May 23, 1933. J. S. SHANLEY ET AL 1,910,264

BUILDING CONSTRUCTION

Filed July 12, 1932 4 Sheets-Sheet 1

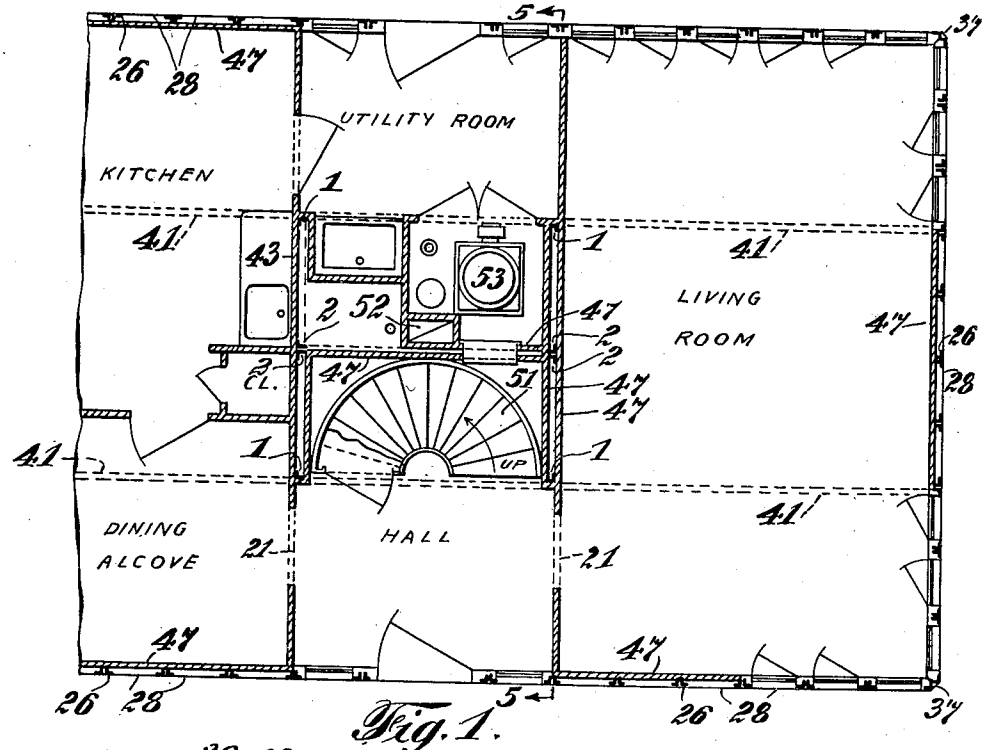


Fig. 1.

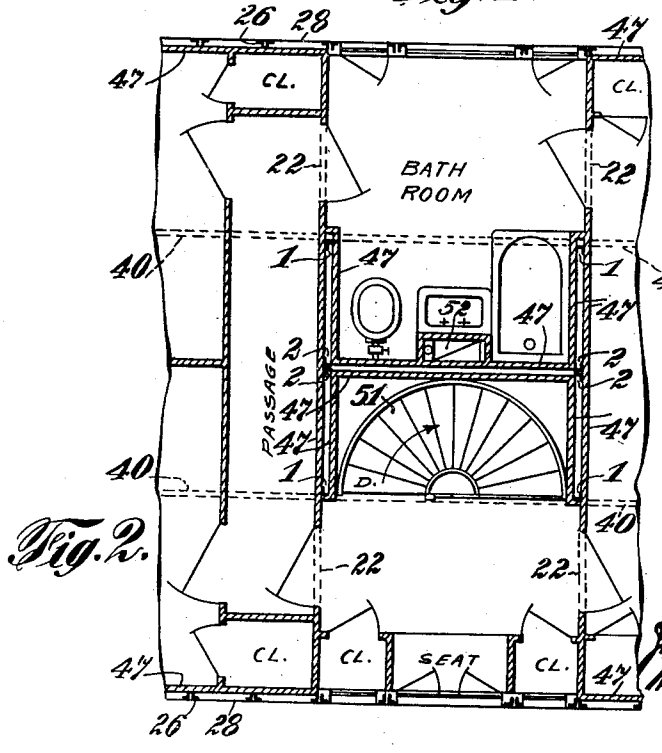


Fig. 2.

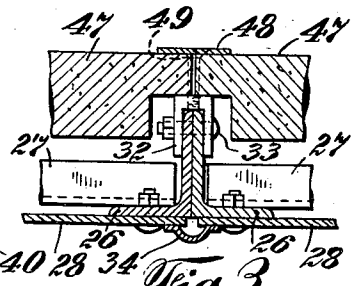


Fig. 3.

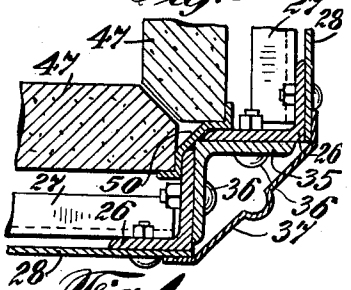


Fig. 4.

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BUILDING CONSTRUCTION

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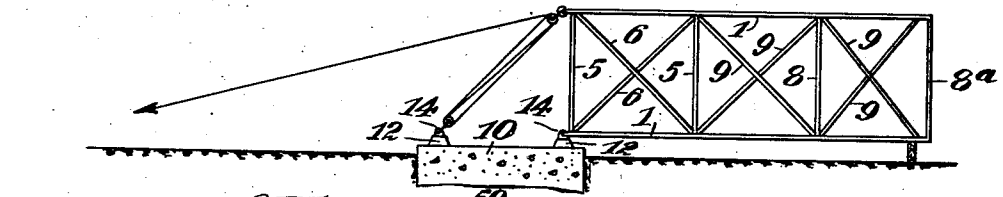


Fig. 6.

