Sept. 11, 1928. 1,683,600

A. BLACK

BUILDING CONSTRUCTION

Filed June 29, 1923 2 Sheets-Sheet 1

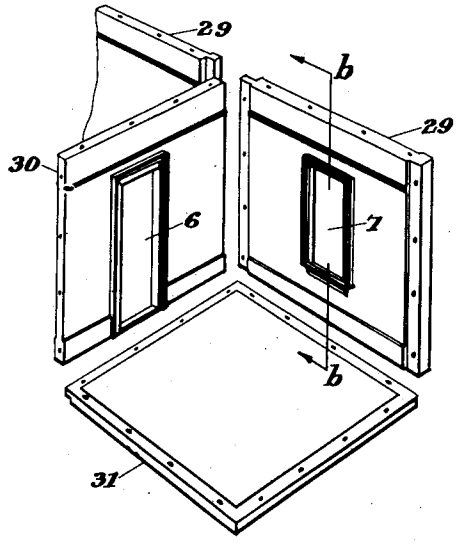


Fig. 1.

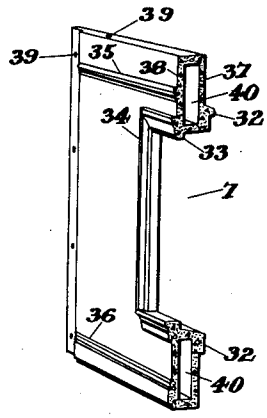


Fig. 2.

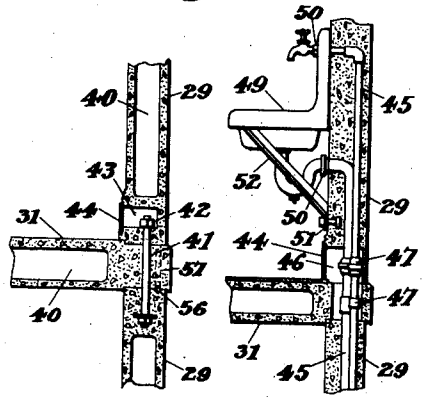


Fig. 3.

Fig. 4.

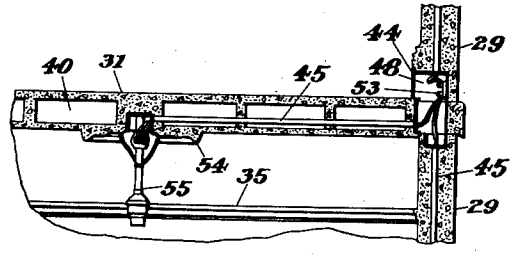


Fig. 5.

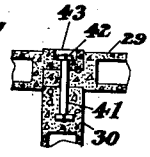


Fig. 6.

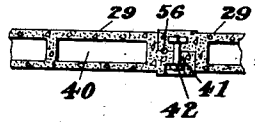


Fig. 7.

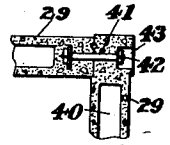


Fig. 8.

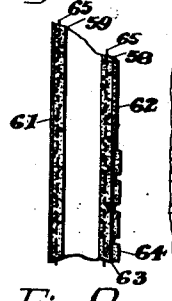


Fig. 9.

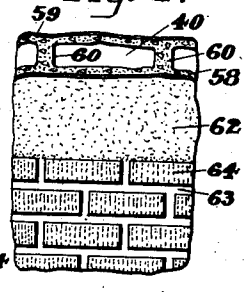


Fig. 10.

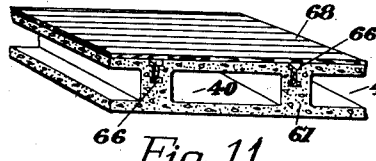


Fig. 11.

INVENTOR.

Archibald Black

BY

ATTORNEYS.

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A. BLACK

BUILDING CONSTRUCTION

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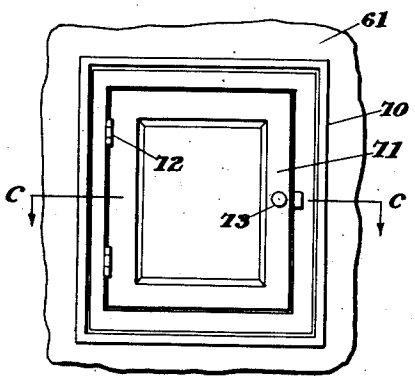


Fig. 12.

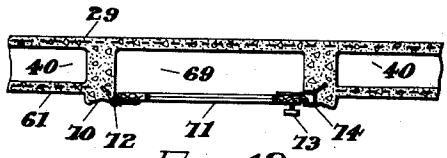


Fig. 13.

