March 4, 1930. F. S. SWAN 1,749,166

BUILDING CONSTRUCTION

Filed June 14, 1926 7 Sheets-Sheet 1

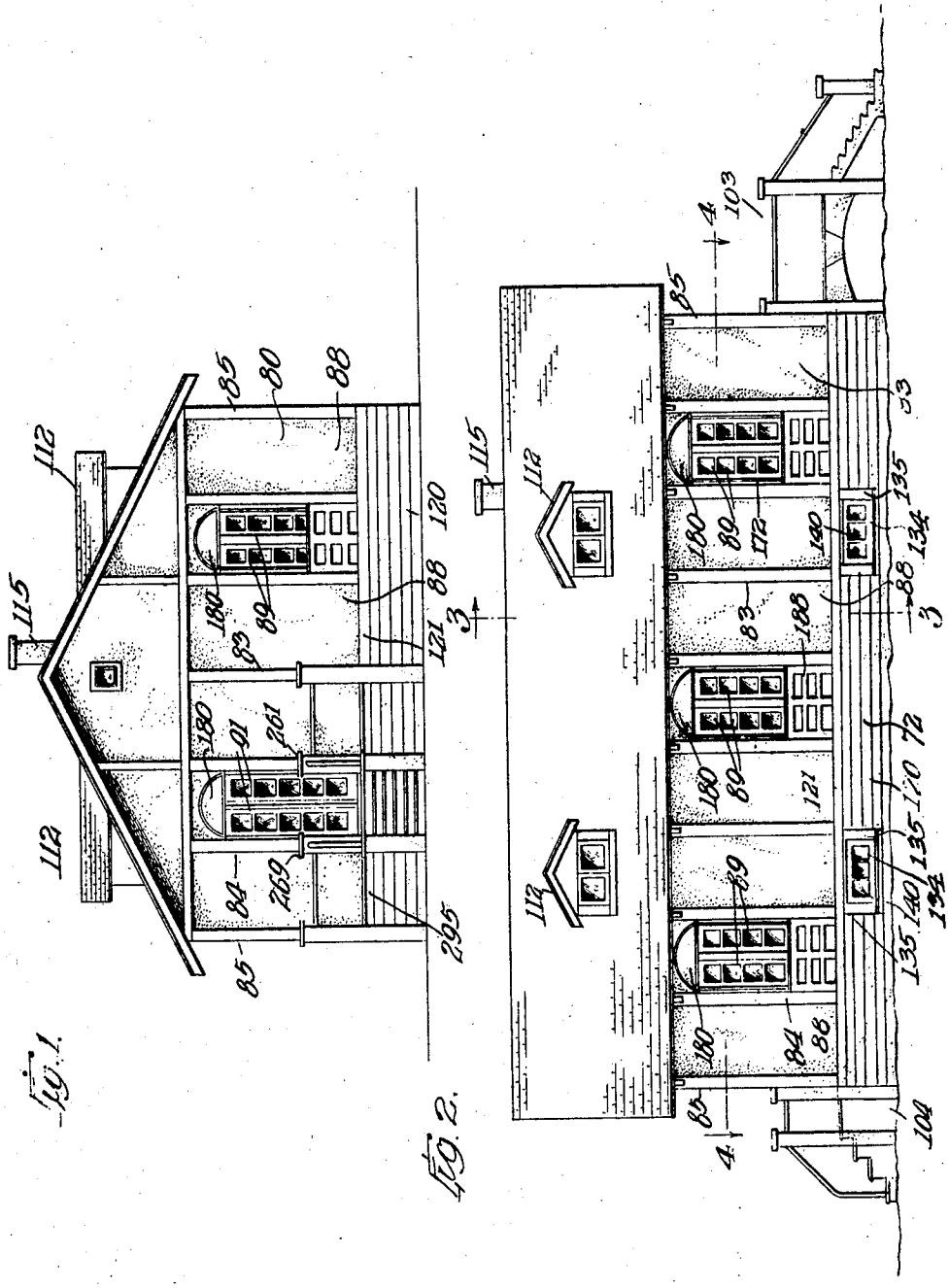


Fig. 1.

Fig. 2.

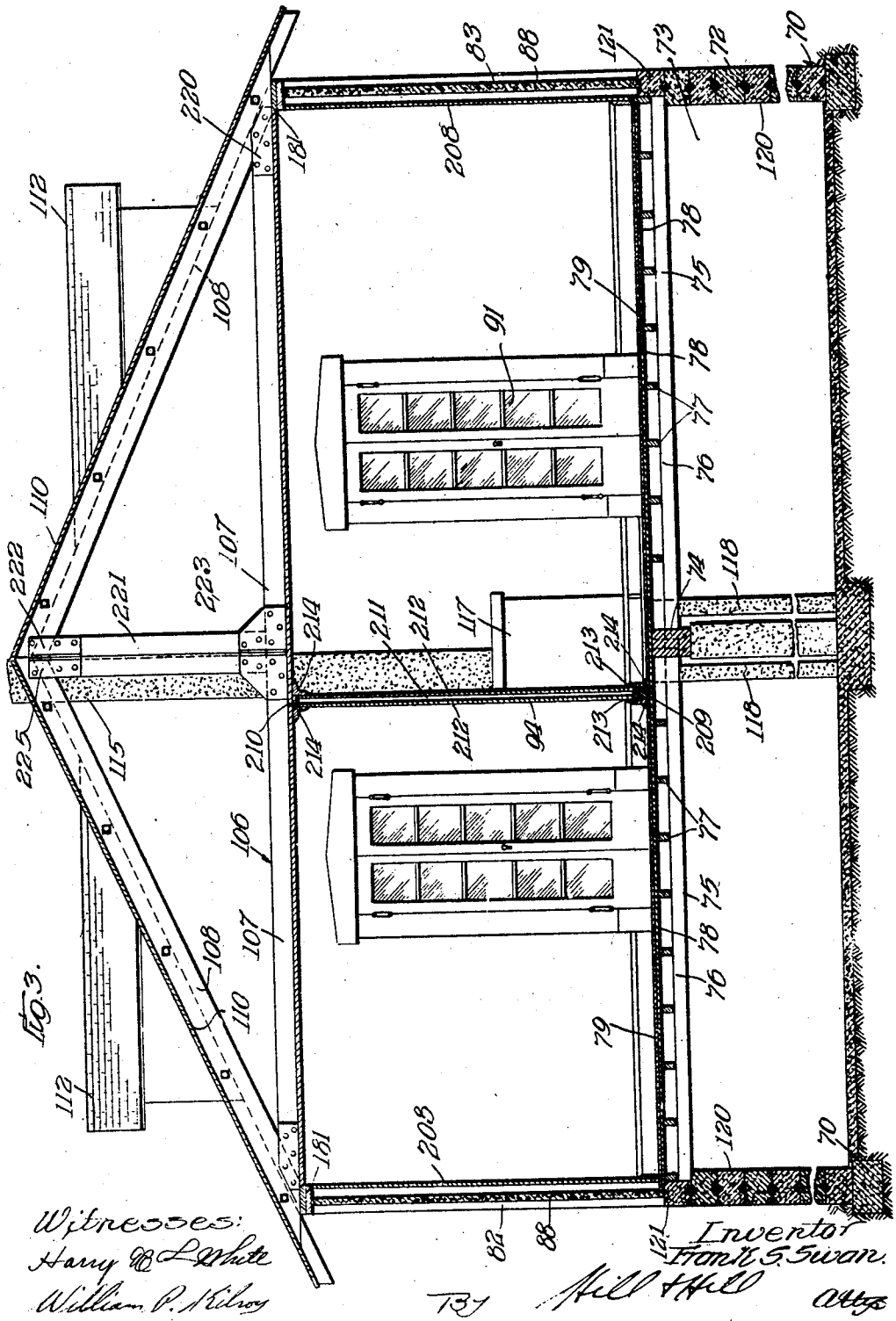
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William C. Kilroy

