J. STRETCH.

MOLD FOR CONCRETE BUILDINGS.

APPLICATION FILED NOV. 25, 1910.

1,038,986.

Patented Sept. 17, 1912.

3 SHEETS—SHEET 1.

Fig. 1.

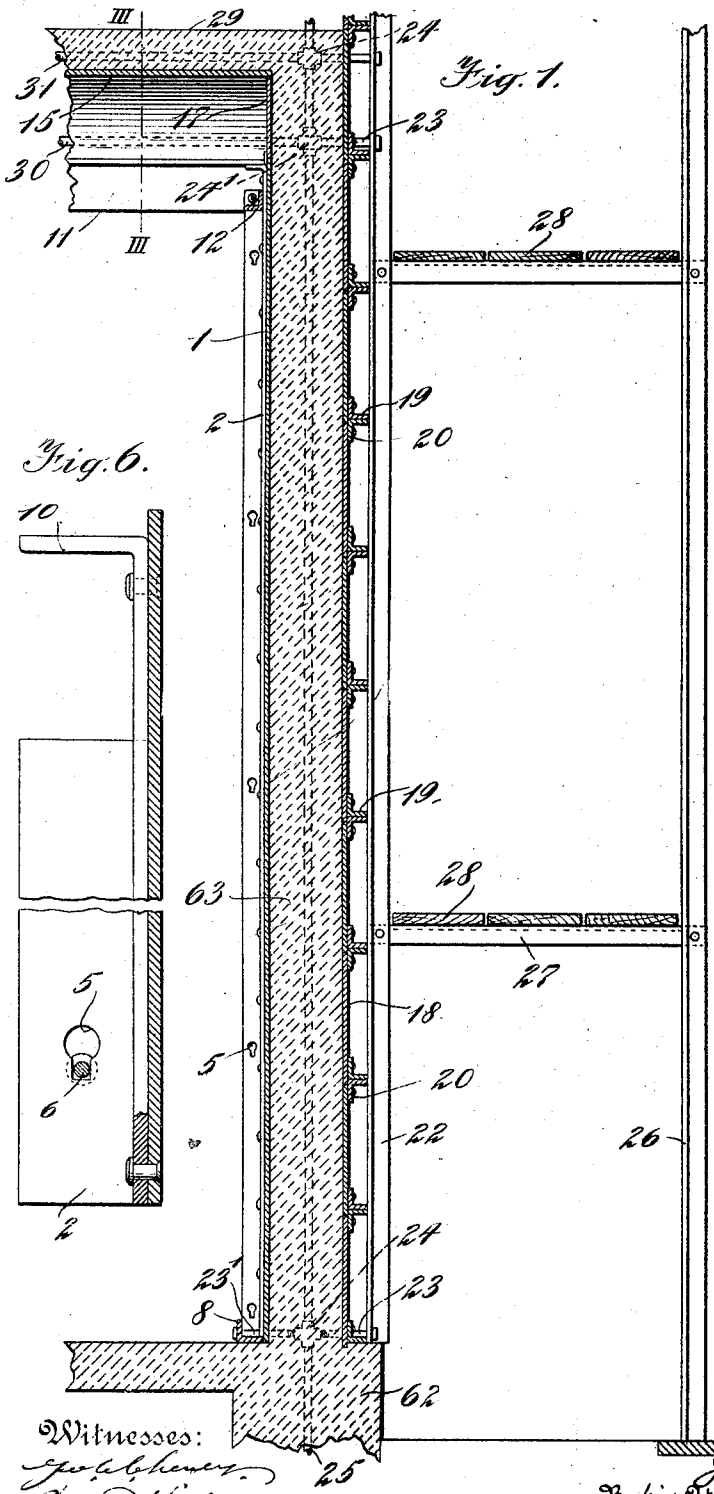


Fig. 4.

