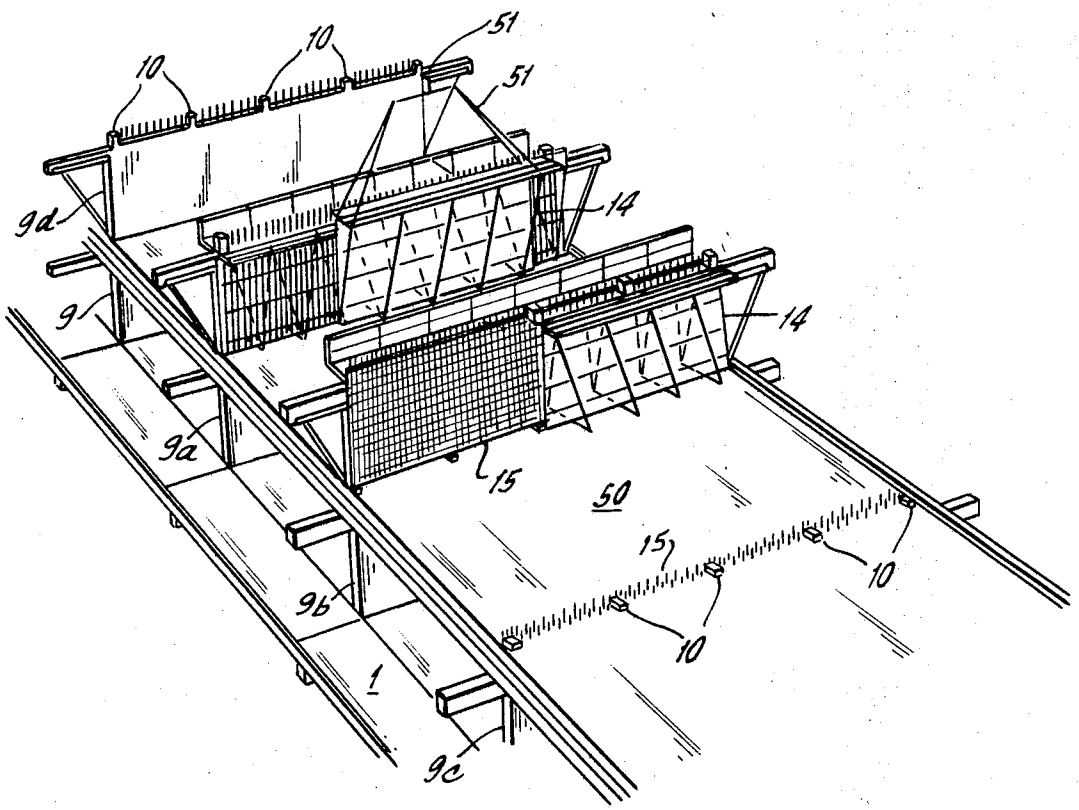
Aug. 18, 1970 A. LEYTEN ET AL 3,524,293

APPARATUS AND METHOD FOR CONSTRUCTION OF MULTISTORIED BUILDINGS

Filed July 3, 1968 5 Sheets-Sheet 1

FIG. 1



INVENTORS
ADRIAAN LEYTEN
DIRK K. VERBURGH

BY

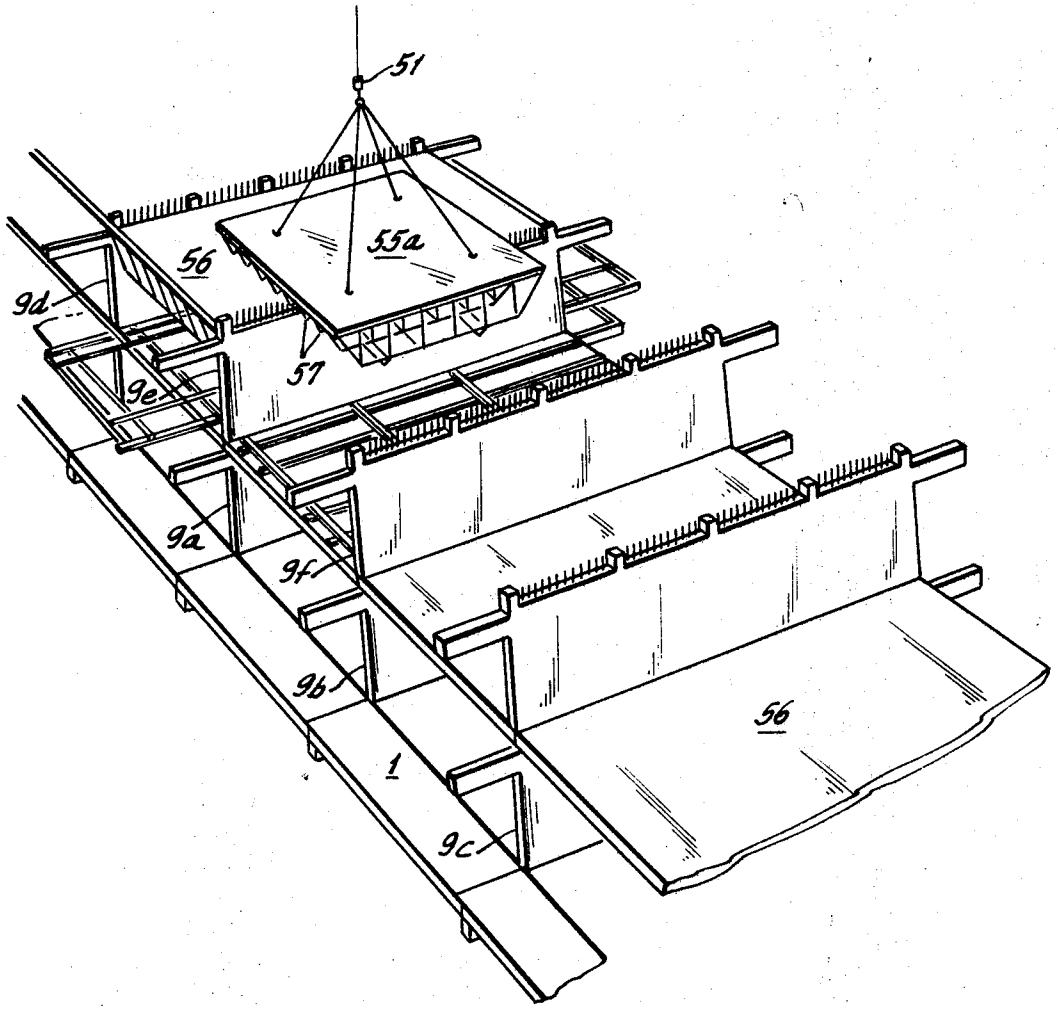
OSTROLENK, FABER, GERB & SOFFEN
ATTORNEYS

