floor shown in FIGS. 1 and 2 and with some of the components or elements illustrated in exploded positions before assembly;

FIG. 4 is a fragmentary perspective view of a reinforcing structure for one of the precast concrete beams shown in FIG. 3;

FIG. 5 is a slightly enlarged fragmentary section taken generally on the line 5—5 of FIG. 3;

FIG. 6 is a fragmentary section taken generally on the line 6—6 of FIG. 5;

FIG. 7 is a slightly enlarged fragmentary section taken generally on the line 7—7 of FIG. 3;

FIG. 8 is an enlarged fragmentary section of a portion of a precast modular element shown in FIG. 6;

FIG. 9 is a fragmentary section of two adjacent beams constructed and assembled in accordance with another embodiment of the invention;

FIG. 10 is a fragmentary perspective view of a floor system constructed in accordance with another embodiment of the invention;

FIG. 11 is an exploded perspective view of a portion of the system shown in FIG. 10; and

FIG. 12 is an enlarged fragmentary vertical section of the floor system shown in FIG. 10.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

A floor structure or system 15 constructed in accordance with the present invention, is shown in FIGS. 1 and 2, and has the general appearance of a cast-in-place concrete floor having a waffle-like bottom appearance as mentioned above. This floor structure is constructed by positioning a plurality of parallel spaced elongated modular slabs or beams 18 on a pre-erected frame structure (not shown) consisting of a series of vertical frame members or columns rigidly connected by horizontal frame members or cross-beams. Each of the slabs or beams 18 is prefabricated or precast from a concrete material and includes a pair of longitudinally extending sidewalls 22 integrally connected by an upper or top wall 24 and a plurality of longitudinally spaced and laterally extending intermediate walls 26. These walls cooperate to define a plurality of longitudi-

nally spaced open bottom cavities **28** within each of the beams **18**.

As shown in FIGS. **3** and **5**, each of the sidewalls **22** of each beam **18** includes a series of longitudinally spaced and outwardly projecting bosses **31** which are cast as an integral part of the beam. The bosses **31** define a corresponding series of longitudinally spaced slots or grooves **32** between the ends of the bosses **31**. Each boss **31** has a benerally triangular configuration and forms a longitudinally extending surface or seat **33** along the top of each boss. That is, the outer surface of each boss **31** tapers inwardly toward the bottom of the beam **18**, and the inner surface of each groove **32** tapers inwardly toward the top surface of the beam **18**.

The inner surfaces of the sidewalls **22** and the intermediate walls **26** also taper outwardly towards the top wall **24** of the beam **18** so that the cavities **28** each have a truncated pyramid configuration. These tapered wall surfaces provide for convenient removal of each beam **18** from its corresponding mold after the concrete has set. As shown in FIG. **5**, a tube section **36** extends through each of the intermediate walls **26** of each beam **18** and is positioned within the mold prior to casting the beam **18** to provide for extending electrical and fluid lines within the floor structure after it is assembled. Preferably tube sections **36** are formed from steel tubing.

Referring to FIGS. **3** and **4**, each of the beams **18** is reinforced by a steel reinforcing structure **38** (FIG. **4**) which includes a series of longitudinally extending parallel reinforcing rods **39** rigidly connected by spot welds to a plurality of sets of vertical reinforcing rods **41** and a plurality of longitudinally spaced sets of laterally extending upper and lower steel reinforcing tubes **42**. Each of the tubes **42** has a square cross-sectional configuration and defines a correspondingly shaped passage or opening **44** extending through the tube. As shown in FIG. **5**, each set of upper and lower tubes **42** extends laterally through the corresponding intermediate wall **26** of the beam **18**, and the ends of the passages or openings **44** open into the corresponding grooves **32** defined between the ends of the outwardly projecting bosses **31** on each beam **18**.

As shown in FIGS. **3** and **6**, a series of modular elements or slab members **46** and **48** are positioned between each pair of adjacent beams **18** and are precast of a reinforced concrete material either in the same manner as the beams **18** or in a continuous manner with insert dividers forming the ends of each of a slab member. Each of the slab members **46** includes an upper or top wall **51** which is integrally formed with a center vertical wall **52** to define a generally T-shaped cross-sectional configuration. Each of the slab members **48** includes a top wall **54** and one sidewall **56** to define a generally inverted L-shaped configuration. The slab members **46** and **48** are each reinforced by a steel reinforcing structure which includes a corresponding set of upper and lower steel reinforcing tubes **42** defining corresponding passages or openings **44** extending longitudinally through the slab member.