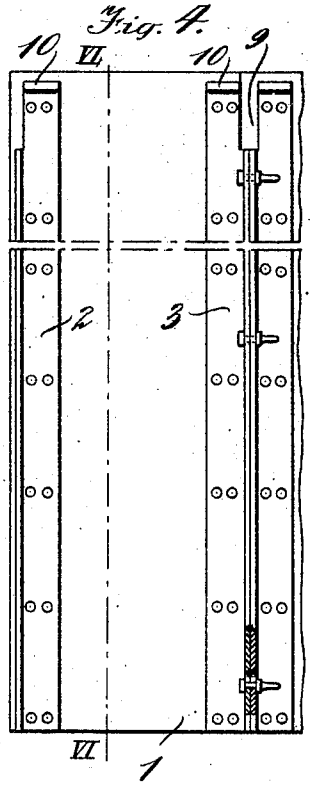
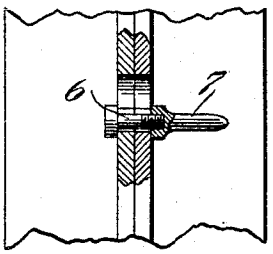


Fig. 6.

Fig. 5.



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3 SHEETS—SHEET 2.

Fig. 3.

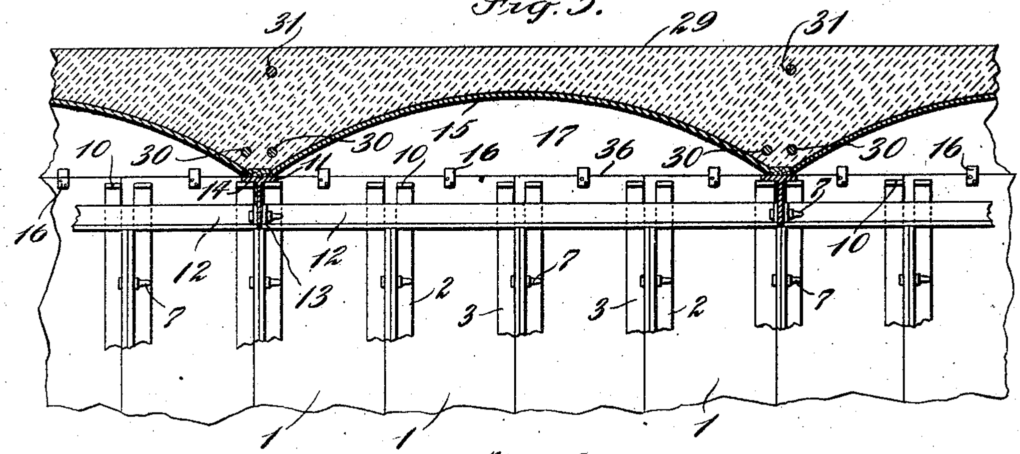


Fig. 2.

