Nov. 20, 1951 V. C. SHADGEN 2,575,474

BUILDING STRUCTURE

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FIG. 1.

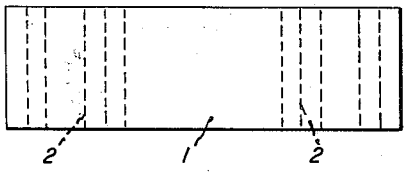


FIG. 2.

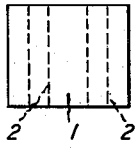


FIG. 3.

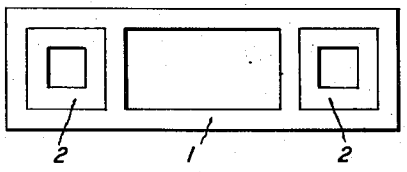


FIG. 4.

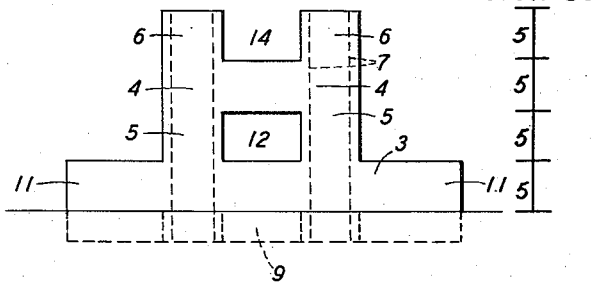
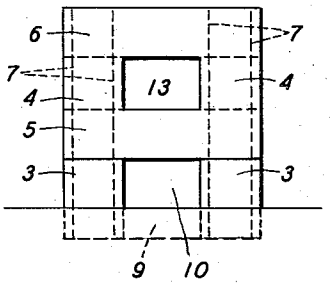


FIG. 5.



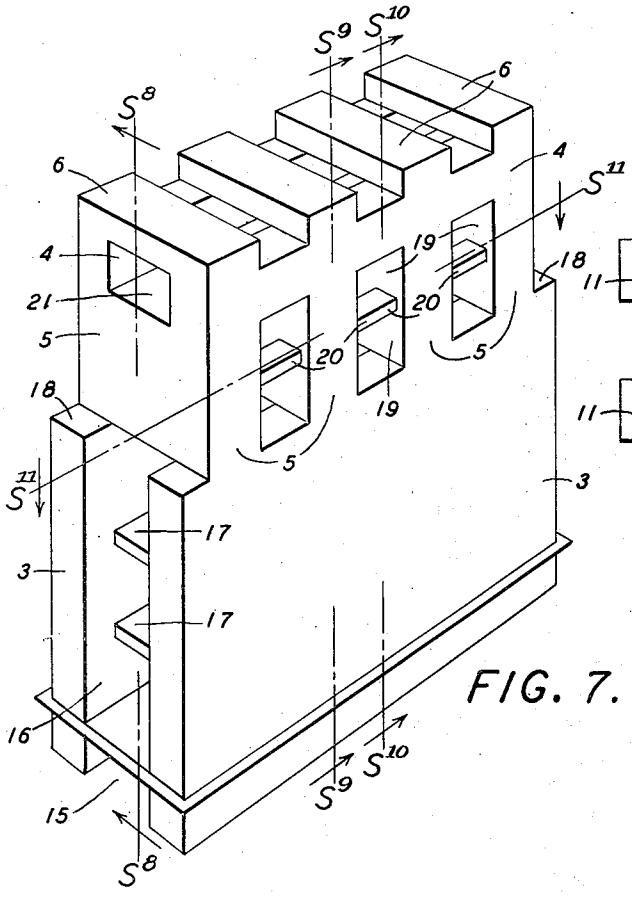
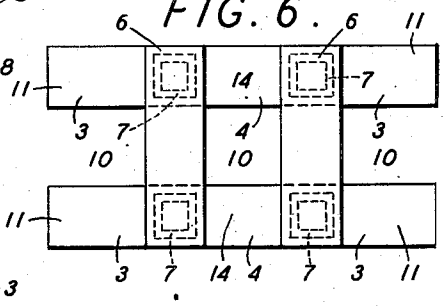


FIG. 7.

FIG. 6.



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BUILDING STRUCTURE

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FIG. 8.