The slab elements or members **46** and **48** are positioned between each pair of adjacent beams **18** so that the ends of the upper walls **51** and **54** of the slab members rest upon the corresponding seats **33** defined by the bosses **31** on the beams **18**. The ends of the vertical walls **52** and **56** interfit into the corresponding grooves **32** defined between the bosses **31**, and the upper flat surfaces of the slab members are flush with the upper flat surfaces of the beam **18**. After the slab members **46** and **48** are assembled in this manner, the openings **44** defined by the reinforcing tubes **42** within the slab members **46** and **48** align with the corresponding openings **44** defined by the laterally extending reinforcing tubes **42** within the beams **18** so that the upper and lower sets of aligned openings extend across the entire width of the floor structure. As shown in FIG. **6**, the vertical walls **52** and **56** of the slab members **46** and **48** respectively, cooperate with the side walls **22** of the adjacent beams **18** to define corresponding cavities **28**. In addition each wall **52** and **56** is provided with a tube section **36** to provide for conveniently extending electrical and fluid lines within the floor structure.

After the precast beams **18** and slab members **46** and **48** are assembled on the support frame structure (not shown), an elongated reinforcing member or steel cable **60** (FIG. **8**) is extended through at least each series of the lower aligned openings **44** within the beams **18** and the slab members **46** and **48**. Preferably, the leading end of each cable **60** is provided with a slip-on plastic fitting (not shown) having a pointed end surface which simplifies threading or pushing each cable **60** through the aligned series of openings **44**. If a portion of the assembled floor structure is supported in a cantilevered manner, cables **60** are also extended through the upper set of openings **44** within the beams and slab members to provide for the change in bending moments resulting from the cantilevered portion.

Clamps (not shown) are secured to the end portions of each cable **60** projecting outwardly from the opposite sides of the floor structure, and the cables are tensioned by hydraulic jacks. The reinforcing tubes defining the openings **44** are then pumped full or filled with a grout or cement mixture **62** which is allowed to set and cure for bonding or securing each of the cables **62** to the corresponding set of aligned reinforcing tubes. After this tensioning operation with the cables **60**, and the setting of the cement mixture **62**, the entire floor structure is reinforced or post-tensioned in a laterally extending direction to provide for a two-way distribution of the weight of the floor structure and the load supported by the floor structure to the supporting frame structure extending adjacent the four sides of the floor.

Referring to FIG. **9** which shows a modification of a floor or roof structure constructed in accordance with the invention, a series of elongated beam members **68** are precast or prefabricated in a manner substantially the same as the beams **18** and with reinforcing structure **38** such as shown in FIG. **4**. However, instead of being placed in parallel spaced relation as shown in FIG. **3** for receiving the intermediate slab members **46** and **48**, the beams **68** are positioned in parallel continuous relation so that the slab members **46** and **48** are eliminated. Each of the beams **68** includes longitudinally extending opposite side walls **69** and **72** which are integrally connected by an upper wall **74** and a series of longitudinally spaced and laterally extending intermediate walls **76**. The side walls **69** and **72**, the top wall **74** and the intermediate walls **76** of each beam **68** cooperate to define a corresponding series of longitudinally spaced open bottom cavities **78** each having a generally truncated pyramid configuration similar to the configuration of the cavities **28** within the beams **18**.