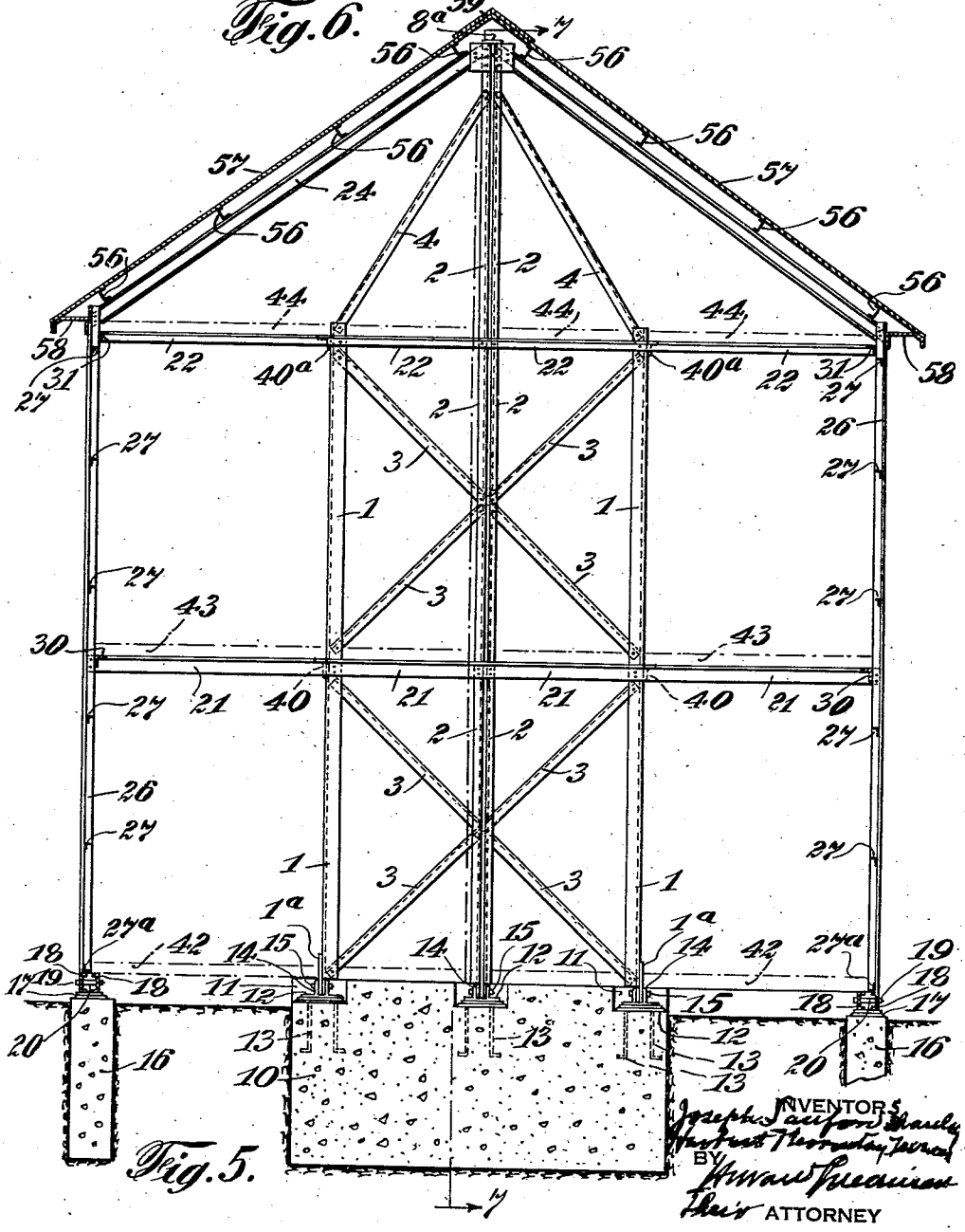


Fig. 5.

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BUILDING CONSTRUCTION

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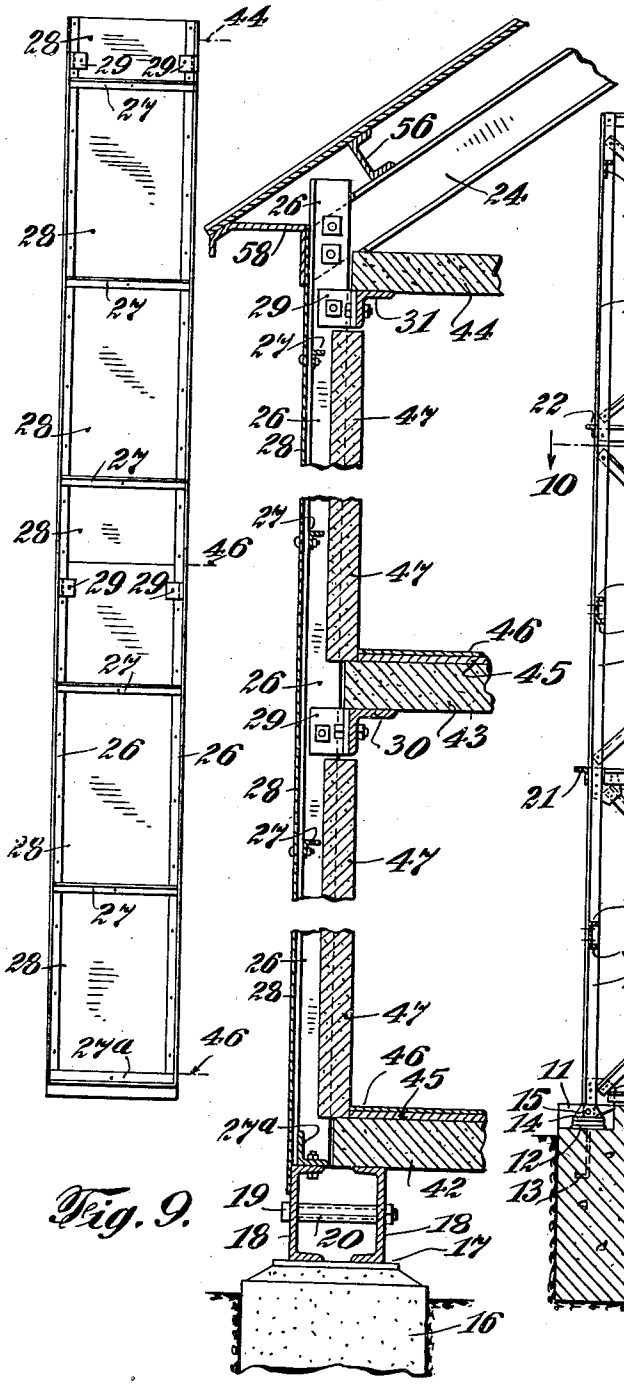


Fig. 9.