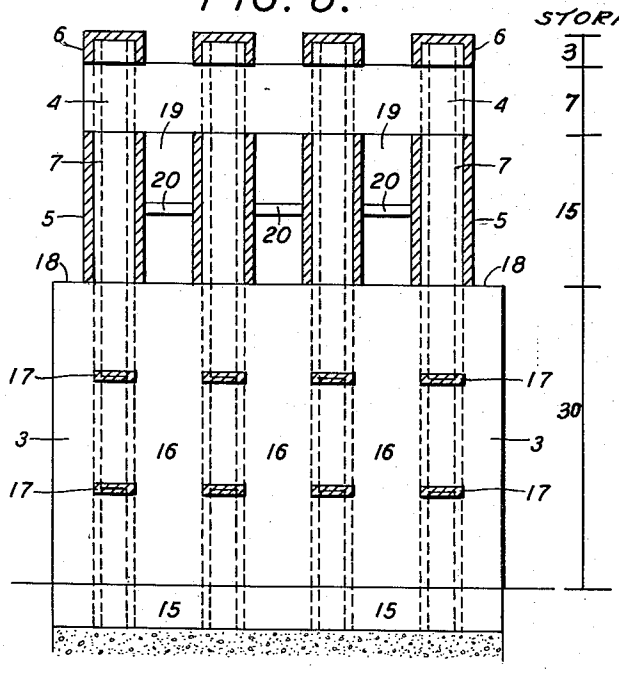
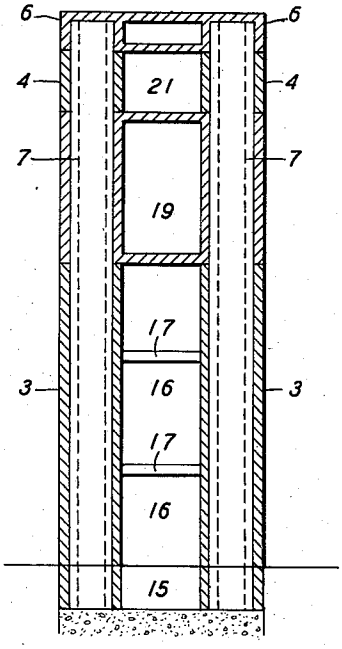


FIG. 9.



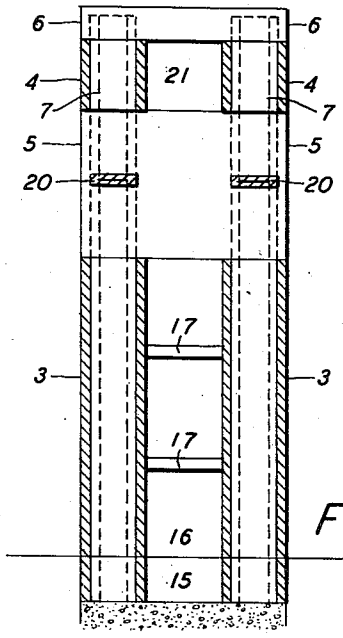


FIG. 10.

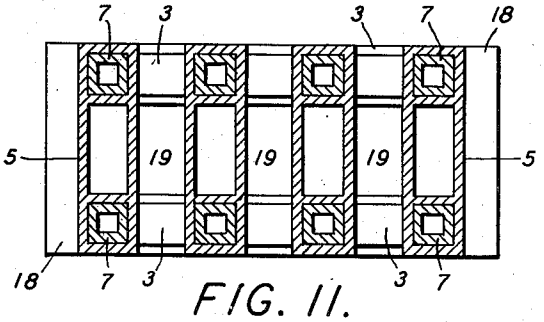


FIG. 11.

