July 12, 1966 R. L. FRASER 3,260,028

METHOD OF CONSTRUCTING A BUILDING

Filed July 22, 1963

FIG. 1

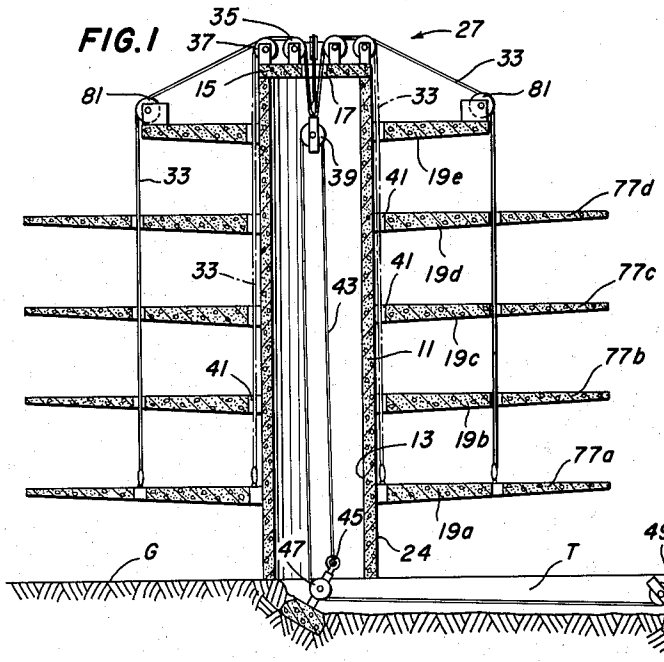


FIG. 4

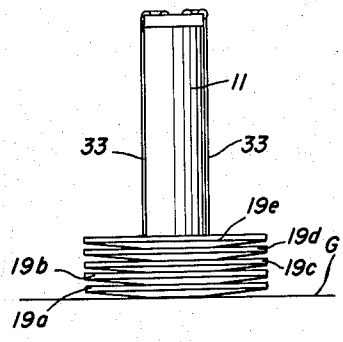


FIG. 2

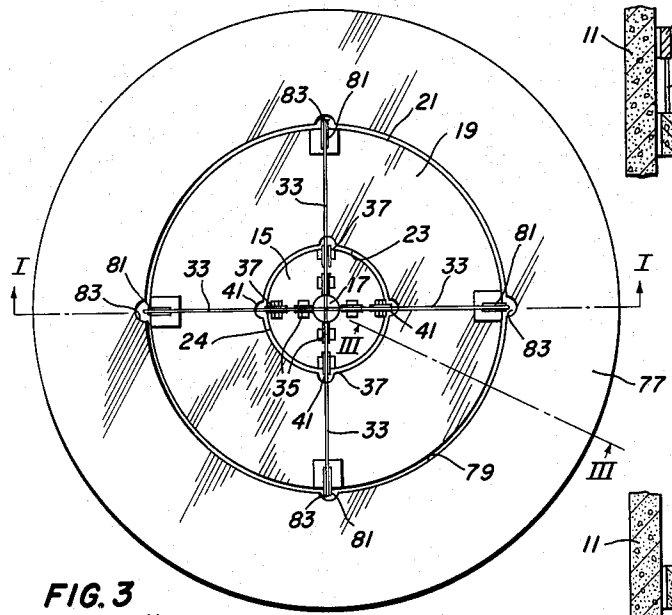


FIG. 5

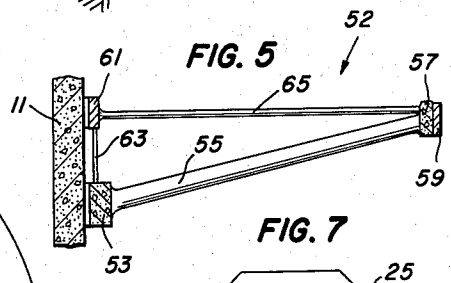


FIG. 7

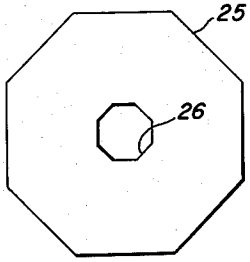


FIG. 3

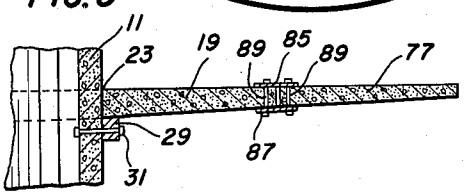
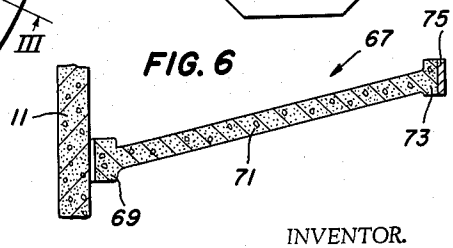


FIG. 6



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METHOD OF CONSTRUCTING A BUILDING

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This invention relates to a method of constructing a building.