The sidewall **72** of each of the beams **68** includes an outwardly projecting integral bottom lip or flange portion **79** which forms a seat for receiving the bottom of

the somewhat shorter sidewall **69** of the adjacent beam **68** (FIG. **9**). The laterally extending reinforcing tubes **42** within each of the beams **68** align with the corresponding tubes **42** within each adjacent beam **68** so that each series of correspondingly aligned openings **44** are adapted to receive a reinforcing cable **60** in the same manner as described above in connection with the beams **18.** Each laterally extending reinforcing cable **60** is tensioned and cemented or secured to the corresponding reinforcing tubes **42** to provide a floor structure which is reinforced longitudinally and laterally post-tensioned in the same manner as the floor structure shown in FIGS. **3 – 7.**

Referring to FIGS. **10 – 12** which show another modular form of roof or floor system constructed in accordance with the invention, a set of precast concrete panels or slabs **90** each have a rectangular configuration and are arranged in side-by-side relation to form a complete rectangular bay. Each of the slabs **90,** which by itself is not a complete flooring slab and it is only a part or segment of it, includes a plurality of longitudinally extending walls **90** which are integrally connected by laterally extending walls **94** and a top wall **96** to define a plurality of rows of downwardly facing cavities each having a square or rectangular configuration to form a waffle-type construction. Each of the walls **92** and **94** have a tapered configuration as shown in FIG. **12,** and elongated prestressed rods or cables **99** (FIG. **12**) extend longitudinally of the slabs **90** through the lower portion of each longitudinally extending wall **92.** A series of longitudinally spaced tubes **101** extend laterally through the walls **94** and are secured to the prestressed or reinforcing members **99,** for example, by spot welds. The tubes **101** within the end slabs **90** of each set, have end portions which curve upwardly adjacent the outer side walls **92** of the slabs, and the ends of each tube **101** terminate within corresponding cavities **103** formed within the outer longitudinal walls **92.**

The opposite ends of each precast concrete slab **90** are supported by corresponding elongated precast concrete beams **105** each of which includes outwardly projecting and longitudinally extending flange portions **106** adjacent the bottom of each beam. The outer longitudinal edges of the end slabs **90** within each bay, are supported by corresponding elongated precast concrete beams **110** each of which also includes longitudinally extending bottom flange portions **111.** Each of the beams **105** and **110** is prestressed by longitudinally extending members **112** in the form of prestressed rods or cables which are located within the upper and lower portions of the beam. The precast concrete beams **110** include a series of longitudinally spaced inverted U-shaped loop members **114** each of which has a lower portion embedded in the concrete beam **110.**

Each of the precast and prestressed beams **105** and **110** has sloping end surfaces **117** (FIG. **11**) and a recessed bottom end surface **118** for the flange portions **106** and **111.** A pair of loop members **121** (FIG. **11**) similar to the loop members **114,** are embedded within each end portion of each beam **105** and **110** and project outwardly from the sloping end surface **117.** The end portions of each beam **105** and **110** are supported by various combinations of precast concrete head support members **124, 126** and **128** each of which is constructed with four uniformly spaced vertical holes **131** (FIG. **11**) within its center portion. As apparent from FIG. **10,** the head support member **124** has a generally T-shaped configuration, and the head support member **126** has an X-shaped configuration while the head support member **128** has an L-shaped configuration.

Each of the head support members includes a lower or bottom peripheral flange portion **134** which aligns with the flange portions **106** and **111** of the beams **105** and **110** and also abuts the adjacent recessed end surface **118** of the adjacent beams. Each of the head support members is mounted on a vertical precast concrete support post or column **140** which is reinforced by a set of vertical reinforcing rods **142.** The upper end portions of the reinforcing rods **142** project through the corresponding holes **131** within the corresponding head member and are also adapted to project above the head member into corresponding holes formed within the lower end portion of each column **140** mounted on top of the head member for supporting the next floor thereabove.

The head support members **124, 126** and **128** include a plurality of outwardly projecting block-like portions **148** each of which has embedded therein a U-shaped loop member **151** spaced above an L-shaped hook member **152.** The outer end surface **153** of each portion **148** slopes on an angle which conforms to the angle of the outer end surface **117** of the adjacent beam **105** or **110.**

The construction or erection of the floor or roof system shown in FIGS. **10–12,** is commenced by positioning the posts or columns **140** on the base foundation or footer for the building. The precast head support members **124, 126** and **128** are mounted on the upper end surfaces of the columns **140** with the column reinforcing rods **142** extending through the corresponding holes **131** within the head support members. The precast and prestressed beams **105** and **110** are then placed in position with the lower loop member **121** at each end of each beam hooked onto the corresponding hook member **152** of the adjacent head support member. The upper loop member **121** overlaps the adjacent loop member **151,** and a short rod segment (not shown) is inserted between the overlapping loop members to form a positive connection.