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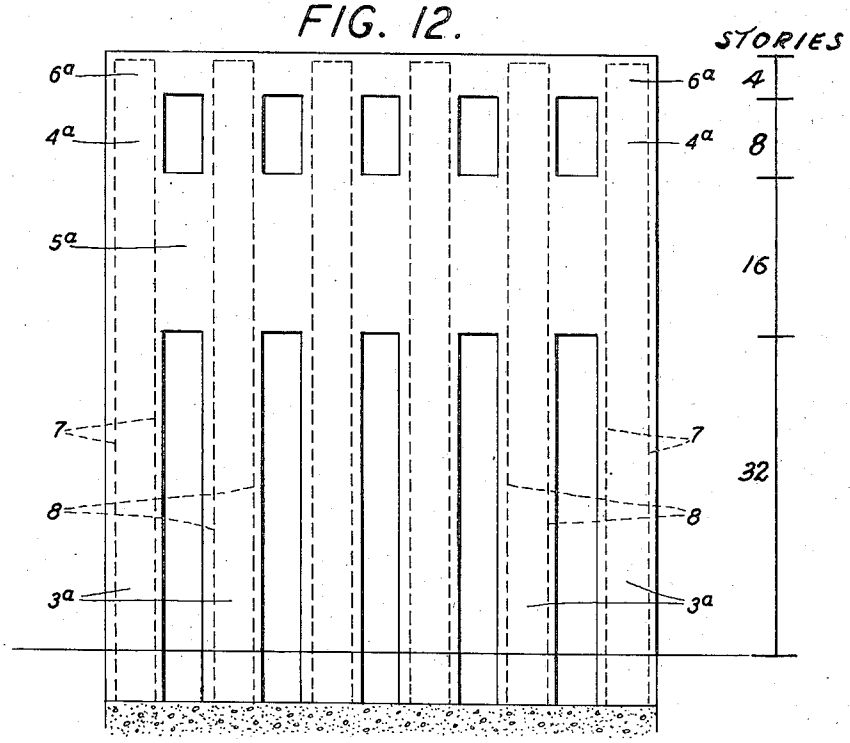
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FIG. 12.



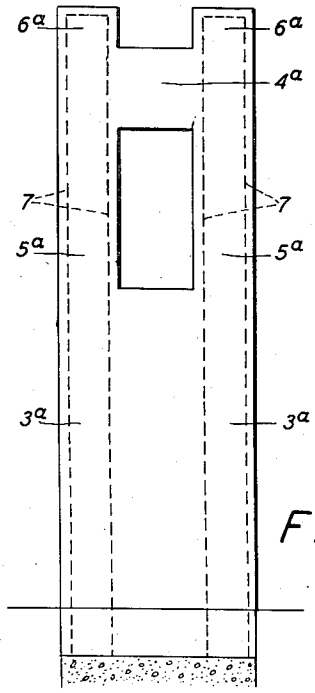
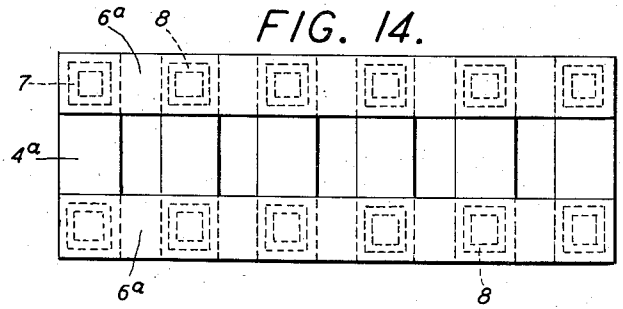


FIG. 13.

FIG. 14.



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BUILDING STRUCTURE

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Application September 10, 1948, Serial No. 48,651

8 Claims. (Cl. 20—1)

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This invention relates to multi-storied building structures, suitable for apartment, office and other uses.

A unit section forms the basis of the invention and is employed throughout various assemblies in the erection of buildings of different types.

A unit section suitable for the purpose, is preferably in the form of a multi-storied structure of suitable dimensions and rectangular outline in horizontal section. Built into the unit, vertically disposed and in spaced apart relation, there are sections of towers, positioned for connection to like tower sections of adjoining units to form walled-in reinforcing towers, extending from the ground upward to or near the top of the building.

In building assemblies, multi-unit tiers are employed in superimposed relation, with the units of each tier spaced apart for the admission of air, light and sunshine, and extend horizontally at right angles, lengthwise, to the units of adjoining tiers, to cross-tie and reinforce the same.

Aside from the structural advantages, the main object in the assembly of the building, is to give it a form that will create and make available to tenants, a natural continuous flow of fresh air in and around all apartments, offices and other space in the building.

To meet this requirement, the unit sections that make up the building are so relatively positioned and spaced apart as to provide passage for a free flow of air from the ground level upward through the building to and through the top thereof, which is of open construction.

As an aid in strengthening and maintaining such an upward flow, the upper portion of the building provides through cross passages, that open on its four sides to the outer air and cross currents of air through the passages act in the well known manner, to induce an upward flow through the building even when there is no appreciable movement of the outside air at the lower levels.

A further object is to position and space the unit sections of the building widely apart and in such relation, that one does not obstruct light to an adjoining or adjacent section, the arrangement being such that light is admitted during daylight hours to all interior parts of the building.