Aug. 18, 1970 A. LEYTEN ET AL 3,524,293

APPARATUS AND METHOD FOR CONSTRUCTION OF MULTISTORIED BUILDINGS

Filed July 3, 1968 5 Sheets-Sheet 2

FIG. 2.



INVENTORS
ADRIAAN LEYTEN
DIRK K. VERBURGH

BY

OSTROLENK, FABER, GERB & SOFFEN

ATTORNEYS

Aug. 18, 1970 A. LEYTEN ET AL 3,524,293

APPARATUS AND METHOD FOR CONSTRUCTION OF MULTISTORIED BUILDINGS

Filed July 3, 1968 5 Sheets-Sheet 3

FIG. 3.

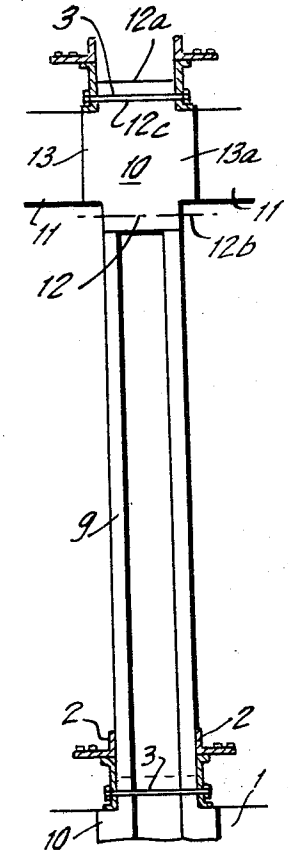


FIG. 4.

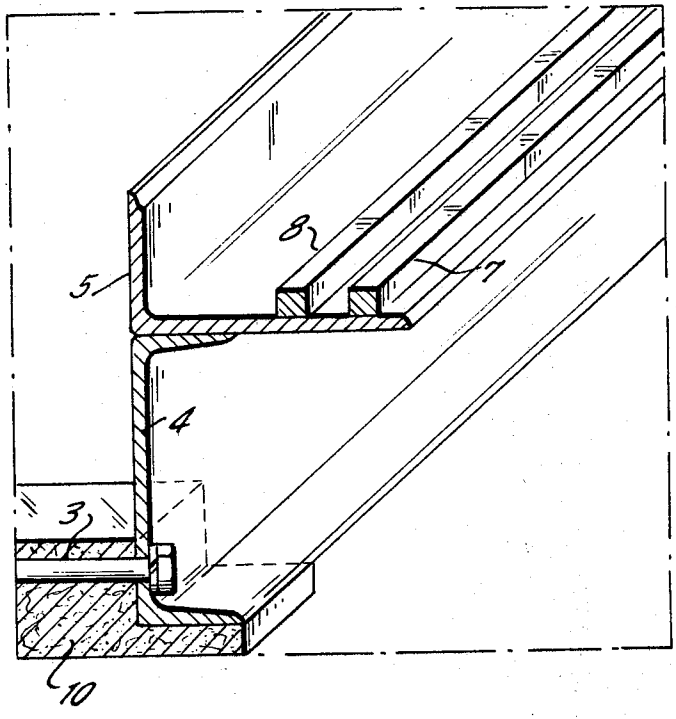


FIG. 5a.

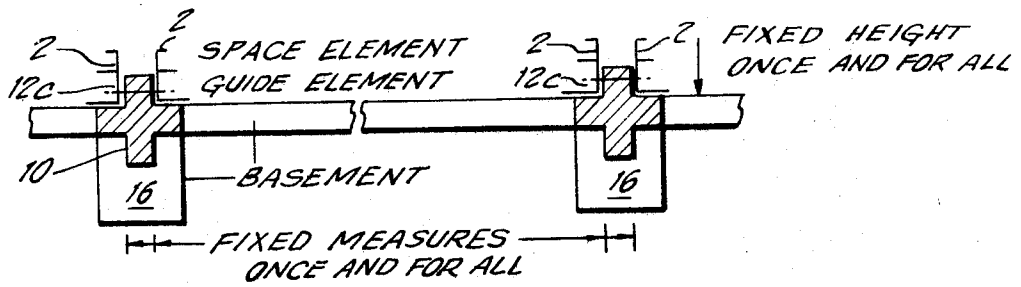
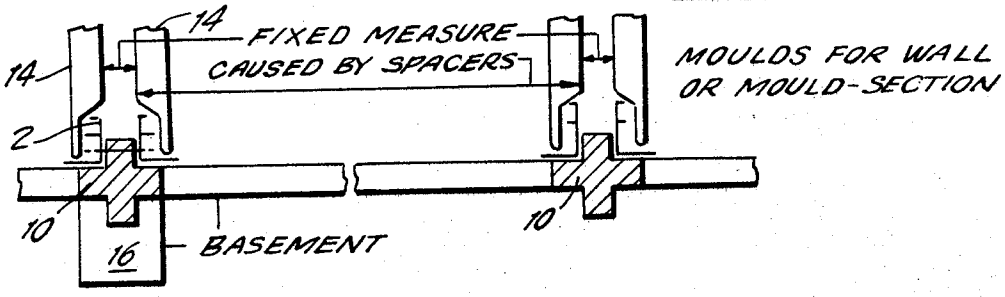


FIG. 5b.