The precast concrete panels or slabs **90** are then placed in position with the ends of each slab resting on the underlying flange portions **106** of the beams **105.** After a bay is completed with a series of adjacent slabs **90,** a series of post-tension cables **160** are fed through the laterally aligned tubes **101** within each set of slabs **90,** and the cables are directed through or connected to the corresponding loop members **114** projecting upwardly from the beams **110** of each bay. The cables **160** are then tensioned, and a cement grout is pumped into the tubes **101** to form a bond between the cables **160** and the corresponding tubes **101** within each precast slab **90.**

As apparent in FIG. **10,** the upper surface of the head support members **124, 126** and **128** are substantially flush with or slightly above the top surfaces of the slabs **90,** and the top surfaces of the beams **105** and **110** extend below the top surfaces of the slabs **90** about 2 inches. After the cables **160** are post-tensioned, a topping layer **162** of concrete is poured over the top of each beam **105** and **110.** The topping concrete is also inserted into the mating cavities **103** of the adjacent slabs **90** and into the joints formed between the ends of each slab **90** and the adjacent support beams **105.** The topping concrete layer **162** covering the beams **110** is efective to cover the post-tensioned cables **160** and the

loop members **114** to form a bond between the cables **160** and the beams **110.** Thus it is apparent that after a floor or roof is formed by the modular elements of the invention, the entire roof or floor structure acts as a monolithic continuous floor or roof structure which is prestressed in one direction and post-tensioned in the other direction. Thus the structure provides for a two way or X-Y distribution of the entire weight of the floor structure and the load supported by the floor structure so that the entire load is uniformly supported by the beams **105** and **110.**

From the drawing and the above description, it is apparent that a floor or roof system constructed in accordance with the present invention, provides desirable features and advantages. The series of longitudinally spaced and laterally extending tubes within each of the precast reinforced beams **18** or **68** or slabs **90,** provide for extending elongated reinforcing members or cables **60** or **160** laterally through the entire floor or roof structure. As a result, the longitudinally prestressed beams or slabs are reinforced or post-tensioned as a unit in a lateral direction by simply securing each tensioned cable **60** to each beam or slab with a cement or other bonding material which is pumped into the tube around the cable **60.** Thus the weight of the floor or roof structure and the load supported by the structure is uniformly distributed both longitudinally of the beams and laterally across the beams, or in a two-way or X-Y direction so that the load of the floor or roof structure is uniformly supported by all of the bordering frame walls or columns of the building structure.

Furthermore, the prefabricated roof and flooring structure is adapted to be erected or assembled without the use of forms on site and thus results in more economical building construction. The use of the slab members **46** and **48** are particularly suited for constructing a floor or roof which has a lateral dimension different from even multiples of the width of each beam **18.** That is, the length of the slab members **46** and **48** may be easily and conveniently changed to permit the floor structure shown in FIG. **3** to be used in a building structure of up to approximately **22** feet in length and width. On the other hand, if the building structure is designed to use of the flooring or roofing system of the invention, the beams **68** can be used in adjacent relation as shown in FIG. **9** without the use of the intermediate slab members **46** and **48.** However, whichever modification is used, the spacing of the vertical walls which define the cavities **28** or **78** will remain uniform so that the load is uniformly distributed by the walls.

The embodiment shown in FIGS. **10 – 12** provides the additional feature of minimizing the time and cost of constructing or erecting a floor or roof structure by forming one or more bays each having a series of slabs **90** and a supporting framework formed by the beams **105** and **110** and the head members **124, 126** and **128.** The set of slabs **90** within each bay are placed between the beams, and the casting of topping concrete **162** to embrace projecting reinforcing elements between the slabs and beams, provides for a monolithic continuous twoway roofing system. It is also apparent that the roofing system shown in FIGS. **1 – 8** is adapted for use with the frame system shown in FIGS. **10 – 12.**

While the forms of floor structure herein described constitute preferred embodiments of the invention, it is to be understood that the invention is not limited to these precise forms of floor structure, and that changes may be made therein without departing from the scope and spirit of the invention. For example, it is apparent that the reinforcing rods **39** within each beam **18** or **68** may be replaced by pre-tensioned cables so that the beam is prestressed, or that the tubes **42** may be round instead of square or rectangular. It is also apparent that each of the beams **18** or **38** may have a relative width greater than that illustrated in the drawing and may include one or more longitudinally extending integral walls intermediate the side walls **20** or **69** and **72** and which cooperate with the intermediate walls **26** or **76** to define multiple laterally spaced rows of longitudinally spaced cavities **28** or **78.** The slabs **90** shown in FIGS. **10 – 12** illustrate this construction.