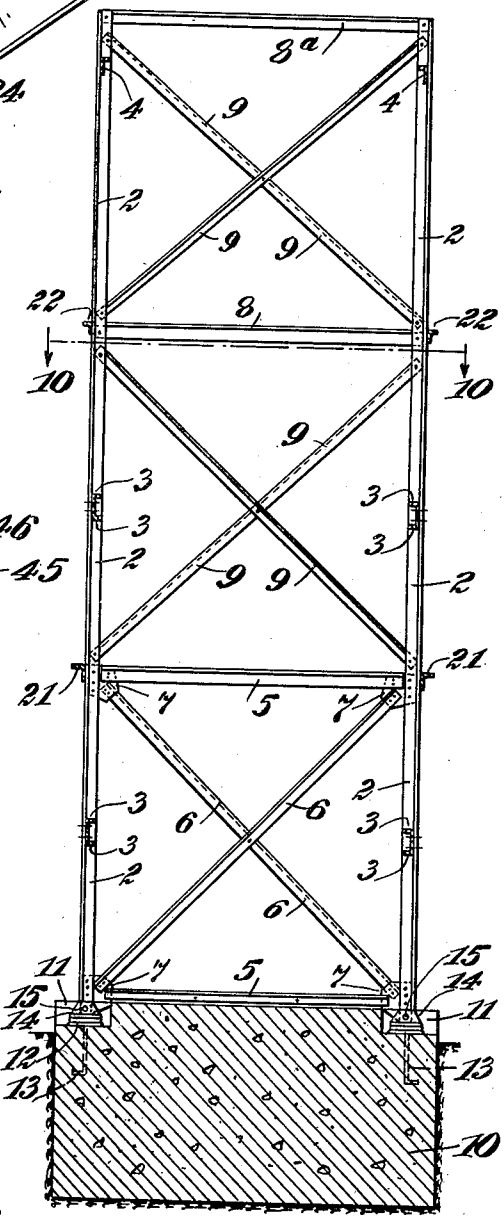


Fig. 8.

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BUILDING CONSTRUCTION

Filed July 12, 1932 4 Sheets-Sheet 4

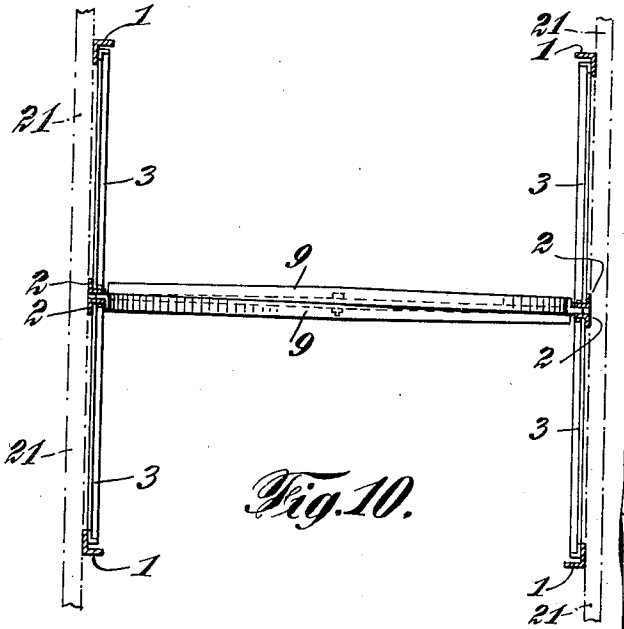


Fig. 10.

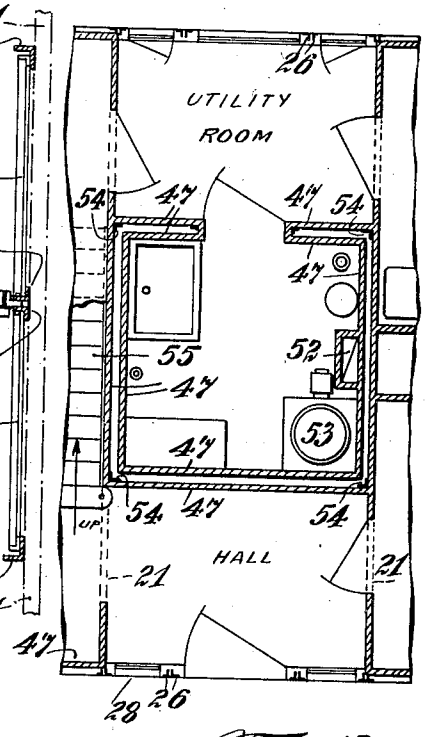


Fig. 13.

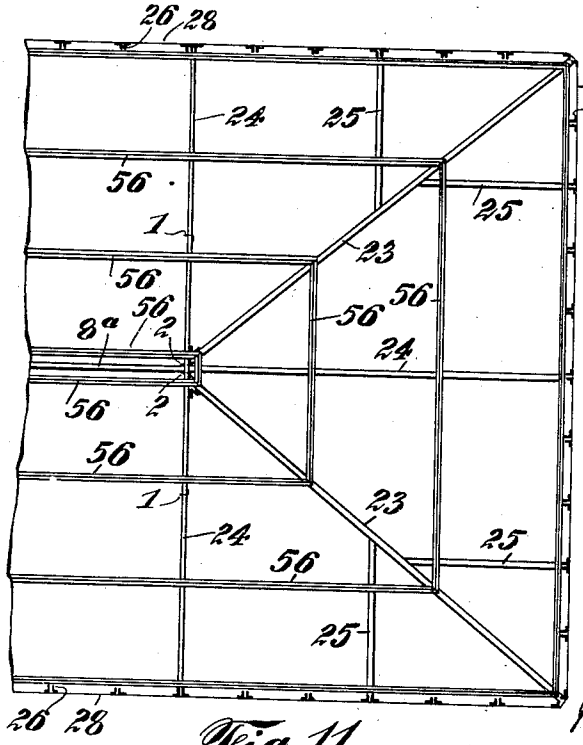


Fig. 11.

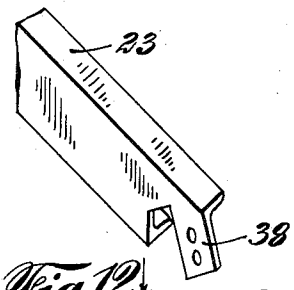
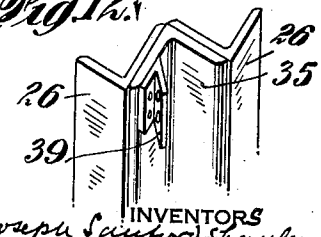


Fig. 12.