For this purpose, the horizontal cross sectional area of the spaces separating the unit sections is made substantially equal to or smaller than the corresponding area of the sections and through the open spaces thus provided, daylight is freely admitted.

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In addition to air and light, it is important to provide for the admission of sunshine to the interior of the building. In the present illustrative embodiments, the buildings, in each instance, will preferably be so situated and positioned, that one windowed side and end will be sufficiently exposed to the east, to get the forenoon and mid-morning sun and the opposite windowed side and end, will be similarly exposed to the west to get the afternoon and evening sun, the result being that sunlight will be brought to all windows of the building during the day.

The ground-based sections that form the greater portion of the building, are multi-storied and spaced apart in parallel relation and are preferably windowed on all sides. Based on and rising above the ground sections, multi-storied cross units bridge the space between them and are widely spaced apart to admit air, light and sunshine through the windowed sides and ends of the units throughout daylight hours. Above the bridging units, there are additional superimposed multi-unit tiers, with the units arranged horizontally at right angles to the units of adjoining tiers and widely spaced apart to open the upper portion and top of the building for the admission of air, light and sunshine in and around the same.

Other structural features, details, etc., not specially mentioned above, will be brought to attention in the detailed description that follows.

In the accompanying drawings, I have shown a building construction suitable for carrying the invention into effect, but it is to be understood that no limitations are intended by this showing other than are imposed by the appended claims.

In the drawings—

Figs. 1, 2 and 3 are respectively side, end and top plan views of a unit section, with the built-in tower sections indicated in dotted lines. These views are enlarged and drawn to a scale of one-eighth of an inch equals ten feet.

Figs. 4, 5 and 6 are respectively side, end and top plan views of a comparatively small building formed by an assembly of unit sections shown in Figs. 1 to 3.

Fig. 7 is a view in perspective of an apartment building made up of an assembly of the unit sections, which differs somewhat in arrangement from the assembly shown in Figs. 4, 5 and 6.

Figs. 8, 9, 10 and 11 are respectively views in section on the lines s^8—s^8, s^9—s^9, s^{10}—s^{10} and s^{11}—s^{11} of Fig. 7, in which the built-in reinforcing towers are shown diagrammatically, owing to the small scale on which the views are drawn, and

Figs. 12, 13 and 14 are respectively side, end and top plan views of a larger building of a somewhat different type.

Referring now to the drawings, I have shown my invention embodied in buildings of the multiple dwelling type, rising twenty, fifty-five and sixty stories above the ground level, but it is to be understood that this showing is for purposes of illustration only, as the number of floor levels, in each instance, may be varied considerably without departing from the structural assembly, as hereinafter described. In open country, for example, buildings of a height of only ten stories, may be the rule.

As designed, the buildings shown are intended to occupy the greater portion of one or more city blocks, which, ordinarily, measure approximately two hundred feet in width by four hundred feet in length, and are based on suitable foundations, not shown, fifty feet, more or less, below the ground level, to provide basement space, indicated by dotted lines, and floor levels therein in sufficient number and area to accommodate all necessary machinery and appliances for various purposes, such as lighting, heating, operating of express, local and service elevators, etc.

As the scale on which the drawings are made is reduced roughly to about one sixteenth of an inch to equal ten feet, it was impossible to indicate floor levels, windows, division of floor space into apartments, offices and other interior details, but as all such will follow conventional plans, a showing of the same is not considered necessary.

In the erection of the hereinafter described buildings, unit sections 1, similar to that shown in Figs. 1, 2 and 3, are employed throughout the several assemblies and, as previously stated, form the basis of the present invention.

The unit is preferably in the form of a multi-storied structure of suitable dimensions and rectangular outline in horizontal section. Built into the unit, vertically disposed and, in spaced apart relation, there are tower sections 2, 2, positioned for connection to like tower sections of adjoining units, to form walled-in reinforcing towers, extending from the ground upward to or near the top of the building.

In the following description of the illustrative embodiments of my invention, I shall use the expression "ground-based sections" in referring to the multi-storied unit sections indicated at 3, 3, throughout the drawings and the expression "extensions of the ground-based sections" in referring to the unit sections, indicated at 4, 4, that are supported in separated relation, at a height above the sections 3, 3. For reference to the cross unit sections, indicated at 5, 5, that are based on and extend horizontally across, at right angles to the multi-storied ground sections, the term "bridging units" will be used and to the cross unit sections at the top of the building, indicated at 6, 6, the expression "upper extensions of the bridging units" will be applied. It will be understood that the dimensions given herein are approximate only and may be varied considerably if found desirable.