MOULDS FOR WALL OR MOULD-SECTION

FIG. 5c.

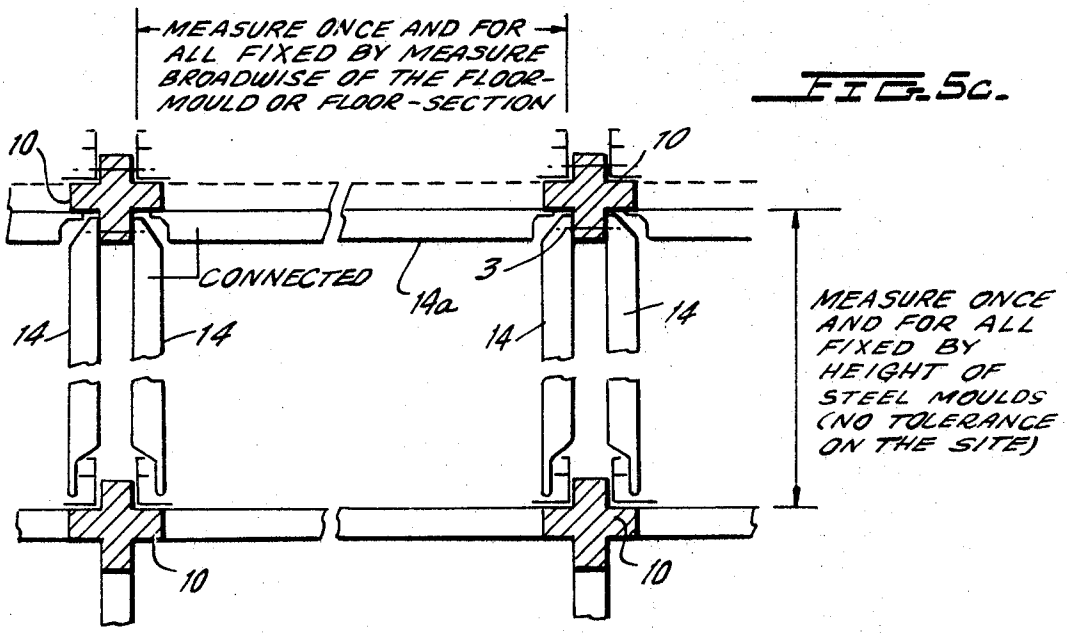


FIG. 5d.

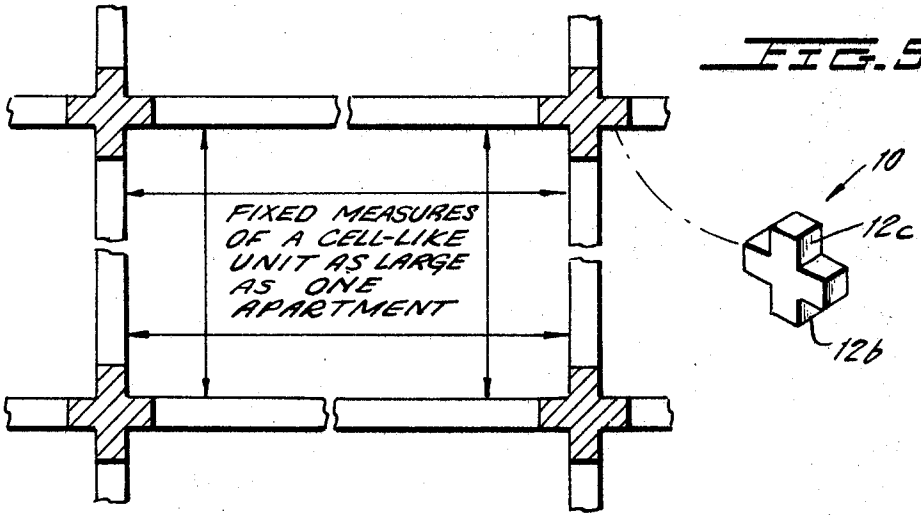


FIG. 6a.

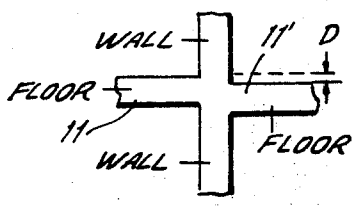


FIG. 6b.

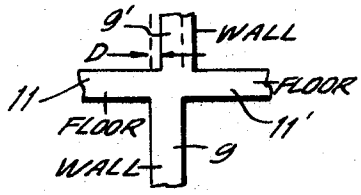
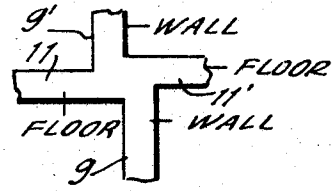


FIG. 6c.