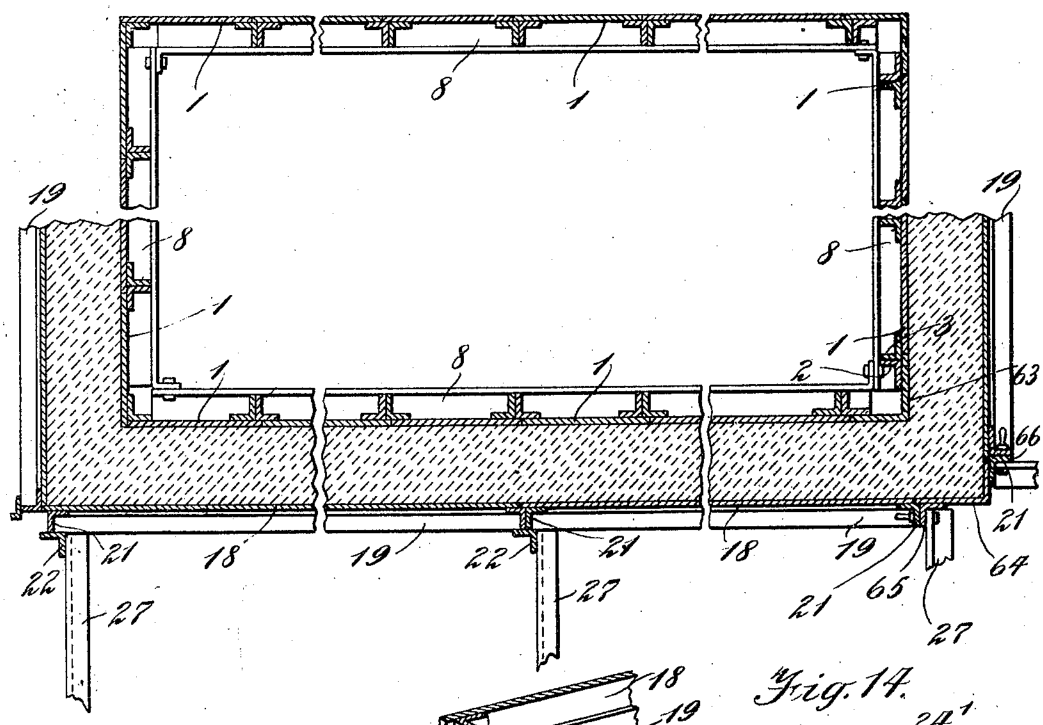


Fig. 14.

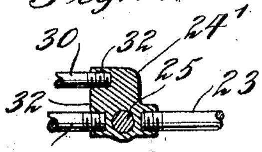
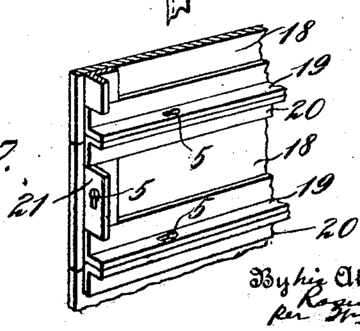


Fig. 7.



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3 SHEETS—SHEET 3.

Fig. 8.

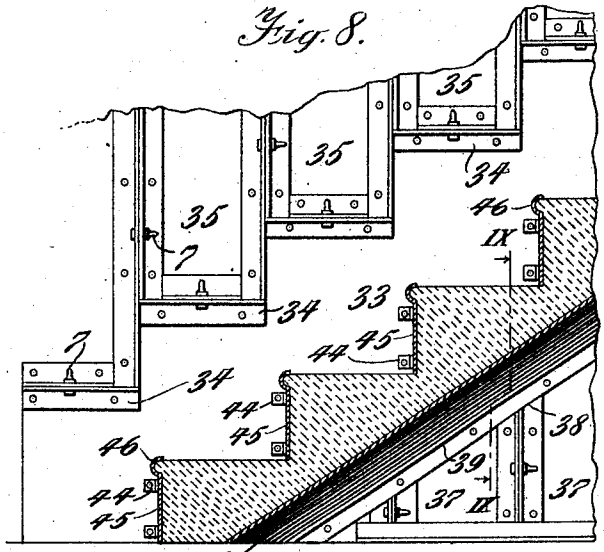


Fig. 9.

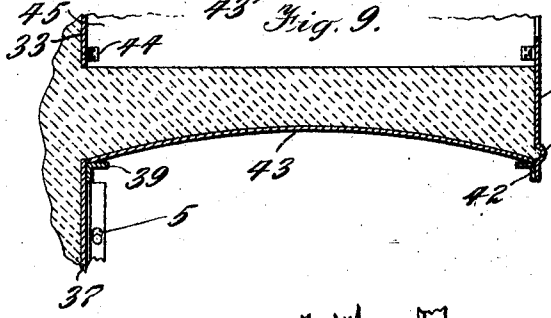


Fig. 11.