One of the objects of the present invention is to provide a unique and simple method of constructing a building.

A further object is to provide such a method which can be accomplished with greater speed than was heretofore possible with the usual and known methods of erecting a building.

A further object is to provide a method of constructing a building wherein a major part of the construction steps are repetitive so that economy can be achieved.

A further object is to provide such a method which results in a unique and conveniently arranged building.

A further object is to provide such a method which results in a building having more usable floor space as compared with conventional buildings.

A further object is to provide such a method in which the major part of the construction is done adjacent the ground, thereby eliminating the necessity for tall booms, etc. to move the building materials, such as concrete.

A further object is to provide a unique method of forming the floors.

A further object is to provide a method of constructing a building with hoisting equipment comprising the steps of constructing a central core in upstanding relationship from the supporting ground, constructing adjacent the ground a plurality of floors respectively having central openings through which said core extends; and by the use of said hoisting equipment respectively attached between said floors and said core and by the use of said core as a support from the ground, hoisting said floors successively to position said floors in vertically spaced relationship and with the upper one being hoisted first to a position adjacent the top of said core and then on down to the bottom one to a position adjacent the bottom of said core.

A further object is to provide a unique method for expanding a building.

A further object is generally to improve the design and construction of buildings.

The means by which the foregoing and other objects of the present invention are accomplished and the manner of their accomplishment will be readily understood from the following specification upon reference to the accompanying drawings, in which:

FIG. 1 is a sectional view taken as on the line I—I of FIG. 2 and showing the hoisting equipment used in connection with the method of the present invention.

FIG. 2 is a top plan view of a partially completed building in which the method of the present invention has been used.

FIG. 3 is a fragmentary sectional view on an enlarged scale taken as on the line III—III of FIG. 2.

FIG. 4 is a diagrammatic view on a reduced scale showing one step in the method of the present invention.

FIG. 5 is a view similar to FIG. 3 showing a floor constructed by an alternate method.

FIG. 6 is a view similar to FIGS. 3 and 5 of another alternate method of forming the floor.

FIG. 7 is a diagrammatic plan view of still another alternate floor.

Referring now to the drawings in which the various parts are indicated by reference characters, the first step in carrying out the method of the present invention is to erect a cylindrical core **11**, which, when the building is constructed in a manner later to be described, becomes the central portion of the building. Cylindrical core **11** is preferably hollow to provide a central shaft **13**, which, in the completed building, is adapted to receive such equipment as desired, for example, elevators, stairways, and other means, not shown, to provide access to the completed building. Core **11** is preferably formed of concrete and preferably, though not necessarily, is erected by conventional slip form methods. In other words, an annular form, not shown, is provided, and the concrete is substantially continuously poured from the bottom of core **11** towards the top thereof. In the completed form, cylindrical core **11** extends vertically upwardly in upstanding relationship from the supporting ground G. Suitable foundations, not shown, for the core **11** are preferably provided, as, for example, by extending the core downwardly into the ground G for a suitable distance. A cap **15** having a central opening **17** for a purpose later to be described, is preferably provided on the top of core **11**, as best seen in FIGS. 1 and 2.