Aug. 18, 1970 A. LEYTEN ET AL 3,524,293
APPARATUS AND METHOD FOR CONSTRUCTION OF MULTISTORIED BUILDINGS
Filed July 3, 1968 5 Sheets-Sheet 5

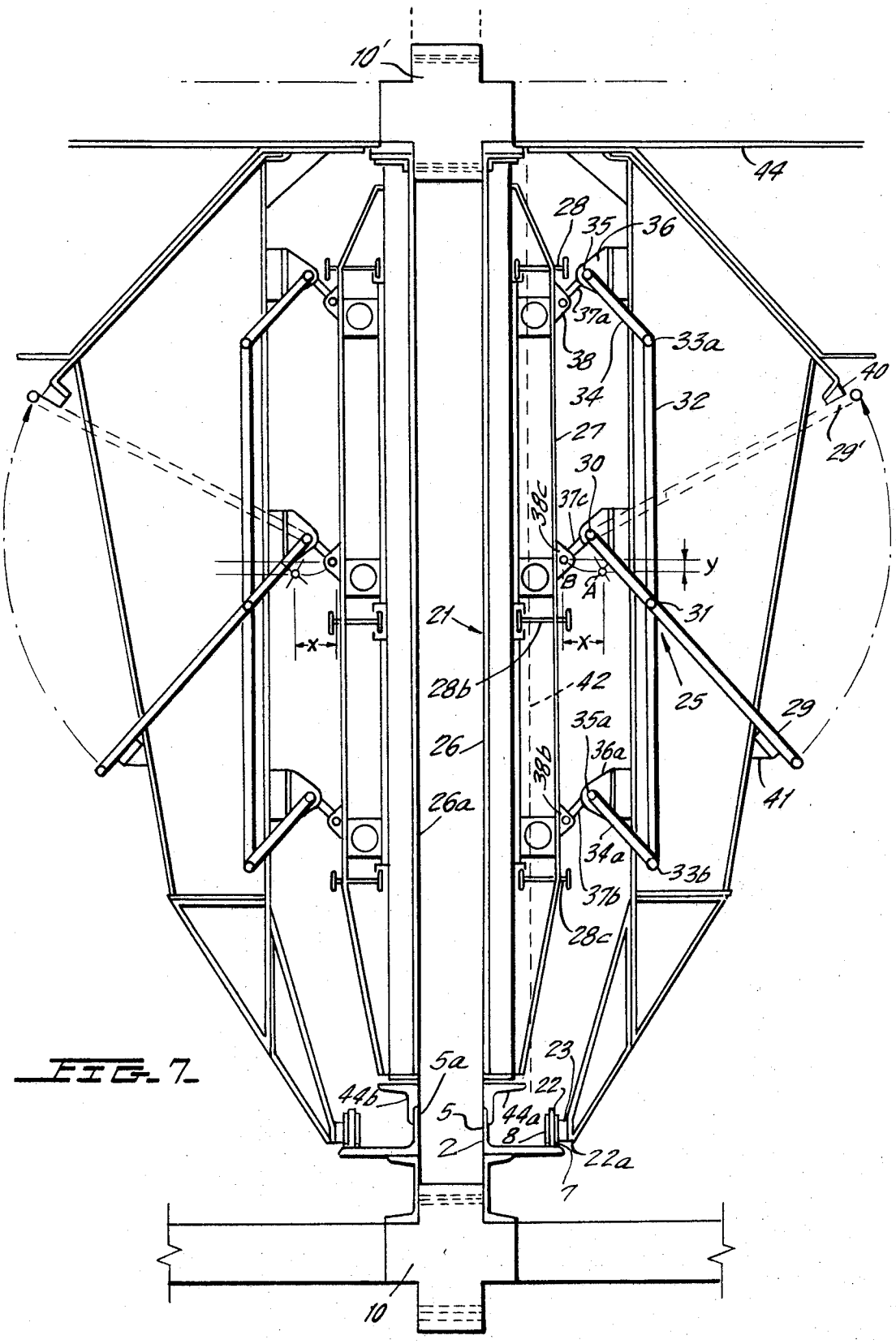


FIG. 7

United States Patent Office 3,524,293
Patented Aug. 18, 1970

3,524,293

APPARATUS AND METHOD FOR CONSTRUCTION OF MULTISTORIED BUILDINGS

Adriaan Leyten and Dirk K. Verburgh, Rotterdam, Netherlands, assignors to J. P. van Eesteren's Administratie Maatschappij N.V., Rotterdam, Netherlands, a limited-liability corporation of Netherlands

Continuation-in-part of applications Ser. No. 472,872 and Ser. No. 472,876, July 19, 1965. This application July 3, 1968, Ser. No. 742,381
Int. Cl. E04h *1/04;* E04b *1/04;* E04g *11/00*
U.S. Cl. 52—741 6 Claims

ABSTRACT OF THE DISCLOSURE

A method of building construction in which a monolithic structure formed through the application of the sequential steps of forming a floor of reenforced concrete; forming loadbearing walls of reenforced concrete upon said floor through the usage of smooth steel molds; providing prefabricated structures for use in each cell defined by the load-bearing walls which is comprised of non-load-bearing partitions within each cell-like unit; placing the prefabricated structure into each cell-like unit; forming ceilings of reenforced concrete above the prefabricated structures which are supported by load-bearing reenforced concrete walls; and sealing the open gable ends of each cell-like unit by means of prefabricated gable walls. The method employs apparatus including spacer elements which are fixed with regard to desired floor and ceiling dimensions and are integrally molded into the load-bearing walls and ceilings of the structure. The guide elements receive and support spacer elements which, in turn, position and support molds whose highly accurate alignment is assured through the use of the spacer elements. Upon setting of the concrete the molds may easily be removed and the method steps may then be repeated.