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March 4, 1930. F. S. SWAN 1,749,166

BUILDING CONSTRUCTION

Filed June 14, 1926 7 Sheets-Sheet 2



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March 4, 1930. F. S. SWAN 1,749,166

BUILDING CONSTRUCTION

Filed June 14, 1926 7 Sheets-Sheet 3

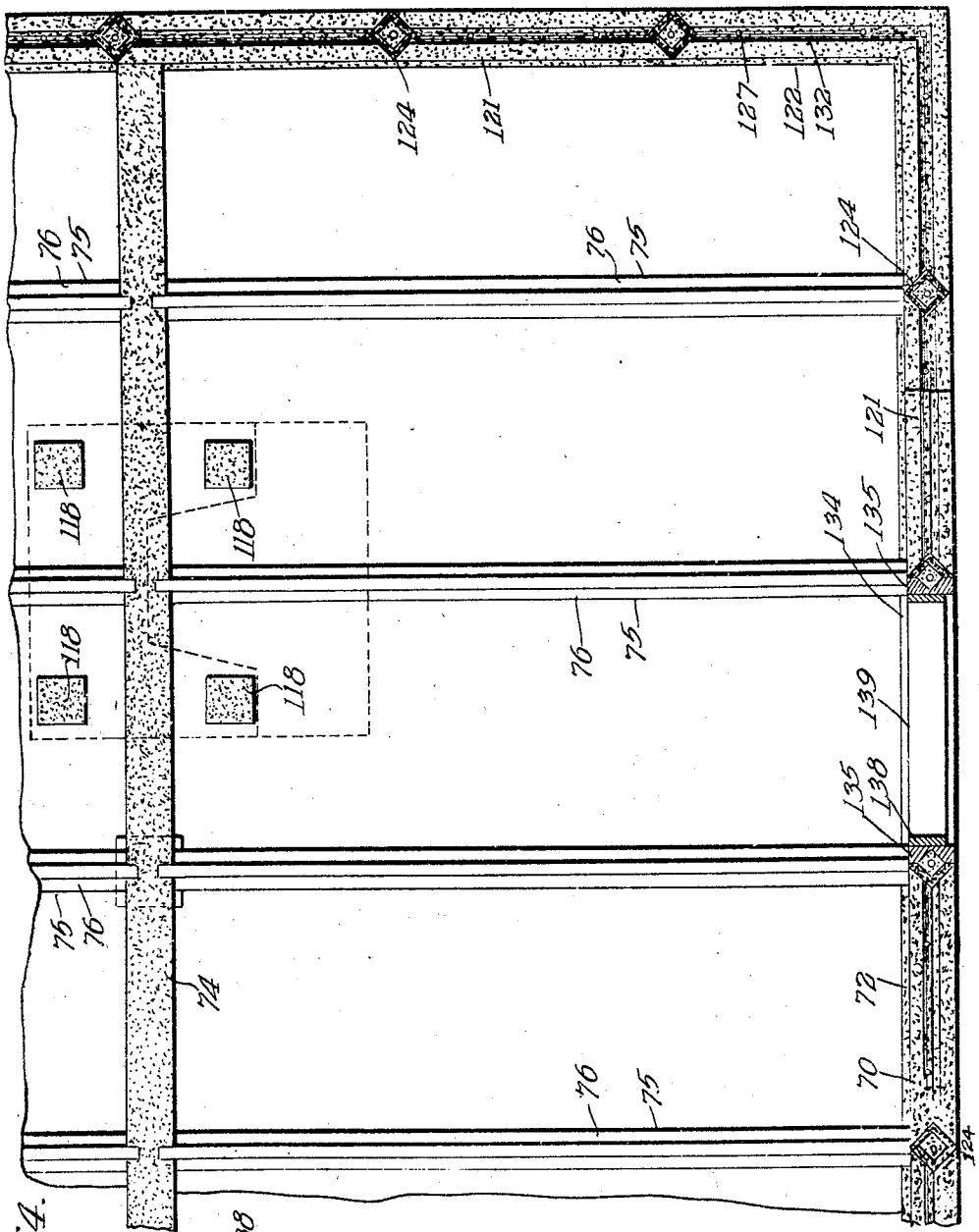


Fig. 4.

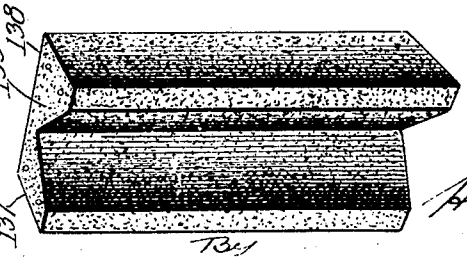


Fig. 5.