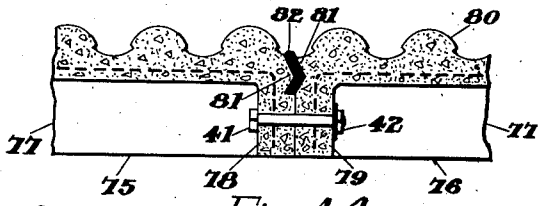


Fig. 14.

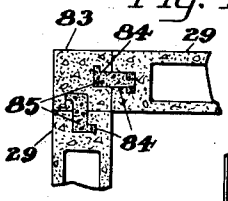


Fig. 15

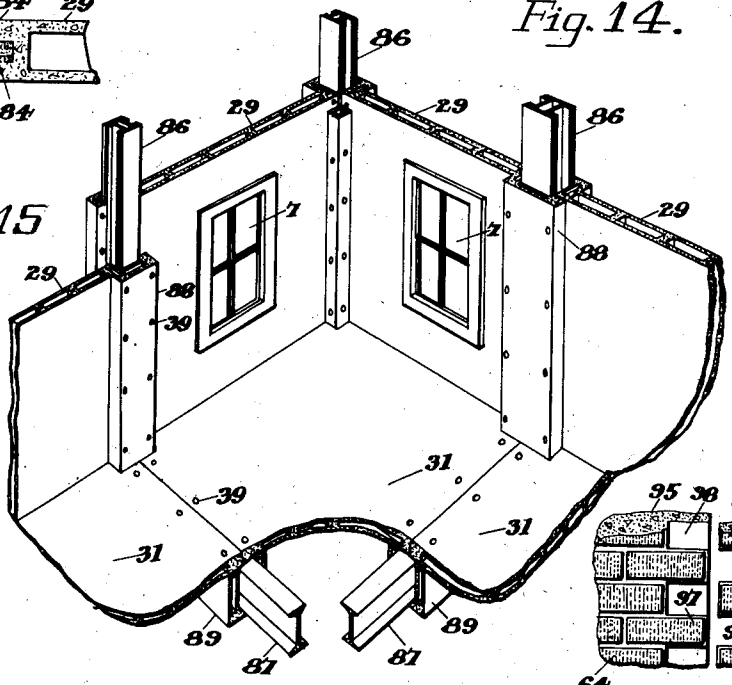


Fig. 16

Fig. 17.

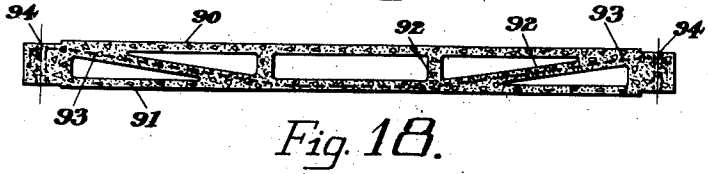


Fig. 18.

INVENTOR

Archibald Black

BY

ATTORNEY

Patented Sept. 11, 1928. 1,683,600

UNITED STATES PATENT OFFICE.

ARCHIBALD BLACK, OF GARDEN CITY, NEW YORK.

BUILDING CONSTRUCTION.

Application filed June 29, 1923. Serial No. 648,514.

My invention relates to building construction and has for its object the provision of a method which permits reduction in the cost of building construction, reduction in the time required for such construction and which, at the same time, permits the use of fire resisting materials and heat insulated types of buildings if such are desired.

It is well recognized that work which is done under factory conditions can be accomplished with greater speed and accuracy, and at lower cost, than similar work which is done under other conditions such as those conditions under which building construction has heretofore been carried on. In my method of building construction many advantages are made available through the provision of a system by which the greater part of the work may be done under factory conditions, while the use of skilled labor in the actual erection of the building is largely eliminated.

My method consists of the manufacturing of buildings in substantially complete units and the assembling of said units to form the building. While the practice of constructing buildings in, so-called, sections, is old, my method differs in many ways from methods previously used and has the advantages, among others, of being adaptable to use with almost any building material and particularly such as are fireproof, of permitting provision of a double or heat insulating wall, of permitting the installation of pipes and other ducts, wires and such, within the walls before erection of the building and of reducing the erection time and cost by permitting a greater proportion of the labor to be performed under factory conditions and by also permitting more efficient use of the materials. In the preferred application of my method of construction, each unit of wall, floor, partition, stairway, roof, porch, etc., will be substantially complete in itself so that the labor required for erection of the building can be almost entirely confined to that required for the assembling of the completed units and the making up of fastenings and connections.