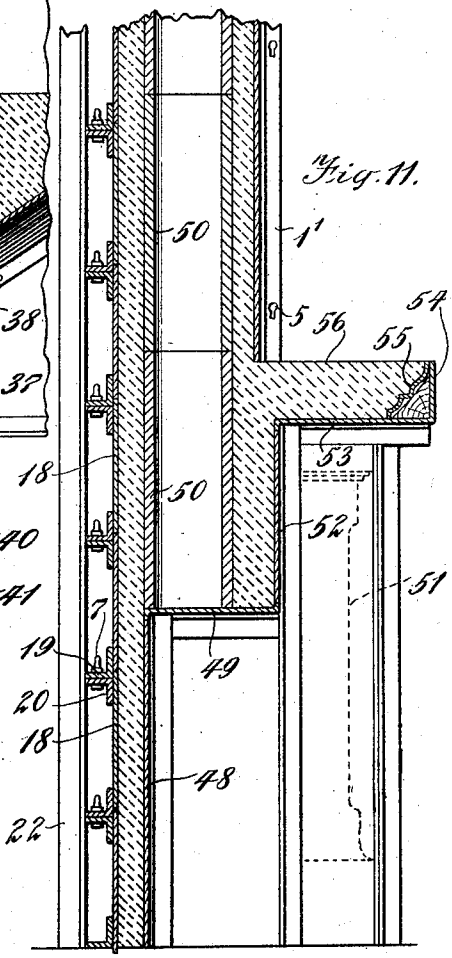


Fig. 12.

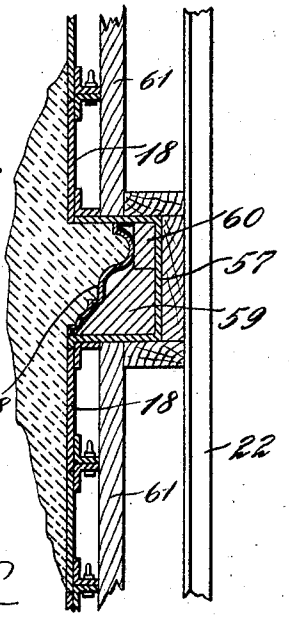


Fig. 10.

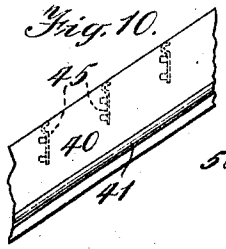
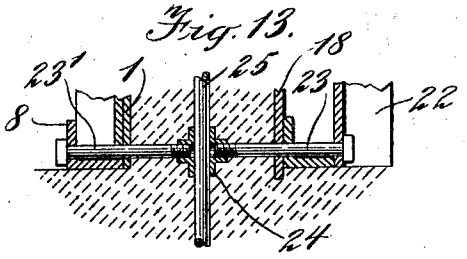


Fig. 13.



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UNITED STATES PATENT OFFICE.

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MOLD FOR CONCRETE BUILDINGS.

1,038,986. Specification of Letters Patent. Patented Sept. 17, 1912.

Application filed November 25, 1910. Serial No, 594,065.

To all whom it may concern:

Be it known that I, JOSEPH STRETCH, a citizen of the United States, residing at Freeport, in the county of Nassau and State of New York, have invented certain new and useful Improvements in Molds for Concrete Buildings, of which the following is a full, clear, and exact description.

This invention relates to concrete construction, and more particularly to monolithic building molds, and has for its object the provision of means whereby buildings of this type can be erected inexpensively and with the assurance that the poured or otherwise deposited concrete shall form a monolithic structure, free from imperfection either in the body or upon the surfaces thereof.

In the attempts which have heretofore been made to erect monolithic buildings it has been found in practice to be exceedingly difficult to pour the concrete in such manner as to insure uniformity of the mass throughout, owing to the character of the material to be handled, which is not of such a nature as to permit it to flow readily into all of the interstices and crevices to be filled. Again, the substance begins to set quite rapidly and for this reason very frequently large spaces would be left in various parts of the composite mold. I have devised means whereby these difficulties may be entirely overcome and a building or other structure constructed in accordance with the principles of my invention may be made a true monolith; the walls, ceilings, floors and even the stairways being, if desired, formed monolithic.

Other objects of my invention will be hereinafter set forth and more particularly pointed out in the appended claims.