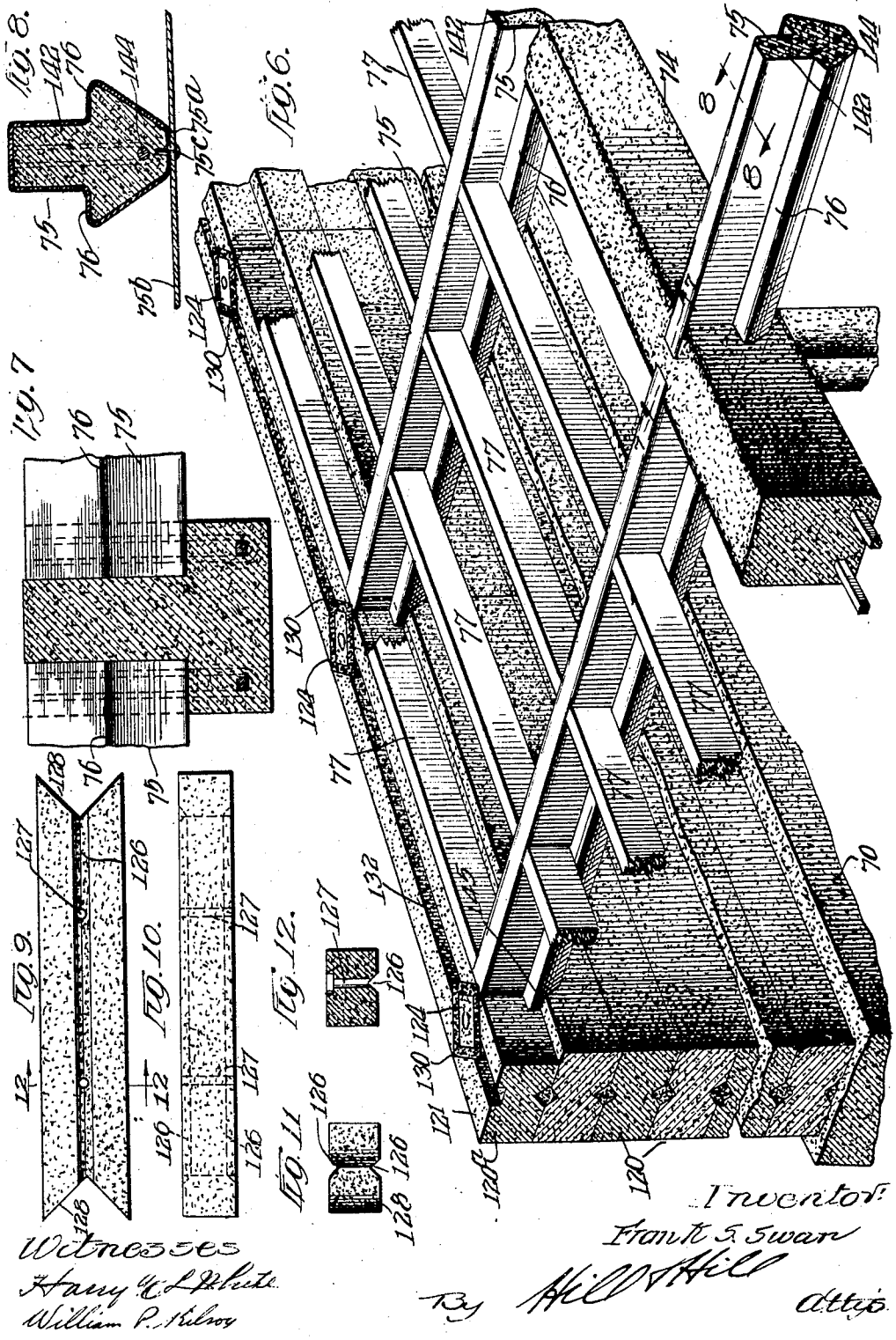
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March 4, 1930. F. S. SWAN 1,749,166

BUILDING CONSTRUCTION

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March 4, 1930. F. S. SWAN 1,749,166

BUILDING CONSTRUCTION

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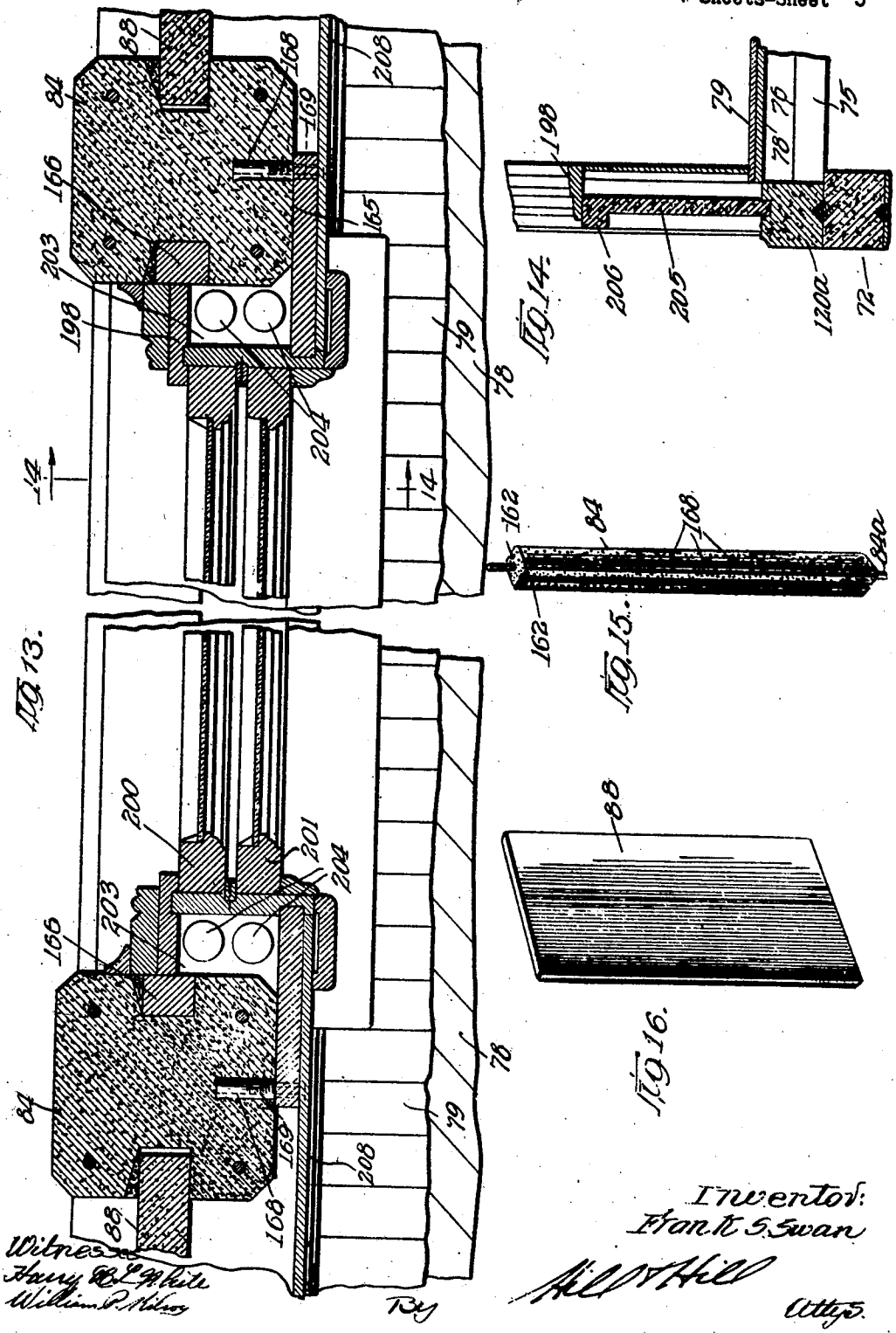