The present invention relates to buildings and the like and more particularly to a novel method and apparatus for simplified construction of multistoried buildings at substantially reduced costs and is a continuation-in-part of copending applications Ser. No. 472,872, now abandoned entitled "Method For Industrial House Building" and Ser. No. 472,876, now abandoned entitled "A Method of Building" both filed July 19, 1965 and assigned to the assignee of the present invention.

The method of erecting buildings is known in which building units are assembled from a plurality of elements which are all self-supporting and which, after assembly, form a complete building. The prefabricated elements are normally produced in a factory and delivered to the job site. Such elements are usually quite large and due to their size are normally very heavy. In view of the size and weight of the units shipped to the job site, difficulties in transportation and erection are experienced. Furthermore, insulation, particularly on the exterior of building erections becomes difficult and the problem of efficient insulation in such conventional structures has not yet been satisfactorily solved. In addition to the above, subdivision of an erected building is achieved during erection and normally cannot be altered during construction or at any time after completion thereof. In view of this fact, it is not possible to build in such a manner that alteration of the internal structure may be undertaken when desired.

There exists some conventional techniques in which housing units are made at the job site in a series fashion with the aid of molds employed for casting the concrete. These techniques have the disadvantages of requiring

separate adjustment for each of the molds because failure to provide such separate adjustment may result in floors which are not horizontally aligned and therefore great dimensional deviations arise in the construction of the building. Suitable adjustments to compensate for these deviations require much time and cause great delay in construction which is undesirable for economic and other reasons.

The present invention is characterized by providing a novel method and apparatus for constructing buildings and the like and especially for the construction of multistoried industrial buildings such as apartments in which construction steps are greatly simplified and in which a high degree of accuracy is maintained throughout the construction job.

The apparatus of the present invention is comprised of a plurality of substantially cross-shaped spacer elements which are cast into the foundation of the structure and are located in accordance with the load-bearing concrete walls to be erected. The foundation may be erected in conventional fashion and is normally constructed of reenforced concrete. The spacer elements are designed to receive and support the fastening means of guide elements which position and support stationary portions of mold members. The dimensions of the mold members automatically locate the spacer elements employed for the next above floor, thereby eliminate the necessity for additional measurement operations. The molds are then moved into position to define the width and alignment of each wall, and then the concrete is poured into the interior region defined by the molds. Once the concrete is set sufficiently to support itself, the molds may be moved away from the operative position so that their stationary portions may be lifted away from the guide elements, allowing the molds to be employed in subsequent operations through repetition of the above recited steps. Obviously, the molds may be employed in a similar fashion to form floors. The spacer elements automatically fix the dimensions of each cell defined by floors, ceilings and walls and further prevent the possibility of any adjacent floor sections separated by a wall from being of unequal height and further prevents offsetting of adjacent upper and lower story wall sections separated by a floor from being offset relative to one another.

It is therefore one object of the present invention to provide a novel method and apparatus for the high-speed, low-cost construction of multistory buildings constructed of reenforced concrete at a job site wherein a minimum of precast concrete components are employed to facilitate transportation, handling and construction operations.

Another object of the present invention is to provide a novel method and apparatus for forming multistoried industrial buildings and the like at a job site employing precast spacer members which, after once being precisely set within the foundation eliminate the needs for separate adjustment of spacer elements and molds for each succeeding floor.

Still another object of the present invention is to provide a novel method and apparatus for forming multistoried industrial buildings and the like of prestress concrete directly at the job site wherein novel spacer elements, guide elements and molds are employed for reducing the precision arrangement of building components to a minimum after having once precisely located guide elements upon the building foundation.

These as well as other objects of the present invention will become apparent when reading the accompanying description and drawings in which:

FIG. 1 is a perspective view showing the construction of a multistoried building in various stages of completion and employing the novel methods and appparatus of the present invention.

FIG. 2 is a perspective view of a multistoried industrial building constructed in accordance with the principles of the present invention showing the manner in which prefabricated non-load-bearing sections are positioned within cells of the building.

FIG. 3 is an elevational view showing the manner in which the spacer elements, guide elements and molds are arranged for the purpose of forming a wall of the building.

FIG. 4 is a perspective view showing a portion of the spacer elements and guide elements in greater detail.

FIGS. *5a–5d* are elevational views employed for the purpose of explaining in step-like fashion the manner in which the walls and floors of a building of the type shown in FIGS. 1 and 2 may be constructed in accordance with the principles of the present invention.

FIGS. *6a–6c* are elevational views indicating three deviations in floor and wall alignments which may occur through the use of conventional techniques employed in the construction of buildings.

FIG. 7 is an elevational view showing one preferred form of adjustable molds which may be employed in the formation of the wall of a building which may be of the type shown in FIGS. 1 and 2.

Referring now to the drawings and more specifically to FIGS. 3 and 4, a plurality of guide elements **10** are set within the foundation of the structure and are precisely located so as to be arranged at the same horizontal level. the element **10** shown in FIG. 1) as well as being precisely located so as to be arranged at the same horizontal level. The elemnt **1** in FIG. 2 may be considered to indicate either the foundation of the structure or a lower floor. Only one element **10** is shown in FIG. 1, it being understood that a plurality of such elements arranged at spaced intervals in the manner shown in FIG. 1 may be employed depending upon the length of the wall section to be constructed.

The spacer elements **10** are formed of precast concrete and are comprised of a pair of vertical legs **12** and **12***a* and a pair of horizontal legs **13** and **13***a* which all extend from a central portion thereof to define the cross-shaped configuration. The vertical legs **12** and **12***a* are each provided with openings **12***b* and **12***c*, respectively, for receiving fastening members **3** to secure guide elements thereto in a manner to be more fully described.