Having constructed core **11**, as above described, the next step in the method of the present invention is to construct adjacent the ground G a plurality of floors **19**, which are stacked one on top of another with the lowermost one **19***a* being preferably supported from ground G and the others being supported thereon. For purposes of clarity, the floors have been designated **19***a*, **19***b*, etc. from the ground upwardly. In the drawings, five floors **19** have been shown, with the uppermost one being **19***e*, although other numbers of floors can be provided without departing from the spirit and scope of the present invention. It should be noted that the floors **19** are individually constructed and are preferably of concrete. The floors **19** are formed by any suitable well-known means, such as providing forms, not shown, in which concrete is poured and providing suitable removable separating members, not shown, between the floors. Floors **19** are concentric with core **11** and respectively surround the core. It will be understood that although the floors **19** are shown in the drawing as being stacked, if desired, the floors can be formed or assembled one at a time and then hoisted before the next one is formed or assembled. Each of the floors **19** is preferably annular in shape; that is, the outer peripheral edge **21** thereof is substantially circular, and a substantially circular central opening **23** is provided therethrough and through which extends cylindrical core **11**. Each of the openings **23** is slightly larger than the outside surface **24** of cylindrical core **11** so that each floor **19** is vertically movable relative to the core **11**. FIG. 4 shows the partly finished building after this step has been completed, that is, after the floors **19** have been constructed adjacent the ground G in surrounding relationship to core **11**. When the term "substantially circular" is used herein, it will be deemed to include not only a substantially exact circular shape, as the outer edge **21** and the central opening **23**, but also other substantially circular shapes such as the outer edge **25** of the floor shown in FIG. **7**, which is formed from a plurality of chords of a circle, and the opening **26** of this same floor which is similarly formed. It will be understood that with an opening shaped as opening **26**, the core used therewith should be correspondingly shaped.

Continuing with the description of the method of the present invention, in the next step, by using suitable hoisting equipment **27** and by the use of core **11** as the support from the ground G, the floors **19** are hoisted from the positions shown in FIG. 4 to the positions shown in FIG. 1, wherein it will be seen the floors **19***a*–**19***e* are vertically spaced. Also, it should be noted that the term "floors" is loosely used since, when in position, the floors also may act as a ceiling for the floor therebelow, and the uppermost floor **19***e* preferably becomes the roof of the building, although it can become the floor of an attic if it is

desired to build one above the floor **19***e*. Once the floors **19** are in place, they are secured by suitable means, as, for example, by blocks such as the block **29** shown in FIG. 3 upon which the floor **19** rests and which block is fixedly attached to core **11** by suitable means, as fastening member **31**.

The hoisting equipment **27** for hoisting the floors **19**, as above described, is of any suitable construction and preferably as shown in FIGS. 1, 2 and 4 wherein it will be seen a plurality of hoisting cables **33** are fixedly attached to the floor **19** being hoisted at places adjacent central opening **23** and respectively extend upwardly over pairs of pulleys **35, 37** which are supported from cap **15**, and then the hoisting cables extend downwardly through opening **17** to their place of attachment with a pulley **39**. In FIG. 1, the hoisting cables **33** are shown attached to the lowermost floor **19***a* and extend upwardly through notches **41** provided in the other floors **19** adjacent central openings **23**. In addition, hoisting equipment **27** preferably includes another cable **43** which is anchored at the end thereof as at **45** by suitable means and which leads upwardly through pulley **39**, downwardly through a pulley **47** anchored in a trough T provided in ground G beneath core **11** and extending outwardly therefrom, horizontally through trough T, through another pulley **49** in trough T, and finally to a winch **51**. It will be understood that as winch **51** is turned, the cable **43** will cause downward pull on pulley **39** which, in turn, will cause hoisting cables **33** to pull upwardly on the floor to which attached. The floors **19** are lifted successively with the topmost one, that is, **19***e*, being lifted first and so on down by first attaching the ends of the hoisting cables **33** to the floor **19***e*, lifting it into place adjacent the upper end of core **11**, then securing it, detaching the cables **33** from floor **19***e*, attaching them to floor **19***d*, and so on until the lowermost floor **19***a* is put into place. After the floors **19** have been put into the positions as above described, the building can then be finished by suitable conventional means, as, for example, by providing partitions, outside walls, etc. in the desired manner.