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Patented May 23, 1933 1,910,264

UNITED STATES PATENT OFFICE

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BUILDING CONSTRUCTION

Application filed July 12, 1932. Serial No. 622,064.

This invention relates particularly to the construction of dwellings and buildings, in the medium or smaller sizes mostly in demand. Building construction as to houses and buildings of this type has remained substantially at a standstill for many years with practically no progress being made outside of a few minor details. Development in this line of building construction has not kept pace with, and has fallen far behind, the modern developments in technological engineering principles of general practical application.

Such houses are commonly constructed of wood in substantially the same old way. Some naturally sectional units, such as the window frames, are ready-made at the mill. Ready-cut framing pieces for small houses of standardized design are also obtainable. Similarly it has been proposed to provide ready-cut and punched steel framing. Also to provide more or less standardized steel frame sectional parts or frame units to be connected or joined together in a variety of ways for producing different effects in design. At best, these proposals obviously fail to remedy most of the difficulties involved, and at any rate have not come into general favor and use.

The ordinary wooden dwelling requires an undesirably long time to build, is expensive, costly in upkeep, presents a dangerous fire hazard, and is commonly faulty in many respects. The contruction of such houses substantially throughout of metal and other suitable incombustible materials has not heretofore been technically developed to an extent nor in a way to produce a generally satisfactory or a commercially practicable dwelling. Small building structures, notably garages, are commonly ready-made with full size wall sections and with large roof sections, all to be joined and connected together, but this has provided no solution of the many problems involved in the construction of a suitable dwelling house.

A general object of this invention is to devise a construction which will result in providing a building more strongly built, better equipped to serve as a residence, more convenient to live in, more easily and much more quickly erected, and at the same time costing considerably less than the usual or conventional type of dwelling house of corresponding size. In this connection, a further object is to satisfy what appears to be a real demand for an inexpensive, durable, sanitary, and fireproof permanent dwelling of the individual or segregated type. In short, objects of the invention are to remove the objectionable aspects of the present situation by overcoming the difficulties and providing satisfactory solutions of the housing problems involved.

Among more detailed objects of the invention are to provide for so grouping the mechanical equipment of the building, such as the heating installation, all piping, plumbing, and electrical wiring, as to effect a distinct saving; to provide a building of a construction in which the enclosed space is more advantageously utilized, which requires no cellar but in which its usual functions and utility are retained and more economically provided for elsewhere in the building; to provide a building structure which can be easily and conveniently erected without the use of scaffolding, ladders, or temporary bracing; and to reduce the number of small indivdual pieces to a minimum and to provide rigid sectional units of moderate size and weight which may be readily transported and which may be easily handled and assembled by two able-bodied unskilled workmen. These were among the numerous problems pressing for solution. Various other objects and advantages of the invention will hereinafter appear.

A building construction provided for carrying out the ideas of the invention basically comprises a strong and rigid central tower forming a vertical unitary stiffening core in the building and which extends from the foundation to the roof ridge. This tower, to form the central core of the building, is erected first, in a fully preassembled condition. This central tower comprises a steel framework which rests upon and is securely anchored to a firm sunken base such as a heavy concrete foundation footing. The steel framework of this tower includes vertical

members which carry suitable interior wall members. These vertical members at the sides of the tower toward the front and rear of the building extend up to the top floor ceiling while other intermediate vertical members are continued up to the roof ridge. The tower, inclusive of its vertical walls, may desirably be of an H-shape in horizontal cross section, with the wings or flanges open, but it may be of a different shape, such as square. In any case, room space or floor space is provided between or within the walls of the tower, these walls serving as interior partitions. This central tower is the main supporting unit for the floors and roof, as well as the upper ceiling. Also it provides the chief reliance for resisting the stresses of wind pressure, as well as resistance to the damaging effects of earthquakes.

The remainder of the building, to provide the required enclosed space, rooms and floors, is built around the erected central tower and securely tied or anchored thereto, including outer walls and a roof over all. This outer structure is of steel construction but is of lighter material than used in the central tower, since the latter braces and sustains the surrounding outer structure. The outer walls and other parts of this outer more lightly built structure are tied to the rigid central core formed by the tower by means of floor beams, rafters, and other connecting members, bolted in place. For example, a pair of horizontal steel cross beams, to extend through the building from front to rear at the level of the second floor, are bolted respectively to the outer sides of the uprights of the tower, serving at the same time as floor beams and for tying the outer walls of the biulding to the central tower. A similar but lighter pair of cross beams are arranged at the ceiling level of the second floor. Rafters, including hip rafters, are connected to the apex of the central tower by means of bolted connections. Continuous suitably constructed steel sills beneath the outer walls rest upon sunken posts which may be of concrete.

No vertical framing, such as studding, is required. The exterior walls are made up entirely from independent wall sections or units in the form of long vertical preconstructed panel frames which extend from the sills up to the lower edges of the roof. These panel frame wall sections have bolted connections to the sills, to the outer ends of the floor and ceiling beams, and to the lower ends of the rafters, including the hip rafters, and also to one another along their adjacent edges, including the corners of the building. This assembled exterior wall construction is amply strong to support the outer edge portions of the floor, the ceiling and the roof. These wall sections may be easily erected by placing their lower ends on the sill, with which they are adapted to have an engaging relation. First the corner panel frame sections and those coming adjacent to floor beams are raised and bolted together and to the sill, beams and rafters, then the intermediate sections are similarly filled in, to form the complete supporting and enclosing exterior walls.

The invention further includes various features of construction and combinations of parts, as will appear from the following description.

The two slightly variant embodiments of the invention illustrated in the accompanying drawings will now be particularly described and thereafter the invention will be pointed out in the claims, reference now being had to the drawings, in which:

Figure 1 is a somewhat diagrammatic typical floor plan of the first floor or ground floor of a dwelling constructed in accordance with the invention.

Figure 2 is a similar floor plan of the second floor.

Figure 3 is an enlarged partial horizontal section of an outside wall showing one form of joint construction for connecting together the wall units, but which may be varied.

Figure 4 is a similar view at a corner.

Figure 5 is a vertical front to rear section through the building structure on the line 5—5 of Figure 1.