Fig. 13.

Fig. 14.

Fig. 15.

Fig. 16.

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March 4, 1930. F. S. SWAN 1,749,166

BUILDING CONSTRUCTION

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Fig. 17.

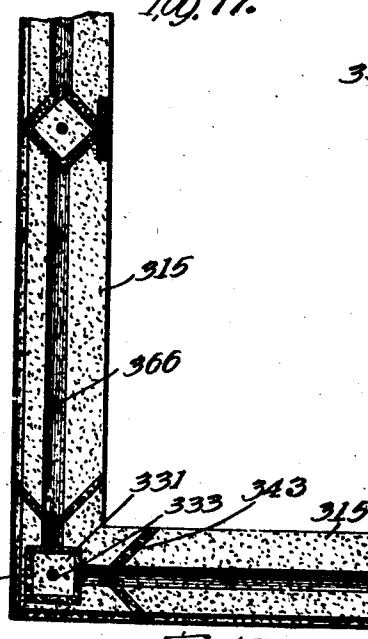


Fig. 20

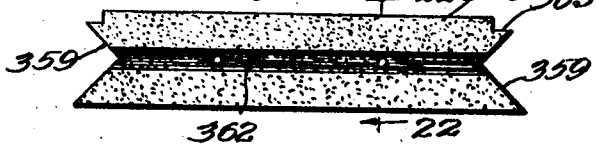


Fig. 21

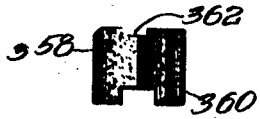


Fig. 22

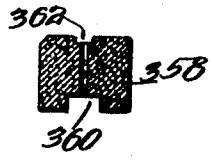


Fig. 18

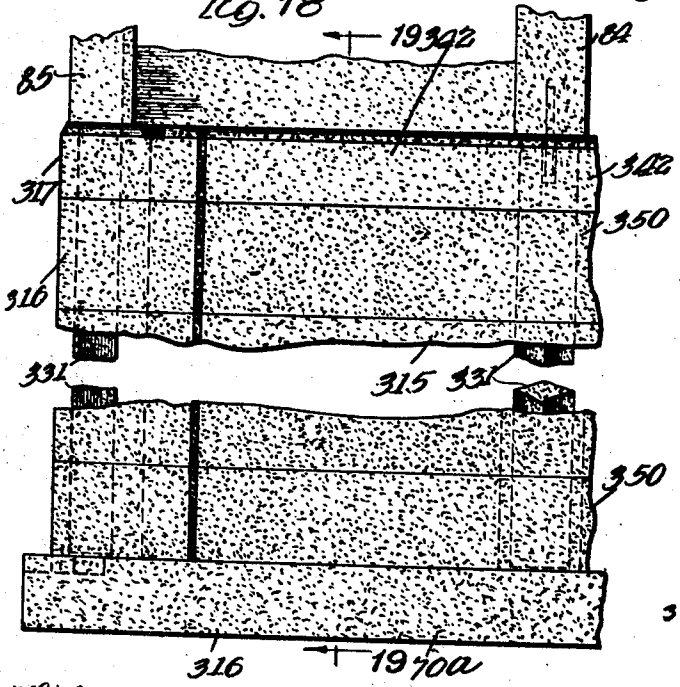
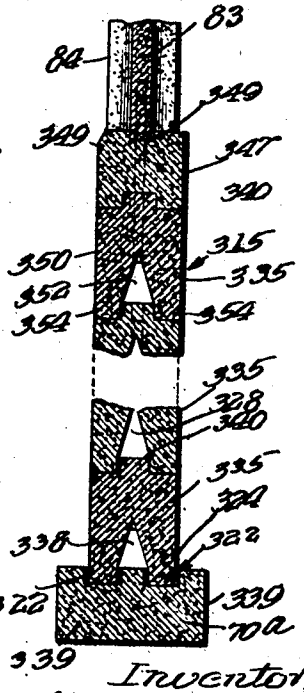


Fig. 19.



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March 4, 1930. F. S. SWAN 1,749,166

BUILDING CONSTRUCTION

Filed June 14, 1926 7 Sheets-Sheet 7

Fig. 23.

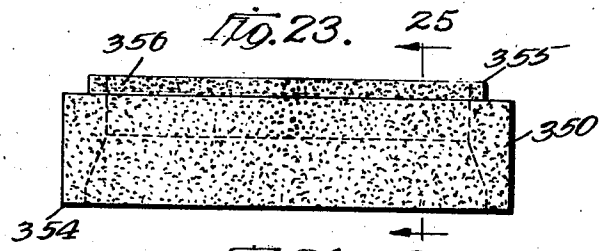


Fig. 24.

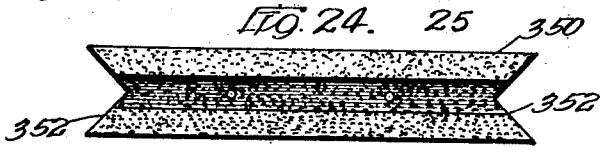


Fig. 25.

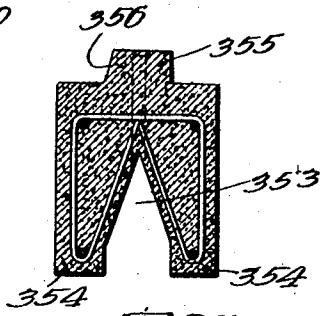


Fig. 26.