In addition to providing a base for the walls of the building, the foundation is extended to support steel-reinforced concrete or other construction of built-in towers, indicated at 7, 7, which extend from the foundation upward to the top of the building. At the base, the towers are preferably square and measure fifty feet or more on a side. Excepting the showing in Figs. 4, 5 and 6, they are erected at each corner of the building, as shown, and as they are widely separated on the longer sides of the building, additional towers of the same dimensions, indicated at 8, 8, are equi-spaced between them, making a double row, with four to six built-in towers in each row. For the comparatively small building shown in Figs. 4, 5 and 6, only four towers are employed, as shown, at the corners of the structure that rises above the ground-based sections.

The last mentioned building is designed for use as a hospital. Below the ground level, there is the usual excavation for a basement 9, indicated in dotted lines, and over the basement, positioned in parallel relation, twin ground-based sections 3, 3 rise five stories above the ground. The sections 3, 3 are spaced apart a distance of 100 feet, more or less, to provide a passage between them to their full height, as indicated at 10, that opens at opposite ends to the outer air. If additional space is found desirable in the ground sections, they may be extended fifty or sixty feet at opposite ends, as indicated at 11.

Based on the ground sections and extending at right angles across the space 10, that separates them, there are twin bridging sections 5, 5 of five stories. The bridging sections are arranged in parallel relation and spaced apart 80 feet or less, to provide a central passage 12 open at opposite ends to the outer air for cross currents that act to induce an upward flow of air from the ground level, through the space separating the ground-based sections.

Based on the bridging sections and rising five stories above them, there are twin unit sections 4, 4 which, for identification, will be termed upper extensions of the ground sections, as they have the same outline formation and dimensions in horizontal section and are vertically aligned with the ground sections. The extensions 4, 4 are spaced apart to provide a cross passage 13 between them that opens at opposite ends to the outer air and forms a continuation of the central upward air passage or shaft through the building.

Above the extensions 4, 4 and based on the same, twin unit sections 6, 6 of five stories, rise to form the open top of the building. For identification, they will be termed "upper extensions of the bridging sections," as they duplicate the same in all respects, having the same outline and dimensions in horizontal section and being positioned in vertical alignment with the sections 5, 5. The extensions are spaced apart in the same manner and to the same extent as the bridging sections, which spacing provides a cross passage 14 that opens at opposite ends to the outer air and continues the central air-shaft upward to and through the top of the building.

As the towers 7, which rise from the foundation at the lower floor level of the basement and extend upward to the top of the building, have been described above as positioned at the four corners of the building that rises above the ground-based sections, it will not be necessary to go into further detail in reference to them.

In the assembly described, the widely separated ground-based sections provide a space between them to their full height, that opens at opposite ends to the outer air and this, plus the central air-shaft of generous proportions, insures a continuous natural flow of air from the ground level, upward to and through the open top of the building.

The upward flow of air is aided materially by cross currents through the open passages in the upper portion of the building which, in fact, induce such a flow when there is little or no appreciable movement of the air at the lower levels.

The apartment building shown in Figs. 7 to 11, though considerably larger than the hospital building above described, is made up of the same general assembly of unit sections.

Above a basement 15, of suitable dimensions, twin ground-based sections 3, 3, each measuring in horizontal cross section, sixty feet or more by three hundred and eighty feet, rise from the ground level to a height of thirty stories and are spaced apart, as indicated at 16, in parallel relation, a distance of sixty feet. As an additional strengthening reinforcement, suitable horizontally spaced apart bridging formations, indicated at 17, are provided at different heights, that extend across from section to section between opposite towers and tie the same together. The bridging formations 17, in vertical cross section, may be square or rectangular and, as they measure ten or more feet on a side, may be utilized as passageways between the sections and for other purposes. Windows (not shown), in the inner and outer side and end walls of each section, at the different floor levels, provide for admission of light, sunshine and the free circulation of fresh air in the various apartments, offices and the like therein.