The invention having thus been described, the following is claimed:

1. In a prefabricated modular flooring system for a building structure, including a first set of parallel spaced elongated precast concrete beams disposed perpendicular to a second set of parallel spaced elongated precast concrete beams and cooperating to form a frame defining a bay, means for supporting the adjacent ends of said beams at the corners of said frame, a plurality of rectangular precast concrete floor slabs disposed in parallel horizontal relation within said frame and having opposite end portions mounted on said firrst set of beams for supporting one portion of the floor load by said first set of beams, each of said floor slabs including a plurality of laterally spaced longitudinally extending walls projecting downwardly from an integrally connecting substantially flat horizontal upper wall, each of said floor slabs further including a plurality of longitudinally spaced and laterally extending transverse walls projecting downwardly from said upper wall and integrally connecting said upper and longitudinally extending walls to define a plurality of longitudinally and laterally spaced downwardly facing cavities providing the bottom of said floor slab with a waffle-type configuration, and a set of elongated reinforcing members extending longitudinally within each said floor slab through said longitudinally extending walls, the improvement comprising a set of longitudinally spaced tubes extending substantially horizontally through said transverse walls of each said floor slab, said tubes within one said floor slab being in substantial horizontal alignment with the corresponding said tubes within each horizontally adjacent said floor slab, and elongated flexible post-tension cable extending continuously through each set of horizontally aligned said tubes within said floor slabs, and means for securing said cables to said second set of beams and said floor slabs after said cables are tensioned to provide for supporting another portion of the floor load by said second sets of beams and thereby produce a two-way distribution of the floor load to both said first and second sets of beams.

2. A modular flooring system as defined in claim **1** including a series of longitudinally disposed slab members positioned between adjacent said slabs, and each said slab member has a generally T-shaped cross-sectional configuration in a direction parallel to said elongated slabs.

3. A modular flooring system as defined in claim **1** wherein said second set of said beams each have outwardly projecting and longitudinally extending bottom flanges and a top surface disposed below the top surfaces of said slabs, said cables extend adjacent the top surfaces of said second set of beams, and means including a layer of concrete on the top surface of said second

set of beams for securing said cables to said second set of beams.

4. In a method of constructing a prefabricated modular flooring system for a building structure, including the steps of positioning a first set of parallel spaced elongated precast concrete beams perpendicular to a second set of parallel spaced elongated precast concrete beams to form a horizontal frame defining a bay, supporting the adjacent ends of said beams at the corners of said frame, positioning a plurality of rectangular precast concrete floor slabs in parallel horizontal relation within said frame with opposite end portions of said slabs mounted on said first set of beams for supporting a portion of the floor load by said first set of beams, forming each of said floor slabs with a plurality of laterally spaced longitudinally extending walls projecting downwardly from an integrally connecting substantially flat horizontal upper wall, forming each of said floor slabs with a plurality of longitudinally spaced and laterally extending transverse walls projecting downwardly from said upper wall and integrally connecting said upper and longitudinally extending walls to define a plurality of longitudinally and laterally spaced downwardly facing cavities providing the bottom of said floor slab with a waffle-type configuration, and extending a set of elongated reinforcing members longitudinally within each said floor slab through said longitudinally extending walls, the improvement comprising the steps of extending a set of longitudinally spaced tubes substantially horizontally through said transverse walls of each said floor slab, locating said tubes within each floor slab in substantial horizontal alignment with the corresponding said tubes within each horizontally adjacent said floor slab, extending an elongated flexible post-tension cable continuously through each set of horizontally aligned said tubes within said floor slabs, and securing said cables to said second set of beams and said floor slabs after said cables are tensioned to provide for supporting another portion of the floor load by said second sets of beams and thereby produce a two-way distribution of the floor load to both said first and second sets of beams.

* * * * *