In the drawings which form a part hereof: Figure 1 is a vertical section through one of the walls of a building of this character showing the molds in position thereagainst, together with the auxiliary scaffolding, which in this case serves to form a brace for sections of the mold. Fig. 2 is a somewhat fragmentary horizontal section of the said wall showing the arrangement of the interior molds. Fig. 3 is a fragmentary vertical section of the ceiling taken on the line III—III of Fig. 1. Fig. 4 is an elevation of one of the interior mold plates, showing also a fragment of an adjoining plate secured thereto. Fig. 5 is a detail of one form of a device used to secure the mold plates together. Fig. 6 is a longitudinal section of one of the plates shown in Fig. 4, the section being taken on the line VI—VI of said figure. Fig. 7 is a fragmentary detail of the outer plates, showing several of the same in assembled relationship. Fig. 8 is a vertical longitudinal section of a stairway showing the molds in position for forming the same. Fig. 9 is a transverse vertical section through one of the treads taken on the line IX—IX of Fig. 8. Fig. 10 is a fragmentary detail of one of the stairway mold boards. Fig. 11 is a vertical section through a flue, fire-place and mantel piece. Fig. 12 is a detail section of a false mold showing the same in assembled relationship with the adjoining mold plates. Fig. 13 is a detail section showing the preferred means for retaining the opposed mold sections in proper relationship. Fig. 14 is a detail of a tie-rod casting.

Like characters of reference designate like parts throughout the several views.

One of the objects of my invention is to so form the molds employed in erecting a building of this character that the respective outer and inner section of the molds may be held in spaced relationship with but few braces and at the same time to provide a mold arrangement such that the whole floor may be poured incrementally to form a monolithic structure. To this end the interior mold sections or boards preferably have the form of long and relatively narrow plates, which plates may if desired extend from the floor substantially to the ceiling. In practice I make these plates about one foot wide and provide stiffening angles adjacent the respective longitudinal edges thereof. One of these angles 2 of each plate is preferably set back from the edge thereof to provide a narrow lip, while the other angle 3 is so disposed as to project slightly over the edge of the plate, preferably by the same amount that the angle 2 is set back from its edge. This arrangement permits of interlocking the mold sections or boards, and the outstanding flanges of the angles afford means for securing the plates together. Of course these mold sections may be secured in any suitable manner, but I prefer to provide in said outstanding flanges a series of keyhole shaped

slots 5 which are adapted to receive bolts 6 in the manner shown in Figs. 5 and 6. The nut 7 of each of these bolts is preferably so formed that it can be readily grasped by the hand so that when the head of the bolt has been inserted through the enlarged ends of the slot and the body of the bolt has been drawn down into the narrow portion of said slot, the angle flanges may be clamped tightly together without the use of a wrench, or other tool.

In assembling the molds, frame forming angles 8 are first laid around the respective sides of a suitable platform or foundation, the horizontal flanges of said angles being directed outwardly as shown in Figs. 1 and 2. One extremity of each of these frame forming angles is cut and bent in the manner shown, to facilitate assembly, the respective extremities of the angles 8 being bolted together to form a base frame. A number of the interior mold sections or panels 1 are then arranged side by side with the lower ends thereof disposed in contact with the respective angles 8 in the manner shown in Fig. 1, these sections being bolted together side by side in the manner above described. As will be seen by referring to Fig. 4, the upper extremities of the respective stiffening angles 2 and 3 have each a section thereof cut away as at 9, and the extremity of the remaining flange of each angle being bent over as at 10 to form a seat for the flange of a T-beam 11, a plurality of which extend across the inclosed space or room substantially at the ceiling thereof as shown in Fig. 3. These beams together with the corresponding frame angles 8 constitute the principal struts used in the construction of the interior casing.

I prefer to space the T-beams about four feet apart, and hence if the mold sections be one foot wide, four of these will be disposed between adjacent T-beams. The upper extremities of these groups of mold sections are retained against lateral displacement due to the pressure of the concrete when poured thereagainst by horizontally disposed angles 12, the extremities of which are formed in the manner shown at 13 in Fig. 3; one web of the angle being cut away and the extremity of the other web being bent over and being preferably slotted for the reception of one of the bolts 6. The extremities of the vertical webs of the T-beams are correspondingly slotted and are received in the slots between the stiffening angles of the mold sections. Retaining angles 12 extend around all four sides of the room and when assembled serve to effectually prevent displacement of any of the mold sections 1. At intervals along the tops of the T-beams are placed small blocks 14 of wood or concrete, and flexible steel plates 15 are arched or bowed in the manner shown in Fig. 3 to form the ceiling of the room. These bowed plates bear against the tops of the T-beams 11 and by reason of the interposition of the spacing blocks 14 mutually retain themselves in position. The upper edges of the respective mold sections or panels 1 may be provided with clips 16 which serve to prevent arcuate plates 17 from being displaced inwardly; these plates being so disposed that their lower edges contact with the upper edges of sections 1 while the arcuate edge of each of said plates 17 bears against the edge of an arched plate 15. The foregoing mold sections hence constitute a casing which is virtually an inverted box, and which serves to form the interior faces of the walls of the room and also the interior or lower face of the roof or ceiling. The outer mold sections or panels 18 are also in the form of elongated stiffening plates somewhat similar in general construction to the plates 1 above described; but while plates 1 are preferably vertically disposed, the plates or boards of the outer mold sections are horizontally arranged. These plates are each provided with stiffening angles 19 and 20, which are so arranged that the mold sections may interlock as shown in Fig. 7 and in addition to these longitudinally extending angles, at each end of these mold sections is a short transversely positioned angle 21.