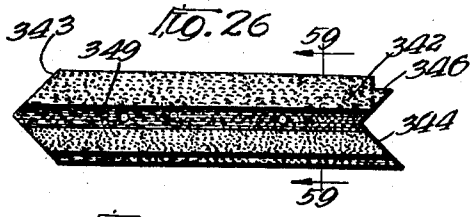


Fig. 27.

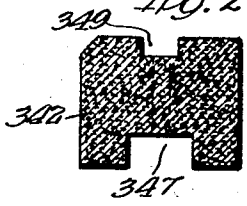


Fig. 28.

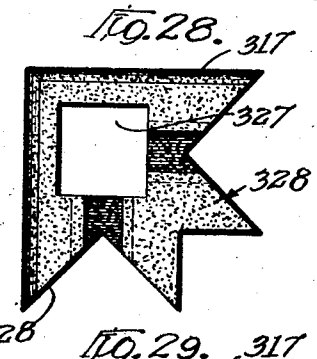


Fig. 29.

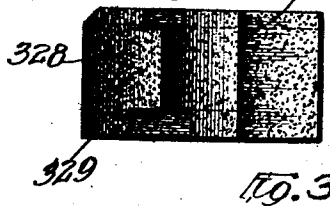


Fig. 30.

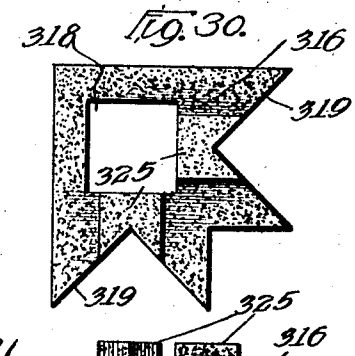


Fig. 31.

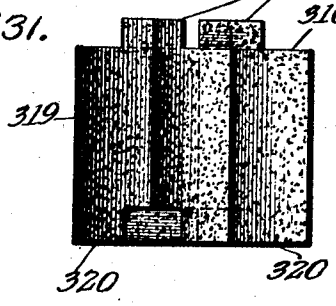
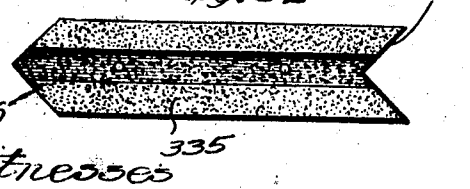


Fig. 32.



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Patented Mar. 4, 1930 1,749,166

UNITED STATES PATENT OFFICE

FRANK S. SWAN, OF GLEN ELLYN, ILLINOIS

BUILDING CONSTRUCTION

Application filed June 14, 1926. Serial No. 116,053.

My invention relates to buildings and particularly to buildings of the type that are built mainly from materials molded, cut or formed to standardized sizes at a place removed from the sites upon which the buildings are to be erected.

The invention has among its other objects the production of buildings of the kind described which are of substantial construction and may be erected with a minimum of labor.

A particular object of the invention is to provide buildings of the kind described which are formed largely of substantially fire-proof materials.

Another particular object of the invention is to provide improved buildings of the kind described which may be dismantled and then erected upon other sites.

One form of the invention is embodied in a dwelling house of which the foundation and outer walls are formed from molded concrete posts and slabs of standardized sizes, improved girder construction being employed to support a floor comprising sub-flooring formed in panels which are also of standardized sizes. Roof trusses quickly attachable to the walls support a roof formed of panels bolted to the trusses and dormer windows of unit construction are also bolted to the trusses. The porches are assembled from precast members.

Many other objects and advantages of the construction herein shown and described will be obvious to those skilled in the art from the disclosure herein given.

To this end my invention consists in the novel construction, arrangement and combination of parts herein shown and described, and more particularly pointed out in the claims.

In the drawings, wherein like reference characters indicate like or corresponding parts:

Fig. 1 is a front elevation of a building embodying the invention;

Fig. 2 is a side elevation of the improved building;

Fig. 3 is a section taken on line 3—3 of Fig. 2;

Fig. 4 is a fragmentay plan section taken through the basement of the building;

Fig. 5 is a perspective view of one of the posts employed in the foundation;

Fig. 6 is a fragmentary perspective view showing the details of construction of the foundation of the building and the details of construction of the floor beams and joists;

Fig. 7 is a section taken on line 7—7 of Fig. 6;

Fig. 8 is a section taken on line 8—8 of Fig. 6;

Fig. 9 is a plan view of one of the blocks forming the foundation;

Fig. 10 is a side elevation of the blocks shown in Fig. 9;

Fig. 11 is an end elevation of the blocks shown in Fig. 9;

Fig. 12 is a section taken on line 12—12 of Fig. 9;

Fig. 13 is a horizontal section taken through a window embodying one form of the invention;

Fig. 14 is a section taken on line 14—14 of Fig. 13;

Fig. 15 is a detail of one of the upright posts employed in the walls of the building;

Fig. 16 is a perspective view of one of the slabs employed to form the walls of the building;

Fig. 17 is a fragmentary plan elevation of a foundation embodying another form of the invention;

Fig. 18 is a fragmentary side elevation of the foundation shown in Fig. 17;

Fig. 19 is a section taken on line 19—19 of Fig. 18;

Fig. 20 is a plan elevation of one of the blocks employed in the foundation shown in Fig. 17;

Fig. 21 is an end elevation of the block shown in Fig. 20;

Fig. 22 is a section taken on line 22—22 of Fig. 20;

Fig. 23 is a side elevation of another of the blocks employed in the foundation shown in Fig. 17;

Fig. 24 is a plan elevation of the block shown in Fig. 23;

Fig. 25 is a section taken on line 25—25 of Fig. 23;

Fig. 26 is a plan elevation of still another block employed in the foundation shown in Fig. 17;

Fig. 27 is a section taken on line 27—27 of Fig. 26;

Fig. 28 is a plan view of one of the top corner blocks employed in the foundation shown in Fig. 17;

Fig. 29 is a side elevation of the block shown in Fig. 28;

Fig. 30 is a plan view of another corner block employed in the foundation shown in Fig. 17;

Fig. 31 is a side elevation of the block shown in Fig 30; and

Fig. 32 is a plan view of another block employed in the foundation shown in Fig. 17.

In the drawings, I have shown the invention embodied in a dwelling house, but it will become apparent as this description progresses that the invention may be embodied in buildings of other types.