Figure 6 is a reduced side elevation showing the method of erecting the assembled tower unit on its base at the building site.

Figure 7 is a vertical side to side section of the tower taken on the line 7—7 of Figure 5.

Figure 8 is an enlarged broken vertical section through an outside wall and portions of the floors and roof.

Figure 9 is a view in elevation from its inner side of a preassembled factory-built individual outside wall unit.

Figure 10 is an enlarged horizontal section of the tower on the line 10—10 of Figure 7, showing the H-shape of the tower.

Figure 11 is a plan view in part of the framework of the roof construction.

Figure 12 is an enlarged perspective view showing the connection of a hip rafter to a wall corner.

Figure 13 is a view similar to Figure 1 but showing a modified floor plan resulting from a modified tower construction in which the tower encloses a square instead of being of the open H-shape as shown in Figures 1, 2 and 10, for example.

The embodiment of the invention in the dwelling house construction shown in Figures 1 to 12 inclusive will now be particularly described with reference to the drawings, beginning with the central tower or core, which constitutes a principal supporting, stiffening and sustaining unit of the entire building. The steel framework of this core-forming

tower is shown (Figure 10) as arranged in H-shape, comprising wings or flanges and an interconnecting web. This shape contributes desirably to the conservation and convenient utilization of space in the building, as will be clearly evident from Figures 1 and 2. All individual parts or members making up the framework of the tower are bolted together, although rivets could be used in assembling this unit at the factory or mill. This tower unit may be completely assembled at the mill, or if found more convenient or desirable for transporting, or for any reason, the flange portions only may be assembled in the mill, and these joined together by the web portion in the field, with the tower than in a horizontal position before erection. (Figure 6).

The steel framework of the tower has vertical corner uprights 1, 1, arranged to form a rectangle horizontally, shown as a square. These corner uprights are of angle shape with their flanges in alignment and with their salient angles forming the corners of the tower structure. These corner uprights are of a length to extend from the foundation for the tower up to the ceiling of the top floor of the building. In line with the respective flanges of the H-shaped tower (Figure 10) is a pair of adjacent but slightly spaced intermediate vertical uprights 2, 2, of a length to extend from the tower foundation upwardly beyond the upper ends of the outer uprights 1, 1, and to the roof ridge of the building (Figure 5). These intermediate uprights are also of angle shape, but of lighter material than the outer uprights 1, 1. The uprights of each pair of an intermediate pair of uprights 2, 2 are arranged to have adjacent spaced flanges extending towards and in alignment with the flanges of the other or opposite pair, and have oppositely extending flanges in alignment with the flanges of the corner uprights 1, 1, between which the intermediate pairs of uprights 2, 2, are disposed. (Figure 10).

The two corner or outer uprights 1, 1, and intermediate uprights 2, 2, of a pair thereof, in the line of the wings or flanges of the H-shaped tower, are respectively connected together by means of diagonal braces 3, 3, shown as of angle shape, at the inner sides of the uprights, as shown in Figures 5 and 7. Also there are two pairs of similarly arranged inclined angle braces 4, 4, connecting the upper ends of the outer or corner uprights 1, 1, with the longer intermediate uprights 2, 2, adjacent the upper ends of the latter. (Figures 5 and 7).

The interconnecting web portion of the H-shaped tower connects together the two pairs of intermediate uprights 2, 2. This web portion is shown as comprising, in its lower part, two transverse horizontal angle-shaped members 5, 5, and a pair of crossed angle-shaped diagonal braces 6, 6, all connected at their ends to corner plates 7, 7, which in turn are connected to the pairs of intermediate uprights 2, 2, being inserted into the space between these uprights of a pair and bolted thereto, as indicated in Figure 7. The lowermost horizontal tie member 5 is adjacent to the lower ends of the pairs of uprights 2. 2, while the other horizontal tie member 5 is at the level of the second floor.

In spaced relation successively above the upper tie member 5 are two other flanged horizontal tie members 8 and 8*a*, the tie member 8 being at the ceiling level of the top floor, while the other tie member 8*a*, which is shown as T-shaped (Figure 5) connects together the upper ends of the pairs of uprights 2, 2. The pair of uprights 2, 2, are further connected together by two pairs of angle-shaped diagonally crossed braces 9, 9, one such pair of braces being between the two upper tie members 8 and 8*a*, and the other pair of braces being between the successive tie members 5 and 8. (Figure 7.) Flange portions of the ends of these tie members 8 and 8*a* and of the braces 9, 9, enter between the uprights 2, 2, of the respective pairs of these uprights and are bolted thereto. (Figures 7 and 10.) The two braces of each of the three pairs of diagonally crossed braces 6, 6, and 9, 9, are bolted together at their crossing point. (Figures 7 and 10.)

A bulky and heavy solid concrete block 10 provides a firm and secure foundation footing or base for the tower. This block is sunk deeply into the ground, above which it projects to the level of the lower side of the first floor. (Figures 6 and 7.) This foundation block is horizontally square and is provided at the top corners and at two of the intermediate points with similar notched-out recesses 11, 11, having flat bottoms at the same level just above the surface of the ground. Similar base plates or foot plates 12, 12, are supported on the bottoms of these recesses and are firmly secured to the concrete foundation block 10 by means of anchor bolts 13, 13.

The relative elevations of these base plates 12, 12, may be adjustably varied, to assure that all are at the same level, for example, by means of shims, as is well known in the general art. This assures that the tower can be erected in a perfectly vertical position. Each foot plate 12 has a pair of spaced upstanding ears 14, 14, between which the lower ends of flange portions of the respective outer or corner uprights 1, 1, and of the two pairs of intermediate uprights 2, 2, are received and to which these lower ends of the uprights are securely anchored respectively by means of strong bolts 15, 15. The projecting securing flanges on the lower ends of the outer uprights 1, 1, may desirably be strengthened by means of short and rather thick outwardly attached plates 1*a*, 1*a*. (Figure 5.)

In order to raise the tower unit from the horizontal to its final vertical position, three aligned securing bolts 15, 15, are inserted in place, and then by using one or more of the three remaining aligned foot plates 13, 13, as an anchorage, the assembled tower may be readily raised by means of a block and tackle connection to one or more of the adjacent free ends of the uprights along the upper side of the horizontally disposed tower unit, as is clearly shown in Figure 6. This completes the description of the erected tower unit which is to form a strong and rigid supporting and sustaining core for the building as a whole.