The ends of the angles 19 and 20 and the outer face of the outstanding flange of the angle 21 are in alinement and are set in from one edge of each of the plates 18 as shown in Fig. 7, while they correspondingly project over the other end of each of said plates so that the mold sections may further be interlocked end to end. The exterior mold sections hence interlock both vertically and horizontally. They are adapted to be secured together by keyhole shaped slots 5 and bolts 6 in the same manner as are the interior mold sections, and are held against outward lateral displacement by uprights 22. These uprights are preferably long sections of angle iron perforated at intervals for the reception of bolts 23. These bolts extend through one of the flanges of such an upright and through apertures in the outer mold sections into threaded engagement with suitable castings 24, which castings are adapted to be embedded in the concrete mass when the latter is poured therearound. A detail of one of the castings 24 is shown in Fig. 13, this casting being substantially cross-shaped, two oppositely disposed arms of the cross being apertured and threaded for the reception of bolts 23 and 23′; the latter extending outwardly through the angles 8 above described of the interior mold sections 1. Bolts 23 and 23′ and castings 24 hence constitute tie rods for preventing spreading of the respective inner and outer mold section walls. The

remaining arms of the cross are hollow, a recess extending therethrough adapted for the reception of vertical stiffening rods 25 which are intended to be left in the concrete mass after the molds are removed therefrom. The uprights 22 are united to scaffolding uprights 26 by cross members 27 so form a scaffolding frame, and this frame when assembled is sufficiently rigid to support the exterior mold sections against outward displacement, and further serves to carry the platforms 28.

In practice, it is found desirable to completely assemble the inner mold sections and to also erect a scaffolding frame, but the horizontal outer mold sections are only placed in position as needed. For example, the first one or two tiers of these sections are placed in position and concrete is then poured into the pocket so formed until said pocket has been nearly filled. Thereupon the third mold section is bolted into position and the next course of concrete is poured; and so on until the level of the floor 29 has been reached. By this means it is possible for the operator to see exactly how the concrete is being placed and hence the inadvertent formation of holes or open spaces in the mass may be obviated. The ceiling or roof of the chamber is formed by spreading concrete on top of the arched plates 15 and leveling the same in the manner shown in Fig. 3. Embedded in this mass of concrete are groups of tie rods 30 and 31; rods 30 being preferably disposed side by side in pairs, while a rod 31 is arranged substantially parallel to each pair of rods 30, but above the same. The extremities of these rods are threaded into the respective castings 24 and 24′, replacing tie bolts 23′ in this portion of the structure. The casting 24′, shown in detail in Fig. 14, is slightly different from casting 24, in that in place of one inwardly directed arm a boss is provided which has two threaded apertures 32 which are adapted for the reception of the tie rods or bolts 30. It will be understood, of course, that various devices may be employed whereby to secure such tie rods in position, those herein shown being merely exemplifications.