Based on the ground sections and rising fifteen floor levels above the same, there are four spaced apart cross units 5 that extend at right angles to the ground sections and bridge the space from tower to tower between them. In horizontal cross section and allowing for the "setbacks" indicated at 18, required to meet building regulations of various cities, the bridging units each measure about sixty by one hundred and seventy feet and the width of the spaces 19, separating them is forty odd feet, which provides ample space to insure an upward flow of air, induced, when necessary, by the cross currents between the bridging and higher positioned units. Cross formations, indicated at 20, similar to those above described in connection with the ground sections, may be provided to tie the bridging units together from tower to tower as shown. Windows (not shown) in the opposite side and end walls of bridging units, admit light, sunshine and a constant supply of fresh air to the apartments of offices within the units.

Based on the bridging units and rising seven floor levels above the same, there are twin elevated extensions 4, 4 of the ground-based sections. The extensions 4, 4 are vertically aligned in set-back relation with the outer walls of the bridging units and have the same horizontal cross sectional form and the same dimensions, less the set-back, as the ground sections and are, in effect, continuations of the same, supported at a height above the ground sections, with the same space, indicated at 21, separating them. It will be apparent that windows (not shown) in the opposite side and end walls of the extensions 4, 4 will admit an abundance of light, sunshine and a constant supply of fresh air.

Based at right angles on the extensions 4, 4 and rising three floor levels above the same, there is a second series of spaced apart bridging units 6, 6, which form the open top of the building. The units 6, 6 are vertically aligned with and have the same horizontal cross sectional form

and dimensions as the main bridging units previously described, at the lower level.

Constructed as described, the building is open from end to end to the full height of the ground-based sections for an upward flow of air between the same and above the ground sections 3, 3; a wide open passage or air-shaft is provided for a continuance of the air flow to and through the open top of the building.

In providing through cross passages to the outer air on four sides of the upper portion of the building, the cross currents of air through the passages aid materially in maintaining a strong upward flow of air between the ground sections and, under certain weather conditions, as previously stated, are instrumental in inducing and maintaining such an upward flow when there is very little movement of the outer air at lower levels, thus insuring a continuous supply of fresh air to all apartments or offices in the building.

Assuming an apartment to be planned with a central hall running horizontally lengthwise of any section of the building and rooms on each side of the hall opening into the same and extending to the outer walls; to clear the air and get a circulation through the apartment, it would only be necessary to open the hall doors and the windows in the opposite outer walls for a comparatively short time—a few minutes at the most.

As to light and sunshine, there would be ample light throughout the day in all apartments in the building, as the sections that make up the building are spaced so far apart, one section cannot obstruct or block light to an adjoining or adjacent section. As previously stated, the building would be preferably so situated that the morning sun would shine on the outer windowed side of one ground-based section and more or less, on the inner windowed side of the opposite section, and the afternoon sun would shine on the outer windowed side of the opposite section and more or less on the inner windowed side of the first mentioned section. Above the ground-based sections, the open spacing of the upper sections and their cross arrangement will insure sunshine throughout the day in all apartments in the upper portion of the building.

The building shown in Figs. 12, 13 and 14, differs from the buildings above described, in the following respects.

Instead of twin ground-based sections, as in the other buildings, a series of such sections, indicated at 3^a, are arranged side by side, in spaced apart parallel relation, with their shorter sides and the spaces between them, combining to form the longer side of the building.

As shown, the sections 3^a rise thirty-two stories above the ground level and, in horizontal cross section, measure approximately sixty by two hundred feet, with an open space of forty feet between adjoining sections.

Based on and rising sixteen stories above the sections 3^a, twin spaced apart cross sections 5^a, extend horizontally lengthwise at right angles to the same and their outer side and end walls are vertically aligned respectively with the end and side walls of the ground-based sections or, if necessary, they may be relatively positioned to provide a set-back, to meet building regulations.

Rising eight stories above and based on the twin cross sections 5^a, there is a second series of sections 4^a, that are vertically aligned with and excepting their reduced height, duplicate in all respects, including their relative spacing, the ground-based sections 3^a.

Forming the open top of the building and rising four stories above the sections 4a, there are twin cross sections 6a, that duplicate in all respects, excepting their height, the cross sections 5a, at the lower level.

Comparing the two buildings shown in Figs. 7 to 11 and Figs. 12 to 14, it will be seen that there are the same number of multi-unit tiers in both and the differences between them are mainly that the tiers have been differently positioned or transposed in the assemblies and varied in height. The open spacing for the admission of air, light and sunshine, while ample in both buildings, is doubtless greater in the larger building—the one last described—but both are open from the interior to the outer air to the full height of the ground-based sections and above that, by continuing passages, on all four sides of the building.