There is no continuous foundation beneath the building's exterior walls, which are presently to be described. Spaced concrete base footings or foundation posts 16, 16, are provided at suitable intervals. These posts are sunk into the ground, with flat upper ends only slightly above its surface, about on a level with the bottoms of the recesses 11, 11, in the tower foundation block 10. Sill plates 17, 17, the upper sides of which are brought to a true level, rest upon the flat tops of the posts 16, 16, and a continuous steel sill is supported upon these sill plates. This sill, in the construction shown in the drawings, comprises a pair of like channels 18, 18, disposed with their flanges turned toward one another in alignment and in spaced relation for the respective channels. The webs of these channels are connected together at intervals by means of bolts 19, 19, passing through the webs and through interposed spacing sleeves 20, 20.

A pair of similar strong steel cross beams 21, 21, shown as of angle-shape, are carried by the tower. These beams extend horizontally from front to rear of the building at opposite sides of the tower and are bolted to the tower uprights 1, 1, and 2, 2. These beams are at the level of the second floor and extend beyond the outer uprights 1, 1, of the tower, out to the front and rear exterior walls respectively, and serve the double purpose of securely tying these walls to the central tower and as floor beams. A similar but lighter pair of upper ceiling beams 22, 22, are provided which are bolted to the intermediate uprights 2, 2, and to the upper ends of the outer uprights 1, 1, and which, just below the roof, tie the exterior walls to the tower, as well as serve as ceiling beams.

Hip rafters 23, 23, have a bolted connection to and extend down from the ends of the uppermost tie member 8*a* at the apex of the tower, to the corners of the roof at the upper ends of the corners of the exterior walls. Other rafters 24, 24, having a bolted connection thereto, extend down from this top tie member 8*a* of the tower to the top of the exterior walls, while sub-rafters 25, 25, are shown as similarly extending from the hip rafters 23, 23. (Figures 5, 8, 11 and 12). All of these rafters may be of channel shape, as shown in Figures 5, 8 and 12.

As a further feature of the invention, the exterior walls of the building are composed entirely of independent factory-built wall sections, a view of the inner side of one of which is shown in Figure 9. These unitary sections or wall units are constructed in the form of long panel frames, and when assembled together in the wall extend vertically from the outer sill member 18 up under the eaves of the roof slightly above the lower ends of the rafters. (Figures 5 and 8). Such a panel frame wall section comprises rigid lateral angle bars 26, 26, having their opposed flanges connected together by a series of angle bars, shown as six in number, comprising five smaller cross bars 27, 27, and a lowermost larger cross bar 27*a*. A sheet steel strip 28 completely covers the outer side of the elongated frame formed by the longitudinal bars 26, 26, and cross bars 27, 27. All the parts 26, 26, 27, 27, and 28, 28, are bolted together, as indicated, but rivets might be used instead of bolts.

The lowermost cross bar 27 is shown as flush with the lower ends of the side bars 26, 26, while the lower end of the cover sheet 28 projects for a short distance below the adjacent cross bar 27. The upper end of the cover strip 28 is shown as flush with the upper ends of the side bars 26, 26, with the uppermost cross bar 27 spaced downwardly some distance therefrom. At an elevation to come just below the level of the second floor and also just below the level of the top floor ceiling, the longitudinal bars 26, 26, have angle brackets 29, 29, bolted to the inner sides of their outer flanges, these brackets being arranged in pairs with their free angle flanges projecting towards one another for the respective pairs, just beyond the inner edges of the inwardly extending side flanges of the side edge bars 26, 26. (Figures 8 and 9).

In order readily to raise a wall section to its vertical position in the wall, the downwardly projecting end of the outer strip 28 is placed at the outer side of the outer sill member 18 and the lowermost cross bar 27 over the top of this sill member, with the wall section at an inclination, whereupon the wall section may be easily pushed up to its vertical position and secured in place in the wall. Beginnings are made at the corners, where the corner sections can be secured together and to the hip rafters 23, 23; and at points in the wall adjacent the ends of the long projecting cross beams 21, 21 and 22, 22, on the central tower, so that these wall sections can then be secured to the ends of the beams as well as to the ends of the adjacent rafters 24, 24. Also the lowermost cross bar 27*a* of each erected wall section is bolted to the up-

per flange of the outer sill member 18, as clearly shown in Figure 8.

A second-floor plate 30 of angle shape may then be run along at the inner sides of these erected sections and bolted to the pairs of brackets 29, 29, at that level. (Figures 5 and 8). A similar but lighter ceiling plate 31 is bolted to the upper pairs of brackets 29, 29, at that level. The intermediate wall sections may then be raised and bolted to the outer sill member 18, to the floor plate 30, to the ceiling plate 31, and to one another along their side bars 26, 26, in adjacent relation, as well as to any adjacent rafters such as 24, 24 or 25, 25. The outer portions of the second floor, of the ceiling and of the roof will thus be supported by the upright angle bars 26, 26, of the assembled wall sections, with these bars supported at their lower ends on the outer sill member 18.

One form of joint connection for securing adjoining sections together or to one another is shown in Figure 3. In this construction a U-shaped clip 32 engages over and clamps together the inwardly projecting edge portions of abutting flanges of the longitudinal bars 26, 26, belonging respectively to two of the erected sections. A securing bolt 33 passes through the arms of the clip 32 and the two gripped flanges of the vertical angle bars 26, 26. It is to be understood that as many of these clips 32, 32, may be arranged in a vertical series as may be desired. Also that the clip 32 could be extended vertically to form a continuous U-shaped strip. The clip 32 shown in Figure 3 also is utilized for another purpose, as will presently appear. At the outside of the wall the joint between the joined sections is covered by a facing strip 34. It will be noted that the two connected angle bars 26, 26, form in effect a strong T-shaped post in the wall.

One form of corner joint connection between the adjacent sections is shown in Figures 4 and 12. Here the free flanges of the angle bars 26, 26, belonging to adjacent sections are disposed at right angles to each other and are shown as having their inner edges in slightly spaced relation. An outer corner angle bar 35, similar to the angle bars 26, 26, fits into the angular space between the flanges of the latter and has its flanges firmly secured to the flanges of the bars 26, 26, by means of bolts 36, 36. This corner joint construction is concealed by means of a suitably flanged outer facing plate 37. It will be noted that a strong corner post is produced by the three connected angle bars comprising the two panel frame bars 26, 26, and the intermediate connecting bar 35.