Referring for the present to Figs. 1 to 3, inclusive, wherein I have shown general views of the improved dwelling house, the reference character 70 indicates a footing which supports the walls 72 of a basement 73, the walls 72, in turn, supporting a longitudinal girder 74 and cross girders 75 (see Fig. 6). It will be noted that the cross girders 75 are formed with shoulders 76 adapted to support joists 77 to which sub-flooring 78 is secured, flooring 79 being laid upon the sub-flooring 78. The building comprises front and rear walls 80 and 81, respectively, and side walls 82 and 83, each of the front, rear and side walls preferably comprising piers or posts 84 disposed intermediate the ends of the walls, and corner piers or posts 85 disposed at the corners of the dwelling. Interposed between the posts 84 and between the corner posts 85 and the adjacent posts 84 are slabs 88. The building is provided with a plurality of French windows 89 and doors 91 which are substantially of the same construction as the French windows 89.

Supported upon the piers or posts 84 and 85 are roof trusses 106, which comprise ceiling joists or beams 107 and rafters 108, or the equivalents for the purpose, the rafters being adapted to support the roof which is preferably formed from a plurality of panels 110. Dormer windows 112 project from the roof and projecting through the roof is a chimney 115.

When a building of the kind illustrated in Figs. 1 to 5, inclusive, is to be erected, the footings 70 and 116 are first formed and leveled in any suitable manner after which the basement walls 72 and the piers or posts 118 are erected thereupon. The walls 72 are preferably formed from a plurality of blocks and posts which are so manufactured that like members are interchangeable. The posts 118 are also interchangeable and both the posts 118 and the posts and blocks constituting the walls 72 are preferably formed from concrete or the equivalent, the members being molded in any desired quantities. This permits a supply of them to be kept in a warehouse or the like so that when a dwelling is to be erected it is only necessary to ship the necessary number of members to the site upon which the building is to be erected.

The construction of the walls 72 is best illustrated in Figs. 3, 4 and 6. It will be noted that each wall 72 is formed from a plurality of superimposed blocks 120, 121 and 122 and a plurality of posts 124 interposed between the ends of the blocks. The corners formed by the walls 72 are constructed from the blocks 122, the uppermost block 122 of each corner being narrower than the blocks beneath it. The blocks 120 are superimposed upon each other and disposed intermediate the blocks 122, the lowermost block 120 being supported upon the footing 70. The blocks 121 resemble the blocks 120 but are of less width than the blocks 120 so that the cross girders 75 may rest upon the uppermost blocks 120. For convenience, the uppermost blocks 120 will hereinafter be referred to as the blocks 120^a.

I have shown one of the blocks 120 in detail in Figs. 9 to 12, inclusive, and it will be noted that the block is provided with longitudinal grooves 126 in its upper and lower faces, which grooves extend from end to end of the block and communicate with each other through bores 127 formed through the block. It will also be noted that a substantially V-shaped notch 128 is formed in each end of the block so that when a plurality of blocks are arranged end to end space is provided for the posts 124 which are secured in place by grout, or the equivalent, the grout being indicated at 130. This construction securely locks the blocks 120 and 120^a in their assembled positions, the blocks 120^a being also provided with V-shaped notches 128 and with longitudinal grooves 126 in their lower faces. Sticks or rods may be inserted into the walls through the bores 127 to hold the blocks in alignment, or the sticks or rods may be positioned to project from the lowermost blocks after they have been correctly placed upon the footing and the remaining blocks may be afterwards positioned upon the lower blocks in such manner that the sticks or rods project through them, thus holding the blocks in alignment while the walls are being built. Pitch may be spread between the blocks to form water-tight joints, but in the preferred embodiment of the invention the flat bottom surface of one block is placed in actual contact with the top surface of the next lower block. The grooves 126 and the bores 127 permit pitch to be poured between the blocks

to secure them to each other, and to form water-tight joints between the blocks. As best shown in Fig. 6, the upper surfaces of the blocks 120[a] are provided with grooves 132 adapted to receive the lower edges of the slabs 88. The blocks 122 are also formed with V-shaped notches 128 in their ends and are provided with longitudinal grooves 126 which communicate with each other through bores 127. The uppermost blocks 122 are provided with grooves 132 adapted to receive the lower edges of the slabs 88. Pitch or grout may be placed in the grooves 132 to form water-tight joints. In erecting the walls, the posts 124 are preferably secured in place by wedges which permit the remainder of the building to be erected while the grout surrounding the posts is drying.

One or more windows 134 may be provided in the walls 72, if it is so desired (see Figs. 4 and 5). A space for the dormer window may be provided by leaving out some of the blocks 120 between two adjacent blocks 124. Vertically disposed members 135 are then positioned against the adjacent posts 124 as illustrated in Fig. 5, the members 135 preferably resting upon the lowermost block 120 which is preferably left in place. The members 135 are adapted to support the block 120[a] which is grooved to receive the lower edge of the slab 88 disposed above the window. It will be noted that the members 135 are provided with substantially V-shaped notches 137 adapted to accommodate the posts 124 and that they are provided with substantially flat surfaces 138 against which the side members of a window frame 139 may be positioned, the window frame 139 being formed of any suitable material. Obviously, the window frames 139 may be kept in stock and a suitable supply thereof may be shipped to the site upon which the building is to be erected. As best shown in Fig. 2, each window 134 is preferably provided with a window sash 140.

As hereinbefore set forth, the cross girders 75 are preferably formed with shoulders 76 to support the joists 77. Each cross girder 75 is formed from concrete, as indicated in Fig. 8, and is preferably provided with a metallic sheath 142 in which the concrete may be poured. If desired, reinforcing rods 144, or the equivalent, may be embedded in the concrete. The outer end of each cross girder 75 abuts against the blocks 120[a] and are preferably spaced so as to lie in alignment with the posts 124, the cross girders resting upon the blocks 120 disposed immediately below the blocks 120[a]. For this purpose, the cross girders are preferably provided with shoulders 145 which engage the blocks 120. Tubular members 75[a] are preferably embedded in the lower surface of the cross girders so that slabs or sheets of asbestos 75[b] or the equivalent may be fastened thereto to form a ceiling for the basement. This will provide a dead air space beneath the flooring. The sheets 75[b] are secured to the tubular members 75[a] by members 75[c] screw-threaded into the tubular members.

The longitudinal girder 74 may be of any suitable shape and is preferably formed from concrete, which is poured in place after the cross girders 75 have been correctly positioned with respect to the walls 72.