After having set the spacer elements in a manner shown best in FIG. 1 in the foundation of the building (or in a lower floor, as hte case may be) at least one pair of elongated guide elements **2, 2** is secured to the spacer element **10** by a set bolt **3**, as shown in detail in FIG. 4. Each guide element **2** is comprised of a steel U-beam **4** having secured thereto by welding or any other operation an elongated non-equilateral steel angle **5** whose longer arm **6** has secured thereto (by welding or any other suitable technique) a pair of elongated guide means **7** and **8** which act to accurately position and support cooperating mold members.

The mold members which will subsequently be described in more detail are accurately positioned within the guide means **7, 8** on opposite sides of these upper and lower spacer elements shown in FIG. 3 in order to receive the poured concrete.

FIG. 1 shows such molds **14** as being secured to the spacer elements so as to be maintained in accurate alignment for the receipt of poured concrete. Obviously, if prestressed concrete is to be employed, a framework of steel or other metallic rods arranged in a gridwork and designated by the numeral **15** in FIG. 1 may be positioned within the molds so as to provide additional reenforcement for the concrete to greatly enhance its load-bearing characteristics.

The height of the molds is chosen in a precise manner so that the spacing of the lower floor **1** from the upper floor **11** (see FIG. 3) is accurately controlled by the molds and the spacer elements **10, 10**. The vertical legs **12** and

12*a* accurately determine the thickness of the wall **9** to be cast while the thickness of the horizontal legs **13** and **13***a* accurately control the thickness of the floors to be cast.

The method steps of constructing the wall sections will now be set forth in conjunction with FIGS. *5a–5d*:

The foundation of the building may be erected in more or less conventional fashion and is normally formed of reenforced concrete. The spacer elements **10, 10** are set into the foundation section **16, 16** at the precise locations where the load-bearing concrete walls are to be erected. Once the precise separation between adjacent spacer elements and the horizontal levels of the spacer elements are determined, no further adjustments are required as a result of the apparatus employed herein.

The spacer elements, through their openings **12***c*, **12***c* accurately position and support the guide elements **2** which are fixed upon the spacer elements by the fastening means **3** (see FIGS. 3 and *5a*).

Once the spacer elements **10** have been set, the spacing between the elements both in a horizontal and a vertical direction remains fixed throughout the structure.

Turning to FIG. *5b*, the molds **14** are mounted upon the guide elements **2** which serve to determine the spacing between the adjacent interior faces of the molds. The upper ends of the molds **14** may be secured to upper spacer members **10** in the manner shown best in FIG. *5c* as is schematically represented by the line **3**.

Horizontally aligned mold members **14***a* which have their ends connected to the vertically aligned mold members **14** are arranged as shown in FIG. *5c* for the purpose of forming the mold for the next upper floor section. The spacing and horizontal alignment of the lower spacer members **10** act to maintain the floor heights, wall spacings and thicknesses of each wall and floor section as they are formed. FIG. *5d* shows the completed sections after the concrete has been poured within the molds, has set, and the molds have been removed. The sectional view of FIG. *5d* may constitute the first and second floors and two adjacent vertical walls or may be considered to represent the sectional view of upper floors within a multistory building. The operational steps set forth above are repeated for each floor.

FIGS. *6a–6c* best illustrate the effectiveness of the spacer elements **10**. For example, considering FIG. *6a* in a conventional installation not employing such spacer elements, extreme care must be exercised to prevent the left and right-hand floor sections **11** and **11′** from being offset, resulting in a misalignment causing the floor section **11′** to be positioned lower than the floor section **11** by a deviation distance D which constitutes the deviation between the desired floor level represented by the horizontal dotted line and the surface of floor **11′**. In a like manner, FIG. *6b* indicates a deviation which may occur between lower and upper concrete wall sections **9** and **9′** wherein the deviation distance D′ represents the distance between the true and desired alignment represented by the vertical dotted lines and the alignment of the vertical wall section **9′**. FIG. *6c* indicates that it is possible to have misalignment in both horizontal floor sections **11** and **11′** and in vertical wall sections **9** and **9′**, FIG. *6c* representing a composite showing of the possible misalignments of FIGS. *6a* and *6b*.

FIG. 7 shows one preferred mold assembly which may be employed with the spacer elements and guide elements shown best in FIGS. 3 and 4 and repeated in FIG. 7. Since the left and right-hand frame assembles are substantially identical in design and configuration only the right-hand assembly will be described for purposes of simplicity.

The mold assembly is comprised of a carrier frame **20** which is substantially a skeletonized structure provided with a lower end **20***a* carrying a member **22** designed to have its lower horizontal edge positioned between the spacer guides **7** and **8** shown best in FIG. 4 for example. It should be understood that the carrier frame **20** is

actually comprised of a plural number of vertically aligned frames spaced by predetermined horizontal intervals. The member **22** is actually an elongated member which is horizontally aligned so as to be positionable between the guide elements **7** and **8** of an elongated spacer member which extends at least between two adjacent spacers. The elongated members **22** are releasably secured to the frame sections **20** (only one of which is shown in FIG. 7) by fastening means schematically represented by straight line **23**. The carrier frame is further comprised of an operating assembly **25** for moving the mold assembly **21** between an inoperative and an operative position. The mold assembly is comprised of an elongated steel mold member **26** whose height and width is substantially equal to at least the distance between upper and lower guide elements **10** and **10'** shown in FIG. 7 and horizontally spaced guide elements whose arrangement is best shown in FIG. 1. The steel mold member **26** is secured to the oeprating assembly of the carrier frames preferably, at least, at two positions along the length of the steel member by means of vertically aligned frame members **27** (only one of which is shown in FIG. 7) which are further spaced from one another and secured to one another by horizontally aligned I-beams **28***a*–**28***c*. The frame members **27** are coupled to the operating assembly, as will be described hereinbelow:

The operating assembly **25** is comprised of an actuating rod **29** pivotally secured at its left-hand end at a stationary support **30** and further pivotally coupled intermediate its ends by a coupling pin **31** which secures it to a point intermediate the ends of linking rod **32**. The opposite upper and lower ends of linking rod **32** are coupled by pin means **33***a* and **33***b* to eccentric rods **34** and **34***a*, respectively, whose left-hand ends are rigidly secured to shafts **35** and **35***a* adapted to rotate within suitable openings provided within the mounted brackets **36** and **36***a*. Also rigidly secured to shafts **35**, **35***a* and **30** are a second group of eccentric rods **37***a*, **37***b* and **37***c*, respectively, whose left-hand ends, in turn, are pivotally mounted by suitable pin means to the mounting brackets **38***a*, **38***b* and **38***c*, respectively.

The carrier frame, as was previously described, is transported to the desired locale and positioned so that its elongated members **22** are aligned within the guide means **7** and **8** of guide assemblies **2**. At this time the operating arm **29** is in the dotted line position **29'** bearing against the stop **40** provided as an integral part of the carrier frame **20**. The eccentric rods **37***a*–**37***c*, as a result of the elignment of operating rod **29**, have their lower ends positioned so that the pins mounting these rods to brackets **38** occupy the position A which, for example, indicates the location of the pin means securing eccentric rod **37***c* to mounting bracket **38***c*. The pins of the other mounting brackets **38***a* and **38***b* would occupy similar positions which have been omitted merely for purposes of simplicity. The position of these mounting brackets maintains the mold frame members **27** and hence the mold sheet **26** at a first reference position designated by vertical dotted line **42**. It should further be noted that point A indicates the height of bracket **38***c* at the time that the operating arm **29** is in the inoperative or dotted line position **29'**.

Movement of the operating arm from the dotted line position **29'** to the solid line position **29** against stop member **41** (mounted on carrier frame **20**) causes rotation of shaft **30** and likewise moves linking rod **6** vertically downward to rotate eccentric rods **34** and **34***a* clockwise to rotate their associated shafts **35** and **35***a*. The rotation of shafts **30**, **35** and **35***a* causes rotation of eccentric rods **37***c*, **37***a* and **37***b* causing the connecting pin of the mounting brackets, for example, mounting bracket **38***c* to occupy the position B indicating that the mounting brackets and hence the mold sheet **26** is displaced by a distance *x* toward the left as well as being moved vertically upward by a distance *y* representing the horizontal displacement between points A and B. The spacing between adjacent mold frame sheets **26** and **26***a* is further determined by the horizontally aligned steel angle arms **44***a* and **44***b* which are provided with notches at their lower left-hand and lower right-hand ends, respectively, to abut against the upper arm **5** and **5***a* of each of the spacer elements **2**, thereby accurately positioning the mold sheet members **26** and **26***a* to control the thickness of the wall to be formed. The upper end of the mold sheet forms bear against the lower vertical leg of spacer element **10'** to maintain the sheets **26** and **26***a* in the desired spaced parallel fashion. The concrete is then poured within the mold frames. The forces caused by the concrete in the liquid stage are not transmitted to the eccentric mechanism due to its arrangement thereby enabling the carrier assembly to maintain the mold sheets **26** and **26***a* in their solid line positions until the concrete sets. When the poured concrete is stiff enough to support itself the sheets **26** and **26***a* may be moved away from the concrete by movement of the operating arm **29** to its dotted line position **29'**.

The poured concrete floors can be formed in connection with the walls by means of providing the molding sheet element **44** which is connected to the top of the carrier frame. This latter arrangement is of conventional construction and a detailed description thereof will be omitted herein for purposes of simplicity.

The perspective views of FIGS. 1 and 2 show the various stages of construction of a multistoried cell-like building employing the concepts of the present invention. For example, considering FIG. 1, there is shown therein a ground floor **1** upon which a plurality of concrete wall sections **9**—**9***c* have been formed. In addition thereto a second floor **50** is shown as having been completed. The second floor **50**, in the first stage of construction, is shown as having positioned therein at spaced intervals, the spacer elements **10**. The short vertical lines arranged between the upper vertical legs of the spacer elements constitute the upper ends of metallic reenforcing rods **15** which have been imbedded within the concrete of the lower wall section **9***c*. In another stage of construction the metallic reenforcing rods **15** are shown positioned above the vertical wall section **9***b* with the mold sections **14** being shown in place in readiness for receipt of the poured concrete. The assembly above vertical wall **9***a* shows the manner in which a mold section **14** is being lowered into position by an overhead crane assembly **51**, only a portion of which is shown for purposes of simplicity. Obviously the overhead crane assembly may be used for both placement and removal of the mold sections. A finished wall section **9***d* with the mold sections having been removed load-supporting members. The arrangement of the vertical wall section **9**. This completed wall section **9***d* also incorporates the spacer elements **10** which have been integrally molded within the completed wall section, are in position for formation of the next wall section of the third story as soon as the floor sections have been completed.

FIG. 2 shows a similar arrangement to that of FIG. 1 wherein a plurality of the wall sections formed on floor **50** are completed and the prefabricated non-load-bearing structures are inserted therein.