One form of construction for connecting the hip rafters to the corners formed by the corner joint construction is shown in Figure 12. The channel-shaped hip rafter 23 is notched on its lower side and cut at its end to the shape shown so as to provide from the web of the channel a flat angularly projecting tongue 38, shown as perforated with a pair of bolt holes. When the rafter 23 is swung down to its final position this attaching tongue 38 will then extend straight downward into the re-entrant angle of and in engagement with the outer corner joint angle bar 35, with the shoulder formed at the back of the notch in the rafter in engagement with the adjacent inner edges of the connected flanges of the bars 26, 26, and with the channel web at the notch resting on the upper ends of all of the three connected angle bars 26, 26 and 35, 35. The tongue 38 is then bolted to the projecting wing or flange of an acutely angular or V-shaped bracket member 39, the other flange or wing of which is bolted to the adjacent flange of the corner joint angle bar 35, as shown.

The lateral or end exterior walls of the building are tied to the tower structure by means of transverse floor beams 40, 40, at the level of the second floor, as indicated in part by broken lines in Fig. 2, and as also indicated in dotted line end view in Figure 5; similar transverse ceiling beams 40*a*, 40*a*, indicated in dotted line end view in Figure 5, tie the exterior end walls at that level to the tower structure; and at the ground floor level there are shown in broken lines in Figure 1 similar transversely extending girders or floor beams 41, 41, which extend out to the sill. Additional floor and ceiling beams of course may be inserted wherever they may be required, and further tying the outer structure to the tower structure.

The principal cooperating constructional features of the dwelling house shown in the drawings have now been described. While, for simplicity of illustration, the house shown in the drawings is of rectangular oblong shape in plane, this shape is not required so far as the invention is concerned. The exterior contour, in ground plan or otherwise, of a building constructed in accordance with the invention may be widely varied. In any case, the outer more lightly built parts of the building are supported and sustained by reason of the various stresses thereon being transmitted to the strong and rigid core formed by the central tower. Also similar sectional exterior supporting walls may be employed in carrying out the invention, in any instance.

Furthermore, one or more garages, porches, sun parlors, shelters, bays, for examples, may be added to the plan. Similarly, while a two-story house is shown in the drawings, it should be obvious that the invention can be carried out substantially without regard to the number of stories, whether more than two, or only one. Interior partitions may be installed wherever desired, and some such are shown somewhat diagrammatically in the floor plans appearing in Figures 1, 2 and 13.

All partitions, interior finish walls, floors and ceilings should be constructed of suitable fire-proof and heat-insulating material.

In the building construction shown in the drawings, the lower floor 42 and also the second floor 43 are indicated as each comprising heavy or thick precast gypsum slabs or gypsum planks. The ceiling 44 is similarly formed, but lighter. These floor slabs for the first floor 42 have their outer wall ends supported on the inner sill members 18, 18, as shown in Figure 8, and as indicated by broken lines in Figure 5. These slabs of the first floor 42 are also shown in Figure 5 as supported on the flat top of the tower foundation block 10, and at other intermediate points, remote from the tower construction, may be supported on suitable floor beams.

The outer wall ends of the gypsum slabs or planks which form the second floor 43 are supported on the wall plates or floor plates 30, 30, as shown in Figure 8 and as further indicated by the broken line in Figure 5. These slabs or planks forming the second floor 43 are supported at intermediate points on the wall tie floor beams 40, 40, and also may be further supported at other points upon any required additional floor beams. The outer or wall ends of the thinner or lighter precast gypsum slabs or planks which form the ceiling 44 are supported on the upper wall plates or celling plates 31, 31, as shown in Figure 8 and as indicated by a broken line in Figure 5, and are further supported on intermediate ceiling beams, such as the wall tie beams 40*a*, 40*a* appearing in dotted line end view in Figure 5. A suitable finish flooring 45 is laid upon each of the precast gypsum slab floors 42, 42, and 43, 43, and this finish flooring is shown as topped by a tread layer 46 of suitable material such as linoleum. It may be noted that instead of the precast gypsum slab floors 42, 42, and 43, 43, these floors could be of precast slabs of some other suitable material; also these floors could be formed from suitable sectional units of metal.

Interior finish walls 47, 47, (Figures 1, 2, 3, 4, 8 and 13) are formed from precast slabs of suitable material such as gypsum. These interior finish wall slabs for the inner sides of the exterior walls of the building correspond in width with the width of the above described wall sections, (Figure 3 and 4), and in height or vertical length extend from the floor to the ceiling. (Figure 8). One form of construction for holding these finish wall slabs in place is shown in Figure 3. An inner facing strip of finish strip 48 overlies and conceals the crack or joint between the slabs and is secured by means of a screw 49 to the middle of the U-shaped securing clip 32. The corners of the slabs forming this interior finish wall 47 are shown as notched to accommodate the clip 32 and its securing bolt 33. It is understood of course that there may be a number of the screws 49, 49, in a series corresponding to the number of clips 32, 32, employed.

One form of corner joint construction for joining and holding in place the slabs of this interior finish wall 47 is shown in Figure 4. As there shown, the spaced outer corners of the adjacent slabs are set into V-grooves formed by the flanged edge portions of an inner holding strip 50 which abuts against the adjacent edge portions of the inner connected flanges of the angle bars 26, 26, belonging to the adjacent wall sections. The adjacent inner corner portions of these slabs of the interior finish wall 47 are shown as beveled or mitered to fit against one another in abutting relation, so that, in conjunction with the corner backing strip 50, each of the wall slabs will hold the other in place.

The finish walls 47, 47, for the partitions are formed of similar slabs, which may be supported in any convenient and suitable way on the framework or other base structure of the partition wall. These partition walls may be held in place in the usual way, by fastening them to the floor and ceiling as well as to adjacent walls if desired. Since the construction and installation of partition walls is already well developed in the general art, no particular description thereof is required here.