Referring to Fig. 8, I have therein shown means for constructing a stairway in the monolith, and one which is extremely rigid and strong, while absolutely fireproof, unless it be desired to embed wooden treads in the mass of concrete in order to facilitate the securing of carpets or the like in place thereon. To this end, I provide a plate 33 the edges of which are stepped or zig zag in outline. Along the upper edge of this plate are disposed a series of short angles 34 secured thereto in any suitable manner and adapted to support a series of mold sections 35, which may be substantially of the same form as mold sections 18. These sections, however, are each of sufficient length to reach up to the line 36 shown in Fig. 3, so that they will be successively shortened as the head of the stairway is approached. Correspondingly, a series of mold sections 37 is arranged below the stairs, these sections having the upper extremity of each of the same cut obliquely at substantially the general angle of the stairway. The mold sections 37 have stiffening angles down the longitudinal edges thereof arranged substantially the same as are the corresponding angles in mold sections 1 and 18. These angles, however, are cut obliquely across at the upper extremities as shown at 38 in Fig. 8 so as to afford room for the emplacing of an obliquely disposed angle 39 which extends along the upper edges of the sections 37.

The outer or lateral face of the stairs is formed by means of a long plate or mold board 40 which extends the entire length of the stairway. This plate may be beaded as at 41 to form a bead at the lower outstanding edge of the concrete mass; while at the inner side of plate 40, adjacent the bottom edge thereof is an angle 42 which runs the length of the stairway and is disposed parallel to the angle 39. An arched plate 43 is sprung into position between plate 40 and the mold sections 37, the edges of this plate resting upon the said angles 39 and 42. A series of angle shaped clips 44 are fastened or adapted to be fastened to the plate 33, the outstanding flanges of which are adapted for engagement with the riser plates 45. These plates may, if desired, be beaded at the upper edges thereof as at 46 to form the usual bead at the edge of the tread. In pouring concrete to form the stairs, one tread is poured at a time, the surface of the concrete being leveled off as at 47 and the concrete setting sufficiently rapidly to permit rapid successive pourings to form the successive treads. It will thus be seen that an arched stairway is formed which is integrally united to the wall of the building as shown in Fig. 9. If the building is a house, chimneys and fire-places will usually be provided, and to this end the construction shown in Fig. 11 illustrates the application of my invention to details of this character. Relatively short mold sections 48 are arranged side by side to form a fire-place; these sections being roofed over or covered by a suitable section 49, the longitudinal edges of which are preferably flanged as shown. Supported on this covering section are the superposed tiles 50 which are arranged end to end to provide a flue. Ornate posts 51 may be formed of concrete upon either side of the fire-place by the use of false molds similar to these hereinafter referred to; and the space above the fire-place opening and beneath the mantel is covered by a plate 52. The under side of the mantel

is formed by a mold section 53 generally similar in section to mold board 49. This plate has an upstanding flange 54 thereon which forms part of the false mold for the edge of the mantel and the mold plate proper which is placed in this false mold is preferably formed by bending sheet metal into the desired contour as shown at 55. The mold sections 1′ above the mantel are substantially the same as sections 1, except that they are shorter, and mold sections 18 form the outer wall as in Fig. 1, tiles 50 being preferably spaced equidistant from the sections 1′ and 18. The concrete may be poured in around the fire-place and around the tiles 50 in successive courses in precisely the same manner as it may be done where the wall is of ordinary construction, and the mantel is formed by pouring concrete in at the upper surface thereof leveling the same off to form the flat surface 56 of the mantel.

It is usually desirable for purposes of ornamentation to provide cornices or the like around the exterior walls of the building, and to this end I provide the mold construction shown in Fig. 12, wherein disposed between the usual outer mold boards or sections 18 is a trough-shaped false mold 57 in which may be placed a molded sheet metal plate 58 which provides the cornice forming surface. Blocks of wood 59 and 60 may be placed in the false molds to afford proper support to the metal plate 58, if desired. Where a false mold is used, it is usually necessary to space the uprights 22 back from the mold sections in the manner shown in Fig. 12, in which case the various sections may be held against displacement by suitable timbers 61. It will thus be seen that I have provided means whereby one entire floor of the building may be erected in the form of a monolith, and having thus formed one floor, the second may be superposed thereon as shown in Fig. 1, wherein the lower floor has been designated 62 and the wall 63 is of less width than the said wall 62; the two walls being integrally united to form a monolithic building, the surface of the upper wall against which the next succeeding tier is to be placed may be so arranged that the fresh concrete will interlock with the old, this being accomplished in any suitable manner, as for example by roughening or under-cutting the surface of the latter. The wall may obviously be made of uniform thickness throughout; but the construction shown exemplifies the flexibility, so to speak, of the system.