Immediately after or before the conrete girder 74 is poured the joists 77 are set in place. The joists 77 may also be formed of concrete, if it is so desired, but in Fig. 6 I have illustrated them as beams of wood. These may be cut to size at a factory or warehouse and shipped in the required numbers.

The sub-flooring 78 may comprise planks nailed directly to the joists 77, as illustrated in Fig. 3, the flooring 79 being subsequently laid upon the sub-flooring 78.

In Fig. 15 I have shown one of the piers or posts 84 and it will be noted that it is provided with longitudinal grooves 162 adapted to receive the side edges of the associated panels 88.

When window frames or door frames are to be positioned between adjacent posts 84, inserts 166 of wood are preferably secured in the appropriate grooves 162 by means of grout. This permits the window or door frames to be anchored to the posts. Another feature of the invention is means provided in the posts for securing wall-board or the equivalent to the posts after they have been erected. Thus, I have shown metallic tubular members 168 embedded in the posts and adapted to cooperate with bolts or screws 169 to secure the wall-board to the posts. The members 168 and the screws 169 may also be employed to secure the window frames or door frames to the posts. The posts 84 and 85 are preferably provided with pins 84[a] adapted to be inserted in the posts or blocks upon which they rest.

In some forms of the invention I may prefer to provide check rail windows which may be of the type shown in Fig. 13. The check rail window shown in Fig. 13 preferably comprises a frame 198 secured to the adjacent posts 84 by means of the inserts 166 and the tubular members 168 and the screws 169. Upper and lower sashes 200 and 201 are slidably mounted in the frame 198, the frame being formed to provide boxes 203 in which weights 204 may be disposed. The check rail windows are preferably of mill construction and are so designed that they may be assembled with the posts 84 with a minimum of fitting. As the check rail windows do not reach to the floor 79, I preferably provide relatively short slabs 205 which may be positioned beneath the frames 198 and designed so that their edges may project

into the grooves 162 of the posts 84 and into the grooves 132 of the blocks 120ª (see Fig. 14). Each block 205 is preferably provided with an outwardly projecting flange 206 which forms a sill for the associated window, and a block 180 is suspended from the plate 181 to fill in the space above the window.

Referring now to the roof trusses 106, each roof truss preferably comprises a plurality of complementary sections, each of which comprise one of the rafters 108 and one of the ceiling beams or joists 107. One end of the joist is secured to one end of the rafter by a gusset plate 220 or the equivalent. The other end of the joist is connected to the other end of the rafter by a strut 221, which has one of its ends secured to the rafter by an angle plate 222 and has the other of its ends secured to the joist by an angle plate 223. The complementary sections of each roof truss may be secured to each other by bolts 225 or the equivalent passed through the angle plates 222 and 223 (see Fig. 3). In the embodiment of the invention illustrated in Fig. 3, the rafters 108, the ceiling joists or beams 107 and the struts 221 are preferably formed of wood, but in other embodiments of the invention I contemplate forming these members from concrete or metal. The spacing of the roof trusses 106 is substantially identical to the spacing of the posts 84 so that each end of the roof trusses may be positioned above one of the posts, the plate 181 being interposed between the roof trusses and the post.

In Figs. 17 to 32, inclusive, I have shown another form of the invention embodied in blocks adapted to form the walls of the basement, these walls being positioned upon a footing 70ª, which resembles the aforementioned footing 70. Thus, in Figs. 17, 18 and 19, I have indicated walls 315 resting upon the footing 70ª. The corners of the walls are formed by blocks 316 and 317, the blocks 316 being superimposed upon the footing 70ª and upon each other, and the block 317 being supported by the upper blocks 316. As shown in Figs. 30 and 31, each block 316 has a polygonal opening 318 extending therethrough and is provided with substantially V-shaped notches 319. Downwardly extending lugs 320 projecting from the lower side of each block 316 are adapted to be seated in spaced grooves 322 formed in the footing 70ª, pitch or grout 324 being employed to secure the blocks upon the footing. Of course, only the lowermost blocks 316 have their lugs 320 inserted in the grooves 322. Projecting upwardly from each block 316 are lugs 325 adapted to enter the space between the lugs 320 on the next higher block 316. Each block 317 is provided with a polygonal opening 327 adapted to be aligned with the polygonal openings 318 in the blocks 316 (see Figs. 28 and 29). Each block 317 is also provided with substantially V-shaped notches 328 adapted to register with the V-shaped notches 319 of the blocks 316, and each block 317 is provided with downwardly extending lugs 329 between which the lugs 325 of the uppermost block 316 may be inserted. Grout or pitch may be employed to secure the blocks 316 and 317 to each other. As shown in Figs. 17 and 18, a post 331 may be inserted in the aligned openings 318 and 327 at each corner of the building, the post being adapted to rest upon the footing 70ª. The post 331 is provided with a bore 333 in its upper end into which the dowel pin 84ª of post 85 may be inserted. Horizontally aligned with each block 316 and disposed adjacent thereto is a block 335 having a tapering end 336 positioned in one of the V-shaped notches 319 of the aligned block 316. The other end of each block 335 is provided with a substantially V-shaped notch 337 and is formed with a relatively deep notch 338 in its lower surface to provide downward extending lugs 339 adapted to enter the grooves 322 in the footing 70ª. However, when one of the blocks 335 is superimposed upon another block 335, the groove 338 of the uppermost block accommodates a lug 340 formed upon the lower block, the lug 340 of the lower block being inserted between the lugs 339 of the upper block and being secured thereto by grout or the equivalent. Resting upon each uppermost block 335 is a block 342, best shown in Figs. 17, 18 and 26, the block 342 being provided with a pointed end 343 adapted to enter one of the V-shaped notches 328 of the associated block 317, grout being interposed between the blocks. The other end of the block 342 is provided with a V-shaped notch 344 adapted to be aligned with the V-shaped notches in the blocks 335 positioned below. Adjacent the V-shaped notch 344 is a notch 346, the purpose of which will presently appear. It will be noted that the block 342 is provided with a groove 347 adapted to receive the lug 340 of the uppermost block 335. The blocks 342 are provided with grooves 349 for receiving the lower edges of the slabs 88. Horizontally aligned with the blocks 335 and arranged adjacent thereto are blocks 350, one of which is illustrated in detail in Figs. 23 to 25, inclusive, and comprises V-shaped notches 352 at each end thereto. A relatively deep groove 353 is formed in the lower surface of each block 350 to provide downwardly extending lugs 354 adapted to rest in the grooves 322 when the block is one of the lowermost blocks in the wall. Each block 350 is also provided with an upwardly projecting lug 355 extending longitudinally thereof and adapted to enter the notch 353 of the blocks superimposed thereon. The blocks are secured to each other by grout or the equivalent, the lug 355 having an inclined face 356 to permit the grout to enter between the lug 355 and the

inner face of one of the lugs 354 of the next higher block. Positioned upon the uppermost block 350 is a block 358 having substantially V-shaped notches 359 in its ends (see Figs. 20 to 22, inclusive). Formed in the lower surface of each block 358 is a longitudinal groove 360 adapted to receive the lug 355 of the block 350 disposed immediately from below, and the upper surface of each block 358 is provided with a longitudinal groove 362 adapted to receive the lower edge of a slab 88.