An alternate method of constructing the floor is shown in FIG. 5 wherein a portion of one of the floors **52** is shown. For this alternate method, an annular hub section **53** is constructed around core **11**. A plurality of spoke members **55** are attached to hub section **53** in spaced apart relationship. The spoke members **55** extend radially outwardly from the hub section and are angled upwardly therefrom to their places of termination at distal ends remote from hub section **53** in much the same manner as spokes in a bicycle wheel. An outer ring **57** concentric with hub section **53** is attached to spoke members **55** adjacent the distal ends thereof. Hub section **53**, spoke members **55**, and outer ring **57** are preferably, though not necessarily, integrally formed of concrete. Next, a tensile band **59** is placed around outer ring **57** to give structural strength to the floor **52**. It will be understood that when the word "around" is used in the specification and in the claims, it is used in its broadest sense. Thus, the term "tensile bands respectively around said floors," in the claims is not limited to the tensile bands being around the outside of the floors, but may be simply "around" the floors in any location, as for example, at places spaced inwardly of the outside diameter of the floors so long as the tensile bands give structural strength to the floors whereby they may be lifted. An inner ring **61** is preferably provided around core **11** above hub section **53** and is held in spaced relationship thereto by means of rigid spacing means such as members **63**. A plurality of angularly spaced and radially extending members **65** are provided interconnecting inner ring **61** and outer ring **57**. It should be noted that inner ring **61** and hub section **53** are larger than the outside diameter of core **11** so that the floor **52** can be hoisted in place as heretofore described for floor **19**. Also, it should be noted that the actual finished floor construction and ceiling construction can be provided in any desired manner in connection with the floor **52**. In other words, the floor per se can be provided on top of members **65**, and the ceiling therebelow can be provided adjacent spoke members **55**.

Another method of forming the floors is shown in FIG. 6 wherein a portion of one of the floors **67** is shown. In constructing floor **67**, a hub section **69** is provided around core **11** in a similar manner to hub section **53**. A solid inverted cone-shaped member **71** is erected in attached relationship around hub section **69** and extends upwardly and outwardly therefrom to the outer peripheral edge of the cone-shaped member. An outer ring **73** similar to outer ring **57** is attached to cone-shaped member **71** adjacent the peripheral edge thereof. Hub section **69**, cone-shaped member **71**, and outer ring **73** are preferably, though not necessarily, integrally constructed of concrete. Also, a tensile band **75** similar to tensile band **59** is provided around outer ring **73**.

If it is desired to expand the building heretofore described, or if it is desired to provide additional space outwardly of the previously described floors in the initial construction, the following additional steps can be taken:

A plurality of vertically stacked annular outer floors **77** are constructed adjacent the ground G and supported therefrom in the same manner as heretofore described relative to floors **19**. If desired, floors **77** can be formed or assembled one at a time and then hoisted before the next one is formed or assembled. Each of outer floors **77** is concentric with core **11** and floors **19**. Also, each of the outer floors **77** has a central substantially circular opening **79** through which extend the other portions of the building, that is, the core **11** and the portions supported thereby. In addition, each of the central openings **79** is larger than the outer periphery of floors **19** or the outer periphery of the building if outer walls have been constructed. Next, outer floors **77** are hoisted into position in vertically spaced relationship in much the same manner as the floors **19**. For example, in FIGS. 1, 2 and 3, the outer floors **77** are shown in the hoisted position respectively at the same levels with the corresponding floors **19**, which now become the inner floors. The same nomenclature has been used relative to the outer floors as with the inner floors, that is, the lowermost one is designated **77***a*, the next one **77***b*, etc. It will be understood that substantially the same hoisting equipment **27** can be used to hoist the outer floors, with the hoisting cables **33** being successively attached to the outer floors **77** in the manner heretofore described relative to the inner floors **19**, but it will be understood that additional pulleys **81** should be provided adjacent the outer edge **21** of the upper floor **19***e* to guide the cables **33** around the upper floor **19***e*. Additionally, it will be understood that notches **83** similar to notches **41** are provided in outer floors **77** adjacent central opening **79** to make room for the hoisting cables **33**. After the outer floors **77** are hoisted into place, they may be secured by suitable means as the upper and lower plates **85, 87** connected by fastening means **89**, as best seen in FIG. 3. Also, the cables **33** are preferably replaced by columns and/or tensile members interposed between the outer floors **77**. In addition, the building can then be finished off in a conventional manner by providing walls, etc.

From the foregoing description, it can be seen that a very unique and simple method of constructing a building is provided. Thus, for example, instead of having cranes, etc., the method of the present invention utilizes the central core **11** to act as a supporting means for hoisting the floors into place. Additionally, since the major part of the building construction, that is, the construction of the floors, is a repetitive operation which is performed on the ground level, the cost of the building is greatly reduced over previous methods of erecting buildings. In addition, by using the method of the present invention, a unique substantially circular building is provided which

can be easily and conveniently expanded by the method of the present invention. Further, the building that results from the present invention is one which has more usable floor space than more conventional types of buildings.