The concrete walls on each floor such as, for example, the concrete walls **9**—**9***c* on the first floor, cooperate with the floors **1** and **50** to divide the building into cell-like units which may, for example, be house units, wherein the walls, floors and ceilings shown in FIG. 2 serve as the load-supporting members. The arrangement of the vertical wall shown in FIG. 2 are adapted to receive prefabricated cell dividing walls of a non-load-bearing nature. The self-supporting framework is built up from reenforced concrete which forms a monolithic construction. Once the regular cell-like construction of FIG. 2 is formed, it can be seen that the gable walls are left open. The walls of the units are smooth due to the usage of smooth steel molds eliminating the need for finishing processes such as

plastering, for example. The non-load supporting walls which consist of prefabricated lightweight units serve to subdivide the cells into rooms of a house, for example, and are erected after completion of the basic cell structure. Due to the fact that the concrete framework is built to a measure intolerance of from 2–3 millimeters (as a result of usage of the spacer members **10** and the precision steel molds **14**) the lightweight prefabricated sections can be mounted without difficulty after they have been brought into the cell structure through the open gable ends. These construction techniques avoid the need of providing carpentry, brick laying and painting activities at the job site. The ceilings and walls are so smooth that the finishing work is superfluous and the ceilings and walls of the building upon completion have the advantage that they can be decorated as by painting or wallpapering immediately.

Units produced by the above method described may be initially erected without a plurality of dividing walls so that division as desired, is possible within the outer walls of the unit. In addition, it is possible that after a few years of use the divisions of the individual units can be altered since the lightweight wall members are removably mounted between the supporting structure of the monolithic walls, floors and ceilings.

The regular cellular structure of the concrete framework insures uniformity of the units to predetermined limits so that full industrialization of the entire process of building is possible. Considerable savings of work is obtained and it is only necessary to use a travelling crane for the moving, erection and filling of the molds. As was previously described, the travelling crane **51** is employed for positioning the mold members **14**. In FIG. 2, the prefabricated sections **55** may be lowered into position between the concrete load-bearing walls by the travelling crane **51**. FIG. 2 shows a prefabricated section **55***a* being lowered into position between walls **9***e* and **9***f*, for example. FIG. 2 further shows a prefabricated section **55***b* which has already been lowered into position and further in which a concrete floor **56** has been formed thereupon. The non-load-bearing wall sections **56** may be a composite laminated structure formed of two outer layers and a center plastic filling. The plastic may preferably be expanded polystyrene while the outer layers may be plaster sheets which are not exposed to moisture once the building facing has been completed. On the other hand, in the case where walls exposed to moisture must be provided for use in bath rooms and kitchens, for example, a suitable moisture resistant material may be employed as the outer layers of the non-load-bearing wall structures.

The method of industrial building described hereinabove can be carried out during the winter months as the casting of concrete is now made possible at temperatures below the freezing point if special measures are taken, which measures are conventional in the construction art and have been omitted herein for purposes of simplicity. Thus, completion of the building may take place at such temperatures without any special precautions being taken on the job site.

The spacer elements **10** described hereinabove which are formed of precast concrete, although requiring handling and transportation to and at the job site, are nevertheless quite advantageous for use because they more than compensate for savings in time due to the simplicity of use once the spacers are set within the floor of the building. This is due to the fact that there need be only an initial adjustment after which construction can take place without interruption and without requiring additional measurement efforts.

Although there has been described a preferred embodiment of this novel invention, many variations and modifications will now be apparent to those skilled in the art. Therefore, this invention is to be limited, not by the specific disclosure herein, but only by the appending claims.

What is claimed is:

1. A method of forming industrial building comprised of unitary building elements comprising the steps of:
- forming in situ the floor of said building;
- imbedding spacer elements at spaced intervals within said floor for both locating the spacing between load-bearing walls and determining the thickness of the load-bearing walls;
- forming load-bearing walls upon said floor which serve to define and separate individual cell-like units;
- said load-bearing walls being formed by releasably attaching molds to said spacers to define spaces representing said walls;
- positioning spacers at spaced intervals along the upper ends of said molds;
- pouring concrete into the spaces defined by said molds to form said walls; and removing said wall forming molds;
- forming integral prefabricated structures comprised of non-load-bearing partitions for dividing each cell-like unit in a predetermined fashion;
- placing each prefabricated structure into an associated cell-like unit;
- forming a ceiling upon said prefabricated structures and which is supported by said load-bearing walls;
- said ceiling being formed by releasably joining molds to the spacers imbedded in the upper ends of said walls to define said upper floor; pouring concrete into said molds; and removing said molds;
- sealing the gable ends of each cell-like unit with prefabricated gable sections.

2. The method of claim **1** wherein the steps of forming the load-bearing walls and ceilings are each further composed of the steps of forming said load-bearing walls and ceilings from reenforced concrete in the form of a monolithic structure.

3. The method of claim **2** wherein said monolithic structure is formed by the method of providing smooth steel molds for defining each wall and filling each of said molds with reenforced concrete.

4. The method of claim **3** wherein said molds are spaced within tolerances within the range of two to three millimeters to facilitate placement of said prefabricated structures and formation of said ceilings.

5. The method of claim **1** wherein the steps of forming said prefabricated structures is further comprised of the steps of forming each non-load bearing partition by providing first and second spaced outer layers defining each partition and inserting a plastic material filling in the interior space between said spaced outer layers.

6. The method of claim **5** wherein said step of inserting a filler is comprised of filling said interior space with expanded polystyrene.

References Cited

UNITED STATES PATENTS

1,038,986	9/1912	Stretch.	
3,145,504	8/1964	Dunnington	52—309
3,315,426	4/1967	Rolland	52—235

FOREIGN PATENTS

397,695	1933	Great Britain.
623,447	1949	Great Britain.
Ad 645,548	1955	France.

JOHN E. MURTAGH, Primary Examiner

U.S. Cl. X.R.

52—236, 250; 249—19