Referring again to Fig. 2, it will be noted that the corner constructions at the respective right and left hand sides thereof are somewhat different. The interior or vertical mold sections 1 are adapted to interlock as shown at the left hand side of said figure, but it will be observed that in such construction one of the stiffening angles, in one of the abutting sections of each pair which form a corner, must be omitted; such sections hence being different from the others, and further not being as well secured to the adjacent corner forming section as are the remainder of the plates. I deem it preferable therefore for these and other reasons to provide special corner sections 63, which are shown at the right hand side of Fig. 2. These corner sections may be substantially like the sections 1 except that the plate which forms the body thereof is bent along preferably the median longitudinal line of such plate as shown. The angularly disposed sides of these sections are preferably but half the width of the flat sections 1, so that the corner sections weigh approximately no more than the others. The stiffening angles 2 and 3 are disposed with respect to the edges of these corner sections in the same way as are the corresponding parts of the flat sections and hence the corner and flat sections are equally well adapted to interlock in the manner described while the angular arrangement of the sides of said corner sections insures the proper angular disposition of the building wall molds. Correspondingly, while the horizontal outer mold sections 18 may directly abut to form the corners, as shown at the left of Fig. 2, I prefer to provide vertical, outer mold, corner-forming sections 64. These sections not only provide the molds for the corners of the building, but further serve as parts of the scaffolding frame; uprights 22 being omitted when said corner sections are used. These uprights will however, of course, still be used to support the abutting ends of alined mold sections 18; but the ends of such of said sections which abut against the corner sections 64 may be secured thereto by bolts 6 passing through the apertured angle pieces 5 and corresponding key-hole shaped apertures in the flanges of the stiffening angles 65 and 66 of the corner mold 64. Obviously the narrow sides of the outer corner molds will not interfere with the proper pouring of the concrete and the horizontal sections 18 may be secured in place as needed, as described in the first part of the specification.

In general, by reason of the employment of structural steel shapes and plates, instead of forming the various mold parts of cast iron or the like, the mold sections are rendered inexpensive and durable, and may be used repeatedly in buildings of various types. The work of assembling them may be performed by relatively unskilled labor and by reason of the provision of an interior self supporting and practically unitary casing the walls of which are of predetermined height and which constitute the

inner walls of the mold, while the outer mold walls are of variable height, being formed of a plurality of horizontally disposed sections or panels adapted to be superimposed and assembled in courses as needed, the erection of the building may be rapidly and economically effected with the assurance that when the mold boards are removed after the concrete has properly set, the building walls will be found smooth and solid.

Having described my invention, what I claim, is:

1. A knockdown room mold for concrete buildings comprising wall forming mold sections of successively shorter lengths, stairway forming parts, said parts including a plurality of riser plates, and an obliquely disposed mold section to which said riser plates are attached, said obliquely disposed mold section having both the upper and lower edges thereof stepped to respectively conform with the treads of the stairway and with said successively shortened wall forming mold sections.

2. A knock-down room mold for monolithic structures comprising a casing in the form of an inverted box, the walls of said casing being built up of separable flat sheet metal panels, said panels being flanged and adapted to interlock, and separable sheet metal plates forming the ceiling of said casing, said casing further having a rectangular frame therein adapted to hold said panels in alinement, and ceiling plate supporting struts extending from one side of the casing to another, the casing being rigid and self supporting when the parts thereof are in assembled relationship, exterior mold sections, a combined scaffold and supporting frame for said sections, tie connections between said supporting frame and said casing, said connections extending across the mold space between the exterior mold sections and the casing, said exterior mold sections extending horizontally and being adapted to be superimposed as needed during the erection of the monolithic walls, said exterior mold wall sections being also of sheet metal and adapted to interlock.

In witness whereof, I subscribe my signature, in the presence of two witnesses.

JOSEPH STRETCH.

Witnesses:
CHAS. P. HIDDEN,
WALDO M. CHAPIN.