Although the invention has been described in some detail by way of illustration and example for purposes of clarity or understanding, it is to be understood that it is not to be so limited since changes and modifications may be made therein which are within the full intended scope of this invention as hereinafter claimed.

I claim:

1. The method of constructing a building with hoisting equipment including a plurality of hoisting members, said method comprising the steps of constructing a central substantially large single cylindrical core in upstanding relationship from the supporting ground and with said core having access means to the interior of the building, constructing adjacent the ground and supported therefrom a plurality of substantially annular floors respectively having central substantially circular openings through which said core extends, constructing tensile bands respectively around said floors; by the use of said hoisting equipment respectively attached between said floors and said core and by the use of said core as the support from the ground and said plurality of hoisting members attached to each floor, hoisting said floors successively to position said floors in vertically spaced relationship and with the upper one being hoisted first to a position adjacent the top of said core and then on down to the bottom one to a position adjacent the bottom of said core and with the positioning of said floors being such that the distances between adjacent floors are less than the diameter of said cylindrical core.

2. In a method of constructing a building with hoisting equipment including a plurality of hoisting members, said method comprising the steps of constructing a central cylindrical core in upstanding relationship from the supporting ground and with said core having access means to the interior of the building, constructing adjacent the ground and supported therefrom a plurality of substantially annular inner floors respectively having central substantially circular openings through which said core extends; by the use of said hoisting equipment respectively attached between said inner floors and said core and by the use of said core as the support from the ground and said plurality of hoisting members attached to each floor, hoisting said inner floors successively to position said inner floors in vertically spaced relationship and with the upper one being hoisted first to a position adjacent the top of said core and then on down to the bottom one to a position adjacent the bottom of said core and with the positioning of said floors being such that the distances between adjacent floors are less than the diameter of said cylindrical core; constructing adjacent the ground and supported therefrom a plurality of outer floors respectively having central substantially circular openings through which said core extends and which are larger than the outer periphery of said inner floors; and by the use of said hoisting equipment respectively attached between said outer floors and said core and by the use of said core as the support from the ground, hoisting said outer floors successively to position said outer floors in vertically spaced relationship around at least some of said inner floors.

3. In a method of constructing a building with hoisting equipment including a plurality of hoisting members, said method comprising the steps of constructing a central cylindrical core in upstanding relationship from the supporting ground and with said core having access means

to the interior of the building, constructing adjacent the ground and supported therefrom a plurality of vertically stacked substantially annular inner floors respectively having central substantially circular openings through which said core extends, constructing tensile bands respectively around said inner floors; by the use of said hoisting equipment respectively attached between said inner floors and said core and by the use of said core as the support from the ground and said plurality of hoisting members attached to each floor, hoisting said inner floors successively to position said inner floors in vertically spaced relationship and with the upper one being hoisted first to a position adjacent the top of said core and then on down to the bottom one to a position adjacent the bottom of said core and with the positioning of said floors being such that the distances between adjacent floors are less than the diameter of said cylindrical core; constructing adjacent the ground and supported therefrom a plurality of vertically stacked outer floors respectively having central substantially circular openings through which said core extends and which are larger than the outer periphery of said inner floors; and by the use of said hoisting equipment respectively attached between said outer floors and said core and by the use of said core as the support from the ground, hoisting said outer floors successively to position said outer floors in vertically spaced relationship around at least some of said inner floors.

4. The method of claim 3 in which the method of constructing at least one of said inner floors comprises the steps of constructing a hub section around said core, erecting a plurality of spoke members attached to said hub section and extending radially outwardly and angled upwardly therefrom to their places of termination at distal ends remote from said core, constructing an outer ring attached to said spoke members adjacent the distal ends thereof, constructing a tensile band around said outer ring, constructing an inner ring above said hub section, constructing rigid spacing means between said inner ring and said hub section to keep said inner ring and said hub section apart, and constructing at least one member between said inner ring and said outer ring.

5. The method of claim 3 in which the method of constructing at least one of said inner floors comprises the steps of constructing a hub section around said core, erecting a solid inverted cone-shape member in attached relationship around said hub section and extending outwardly and upwardly therefrom to its outer peripheral edge, constructing an outer ring attached to said cone-shaped member adjacent the peripheral edge thereof, and constructing a tensile band around said outer ring.

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