The manner in which the H-shaped tower construction contributes to the conservation and economical utilization of floor space is exemplified in the floor plans illustrated in Figures 1 and 2. It will be noted that the principal walls of the tower structure are arranged in H-shape in conformity with the H-shape of the framework of the tower. (Figure 10.) On the first floor (Figure 1), one of the open spaces thus formed, at the front of the web wall of the tower structure, is utilized to accommodate a stairway 51, shown as arcuately curved, which opens into or leads directly from a front hall at the outside of the tower structure. Similarly, at the rear, the open space from the tower forms part of a utility room having space within its tower portion for a flue 52 and furnace 53, together with other equipment as indicated. On the second floor (Figure 2), the corresponding front open space formed by the tower walls provides for the stairway 51, while at the rear of the web wall of the tower a bath room is shown partly within and partly at the rear of the tower structure, with the bath tub, lavatory and other plumbing fixtures all within the tower portion of this room as shown.

In the modified plan of a first floor shown in Figure 13, the tower forming the core of the building is not H-shaped, as shown and described with reference to Figures 1 to 12 inclusive, there being no interconnecting web

portion, with a corresponding wall. As shown in Figure 13, the tower is constructed to carry four interior finish walls 47, 47, which enclose a square room entirely within the tower structure. These tower walls are shown as double walls, constituting inner and outer finish walls 47, 47, spaced from one another in order to accommodate the framework of the tower between them. Four corner uprights 54, 54, belonging to this framework are shown. Suitable interconnecting and bracing members (not shown) may extend between these uprights 54, 54, in the wall space. This tower room contains substantially the same equipment as shown in Figure 1 at the rear of the web wall there shown. In this modified floor plan of Figure 13, a straight stairway 55 is shown as provided at the outside of and alongside the tower structure.

It may be noted that the roof structure, in addition to the rafters, such as 23, 23, 24, 24 and 25, 25, above noted, may further comprise channel stringers 56, 56, (Figures 5, 8 and 11) laid across the rafters and suitably secured thereto, and sheet metal roofing 57, 57, secured on the stringers, together with sheet metal cornice strips 58, 58 at the eaves, and a cap plate 59 at the apex of the roof.

It is obvious that various modifications may be made in the constructions shown in the drawings and above particularly described, within the principle and scope of the invention as defined in the appended claims.

What we claim is:—

1. A building construction having in combination, a tower structure comprising a rigid steel framework defined by vertical horizontally spaced uprights, a single heavy foundation block set into the ground and to which the lower ends of the tower uprights are securely and firmly anchored, a weaker steel structure including vertical exterior walls entirely surrounding and enclosing the tower structure, upper floor beams connecting these exterior walls with the framework of the tower structure and top floor ceiling beams connecting the top of the exterior walls to the framework of the tower structure.

2. A building construction having in combination, a tower structure comprising a rigid steel framework defined by vertical horizontally spaced uprights, a single heavy foundation block set into the ground and to which the lower ends of the tower uprights are securely and firmly anchored, a weaker steel structure including vertical exterior walls entirely surrounding and enclosing the tower structure, upper floor beams connecting these exterior walls with the framework of the tower structure, top floor ceiling beams connecting the top of the exterior walls to the framework of the tower structure, the top of the framework of the tower structure extending above the said ceiling beams and above the top of the exterior walls, and inclined rafters connecting the top of the tower framework to the top of the exterior walls.

3. The invention defined in claim 2, in which the said vertical exterior walls are made up wholly from structurally independent unitary wall sections assembled into the walls, each such section being of a length to extend throughout the height of the wall and including a continuous bar along each of its lateral edges, the outer ends of the said floor beams and ceiling beams and rafters being connected to said bars of the wall sections.

4. The invention defined in claim 2, in which the said uprights of the tower framework comprise corner uprights extending up only substantially to the ceiling beams and intermediate uprights extending up to the upper ends of the rafters at the roof ridge.

5. In building construction, a steel framework rigid tower structure forming a vertical central stiffening core for the building and which is entirely enclosed within the building, the said framework comprising corner uprights extending up from the foundation substantially only to the level of the top floor ceiling and intermediate uprights extending from the foundation up to the roof ridge, the intermediate uprights being disposed oppositely to one another and respectively between two of the corner uprights, interconnecting members extending between and connecting these intermediate uprights together to form a web, and interconnecting members at each edge of this web connecting that intermediate upright with both of the adjacent corner uprights thereby to form flanges on the web in substantially the shape of the capital letter **H**.

6. In building construction, an exterior wall formed in its entirety from vertically elongated wall section units extending vertically throughout the height of the wall, each such unit being in the form of a panel frame comprising a pair of continuous parallel vertical side bars along its edges respectively, a vertical series of cross bars connecting together the side bars, and a strip of sheet metal secured in place at the outer side of all of the said bars; the said exterior wall further including means for connecting together the contiguous side bars belonging to adjacent units in the wall thereby to integrate the wall section units into the wall.

7. The invention defined in claim 6, in which a said wall section unit further comprises a pair of inner brackets mounted on its side bars at an intermediate point along their length and a similar upper pair of brackets mounted on these side bars; in combination with a horizontal floor-supporting wall plate extending along the inner side of the wall and secured to the successive said intermediate pairs of brackets, and a ceiling-supporting

wall plate similarly extending and secured to the successive said upper pairs of brackets.

8. In building construction, an exterior elongated unitary wall section comprising continuous side bars of angle shape having their free flanges projecting inward and having their other flanges extending toward each other in alignment, a series of cross bars secured at their ends to the inner sides of the latter flanges of the side bars, and an exterior strip of sheet metal secured along its edges to the outer sides of the aligned flanges of the side bars.

9. In building construction, a continuous steel sill comprising a pair of channels with vertically disposed webs having their flanges turned towards one another in alignment and spaced relation, spacing sleeves interposed between the webs, and bolts passing through the webs and the interposed spacing sleeves.

10. A building construction having, in combination, a tower structure comprising a rigid steel framework defined by vertical horizontally spaced uprights and provided with vertical walls enclosing its framework, said tower structure with its vertical walls being disposed in substantially the shape of the capital letter H in horizontal planes, a single heavy foundation block set into the ground and to which the lower ends of the tower uprights are securely and firmly anchored, a weaker steel structure including vertical exterior walls entirely surrounding and enclosing the tower structure, upper floor beams connecting these exterior walls with the framework of the tower structure, and top floor ceiling beams connecting the top of the exterior walls to the framework of the tower structure.

Signed at Newark, N. J., in the county of Essex and State of New Jersey this 8th day of July, 1932.

JOSEPH SANFORD SHANLEY.
HERBERT THORNTON TURNER.