As the construction and many important resulting advantages will be apparent from the foregoing, it will not be necessary to describe the same at greater length.

I claim:

1. An assembly of unit sections superimposed in multiple unit tiers to form a multi-storied building, the unit sections of each tier being positioned in spaced apart parallel relation and at right angles to the unit sections of adjoining tiers, each unit section comprising a multi-storied walled-in structure of suitable dimensions and approximately rectangular outline in horizontal section, the said structure having spaced apart vertically disposed tower sections built in the unit and positioned for connection to like tower sections of adjoining units to form walled-in reinforcing towers extending from the ground upward to the top of the building.

2. In a multi-storied building structure, spaced apart multi-storied ground-based sections and multi-storied extensions thereof positioned in separated relation to the same and supported at a height above the ground-based sections, a plurality of multi-storied spaced apart bridging units that extend horizontally at right angles to and are interposed between the ground-based sections and their extensions, the said plurality of units being based on and bridging the space separating the ground-based sections and serving as supports for the extensions thereof and a second plurality of multi-storied bridging units that form the top of the building and are spaced apart to open the top to the outer air, the said second plurality of units being based on and bridging the space separating the extensions of the ground-based sections to tie the same together.

3. In a multi-storied building structure, twin spaced apart multi-storied ground-based sections and multi-storied extensions thereof positioned in separated relation to the same and supported at a height above in approximate vertical alignment with the ground-based sections, both the ground-based sections and their extensions having substantially the same horizontal cross sectional form and dimensions, a plurality of multi-storied spaced apart bridging units that extend horizontally at right angles to the ground-based sections and their extensions and are based on and bridge the space separating the ground-based sections to tie the sections together and serve as supports for the extensions thereof, and a second plurality of multi-storied bridging units spaced apart to open the top of the building to the outer air and based on and bridging the space separating the extensions of the ground-based sections to tie the same together, the second plurality of bridging units being vertically aligned with and having the same horizontal cross sectional form and dimensions as those first mentioned.

4. In a multi-storied building, multi-storied structures spaced apart in parallel relation and divided horizontally to form ground-based sections and elevated extensions thereof, and means supporting said elevated extensions at a height above and vertically aligned with the ground-based sections comprising two series of multi-storied bridging sections that extend horizontally at right angles thereto, one series across the space separating the ground-based sections and supported by said sections and the other series across the space separating the elevated extensions and supported by the extensions thereof.

5. In a multi-storied building structure, twin ground-based sections arranged in separated relation with their adjoining sides parallel, the said sections rising equally in multiple stories to a suitable height to provide office, apartment, storage and other space, a series of spaced apart multi-storied units based on and rising above the aforesaid ground-based sections and extending at right angles thereto to bridge the space between the same, multi-storied extensions of the ground-based sections positioned between the aforesaid bridging units and a hereinafter specified formation at the top of the building, the said extensions being similarly spaced apart, aligned with and having substantially the same horizontal cross sectional form and dimensions as the ground-based sections, and a series of multi-storied top units which are vertically aligned with and duplicate the aforesaid bridging units in all respects excepting their height which is reduced to provide a smaller number of stories at the top of the building.

6. In a multi-storied building structure, a series of spaced apart ground-based towers extending upward to the top of the building and arranged in separated parallel rows, each row of towers being walled in from their base upward to less than their full height to form multi-storied ground-based sections for use as offices, apartments, storage and the like, multi-storied units based on and rising above the ground-based sections that extend across and bridge the space between opposite towers in the rows, multi-storied extensions of the ground-based sections based on and extending along opposite end portions of the aforesaid bridging units and walled in to include the projecting towers, the said multi-storied extensions rising above the bridging units and being similarly spaced apart, vertically aligned with and having substantially the same horizontal cross-sectional form and dimensions as the ground-based sections, and bridging units that form the top of the building and duplicate the first mentioned bridging units in all respects excepting their height which is reduced to provide a smaller number of stories at the top of the building.

7. A multi-storied building structure, as defined in claim 6, in which the towers are based below the ground level to permit excavation and walling in the space between the towers and their separated formation in rows for use as a basement.

8. A multi-storied building structure, as defined in claim 6, in which the lower portion of opposite towers in the two rows walled in by the

ground-based sections are tied together by bridging formations at different heights that extend across the intervening space between the sections.

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