Referring now to Figs. 17 to 19, inclusive, it will be noted that the V-shaped notches provided in the blocks 335, 342, 350 and 358 provide a polygonal opening in the wall, which opening extends from the top surface of the uppermost block to the footing 70ª. In these openings I prefer to insert posts 331 hereinbefore described, each post 331 being provided with a bore 333 adapted to receive a dowel pin 84ª projecting from one of the posts 84. Each block 358 is notched as at 363 to cooperate with the notch 346 provided in the adjacent block 350, or to cooperate with the notch 363 provided in an adjacent block 358 to permit one of the ends of one of the cross girders 75 to rest upon the uppermost blocks 335 and 350. As indicated in Fig. 17, the posts 331 are secured in place by the grout 324 or the equivalent. Bores 366 are preferably provided in the several blocks so that pitch may be poured therethrough into the grooves formed in the lower surfaces of the blocks, or rods may be employed to hold the blocks in alignment. Of course, grout may be used as a bonding agent if so desired.

From the foregoing description it is apparent that substantially all of the material required in the construction of the dwelling house may be kept in stock in a ware-house or the like, the various elements being made up in sufficient quantities so that they are economically produced. Due to the fact that the spacing of the posts 84 and the roof trusses 106 is standardized and due to the fact that the floor panels and roof panels and the wallboard are provided in sizes corresponding to the spacing of the roof trusses and the posts 84, houses of different dimensions and designs may be formed by using substantially the same members in different quantities. Thus, it is obvious that the dwelling house shown in Figs. 1 and 2 may be lengthened by inserting the necessary standardized members between the ends of the house. The house may be considered to be formed of a plurality of transverse sections which are substantially identical to each other, the only difference being in those instances where the slabs 88 are omitted to provide space for the windows. Any number of floor plans may be decided upon and the proper partitions provided therefor.

When a building embodying the invention is to be erected, the footing is first prepared after which the basement walls are built from the above described blocks. The girders and floor joists are then supported upon the basement walls, the longitudinal girder 74 being formed on the site in the manner described above. The walls of the house may then be erected and the roof trusses placed thereon so that the roof panels may be secured to the roof trusses. The partitions, sub-flooring and panels are then arranged to form the various rooms, flooring 79 being laid upon the sub-flooring before the partitions are secured in place. The porches may be built at any time. An important feature of my improved construction is the dead air space provided between the slabs 88 and the wall-board as this renders it comparatively easy to maintain the rooms at a comfortable temperature.

An important feature of this invention is that buildings embodying the invention may be dismantled and transported to another site upon which they may be quickly and easily erected.

Having thus described my invention, it is obvious that various immaterial modifications may be made in the same without departing from the spirit of my invention; hence I do not wish to be understood as limiting myself to the exact form, construction, arrangement and combination of parts herein shown and described or uses mentioned.

What I claim as new and desire to secure by Letters Patent is:

1. A wall for a building comprising a foundation built of interlocking members of concrete formed independently of each other, concrete posts formed independently of the foundation and supported thereby, slabs of concrete disposed intermediate the posts and formed independently thereof, said posts and slabs being arranged to form the outer walls of the building.

2. A wall for a building comprising a foundation built of superimposed blocks of concrete, posts of concrete formed independently of the blocks and interposed between them, said concrete posts extending substantially from the bottom surfaces of the lowermost blocks to the top surfaces of the uppermost blocks, concrete posts supported by the first-mentioned concrete posts and formed independently thereof, slabs of concrete interposed between the second mentioned concrete posts, said second-mentioned posts and slabs being arranged to form the outer walls of the building.

3. In a wall for a building, a foundation comprising molded blocks disposed in end to end and in superimposed relation, the adjacent ends of said blocks being notched, and posts snugly disposed in said notches for locking said blocks in place.

4. In a wall for a building, a foundation

comprising molded blocks disposed in superimposed relation, said blocks having longitudinal grooves extending the length thereof and having transverse ducts connecting said grooves, and means occupying said ducts and grooves for maintaining said blocks in position relative to each other.

5. In a wall for a building, a foundation comprising molded blocks disposed in end to end and in superimposed relation, the adjacent ends of said blocks being notched, and said blocks having grooves extending longitudinally thereof and transverse ducts connecting said grooves, posts snugly disposed in said notches, and means occupying said grooves and said ducts for locking said blocks in place relative to each other.

6. In a wall for a building, a foundation comprising similar molded blocks disposed in superimposed relation, said blocks having longitudinal grooves extending the length thereof and transverse ducts connecting said grooves, the grooves of adjacent blocks being disposed opposite each other, and means occupying said grooves and said ducts for maintaining said blocks in place relative to each other.

7. In a wall for a building, a foundation comprising molded blocks disposed in superimposed relation, said blocks having longitudinal grooves extending the length thereof and transverse ducts connecting said grooves, the grooves of adjacent blocks being disposed opposite each other, water-proof material occupying said grooves and means occupying said ducts for maintaining said blocks in place relative to each other.

8. In a wall for a building, a plurality of posts having grooves for the reception of side panels, the rear wall and one side wall of said grooves being rectangular and the other side wall making an obtuse angle with said rear wall, a panel disposed in each of said grooves, and grout disposed between said panel and said other side wall.

9. A wall for a building comprising a foundation built of superimposed interlocking blocks of concrete, and posts of concrete formed independently of the blocks and interposed between them, said concrete posts extending substantially from the bottom surfaces of the lowermost blocks to the top surfaces of the uppermost blocks.

In testimony whereof, I have hereunto signed my name.

FRANK S. SWAN.