Fig. 1 shows one method of applying my system of construction to the assembly of a building, while Fig. 2 shows a typical section through one of my wall units, this section being taken on the line "*b*—*b*" in Fig. 1, looking in the direction indicated by the arrows. Figs. 3, 4, 5, 6, 7 and 8 show typical details of my preferred methods of providing fastenings and connections on and between the units and of ensuring airtightness of the joints between adjacent units. Fig. 9, shows a vertical section through an outer wall unit and illustrates one method of constructing such, while Fig. 10, shows an elevation of part of the outer face of the wall illustrated in Fig. 9. Fig. 11, shows a method of providing floors of materials such as wood with my units. Fig. 12, shows the face of a small cabinet made integral with one of my wall units, while Fig. 13, shows a section through this cabinet taken on the line "*c*—*c*" in Fig. 12, and facing in the direction indicated by the arrows. Fig. 14, shows a cross section through the joint between two adjacent roof units, while Fig. 15, shows an alternate method of fastening my units together at the joints. Fig. 16, shows an application of my method of construction to buildings in which a steel frame is used to carry all or part of the load. Fig. 17, shows a cross section through one of my floor units in which the members have been designed to form a truss, while Fig. 18, shows the exterior face of two wall units at a joint and illustrates an alternate method of preventing this joint from marring the appearance of the building.

Referring to Fig. 1, the outer walls are made in units 29, partition walls in units 30, and floors or ceilings in units 31. Each of these wall, floor, ceiling, or other units is manufactured preferably of a moulded material and complete with all ornaments, trim, openings such as door openings 6, and window openings 7, and other irregularities, in place and with both sides finished so that little or no further labor is required once they are assembled in place and the fastenings and connections made up. However, although this is my preferred method, I may find it desirable, in special cases, to manufacture the units and trim or other appendages, separately and to assemble these to the units after assembly of the units in the building, or to manufacture the units with semi-finished instead of finished surfaces, or to manufacture the units with a single wall instead of a double wall, or to manufacture the units partly or wholly of other than moulded materials.

Fig. 2, shows one method of manufacturing my wall and other units, window opening 7, outer facing 32, window stop 33, in-

ner facing 34, picture moulding 35, baseboard 36, finished outer surface 37, finished inner surface 38, and bolt holes 39, or other fastening means, being placed in position when the unit is manufactured. To prevent excessive transmission of heat in extremes of weather and to reduce the amount of material required for construction of my units, as well as to permit more economical disposition of this material and to retard the penetration of moisture through outer wall units, an air space 40, may be provided in any or all of the units whether outer walls, partitions, floors, roof, or others. In several of the accompanying figures, I have illustrated my units as made of concrete, or similar material, in order to show a specific application of my method. It will be obvious, however, that my system may be also, and with equal facility, applied using hollow tile, gypsum, wood, paper-board, or other materials or combinations thereof, without regard to whether or not such are at present used in the construction of buildings. It is contemplated that the particular material, or combination of materials, to be used will be determined by local conditions, cost, and by the purpose and requirements of the building being erected.

Referring to Figs. 3, 6, 7 and 8, where two or more units are to be connected, these are preferably designed to be fastened together by means of bolts and nuts, bolt 41, being fastened into one of the units while nut 42, is set in a recess 43, in the other. Recess 43, may be filled, covered over as with plate 44, or left open. In Figs. 4 and 5, where piping 45, is required for any purpose it is preferably provided complete in each unit, openings 46, with cover plates 44, being also provided for the making of pipe connections 47, while connection boxes 48 are provided for the making of electrical connections. Where bathtubs, hand basins, toilet bowls, and similar facilities, such as kitchen sink 49, are to be provided, the piping 45, is carried through the wall or other units, as required, to connections 50, while inserts 51, are provided for the attachment of supports 52, in order that these facilities may be installed in the assembled building with the minimum of labor. Similarly, connection block 53, or other means, may be provided to facilitate the making up of electrical connections, while ceiling center 54, and similar ornaments or necessities, are provided ready for such as fixture 55.

To ensure airtightness of all joints between units, I propose to make these irregular or stepped, such as shown in Fig. 3, and other figures, and to provide grooves 56, which may be filled with some resilient material when the units are being assembled, or which may be filled with some such liquid as cement grout which hardens in place. Where the position of the seam is such as to require it, I may provide holes 57, through which the grout, or such, may be poured into grooves 56.

Referring to Figs. 9 and 10, the main body of the wall consists of outer part 58, inner part 59, and connecting parts 60. The inner part 59, may be provided with a thin layer of material 61, forming a permanently exposed finished face, which may also be decorated by painting, papering, etc., while the outer part 58, may be provided with a thin layer of material 62, moulded in imitation of stucco or other type of exterior building facing. If desired, imitation brick or stone finish may be obtained by the use of suitable moulds and by using a material 63, of one color, to imitate the cement seams and a material 64, of another color, to imitate the brick or stone. Another method, which might be used to obtain the desired finish, would be that of using thin inserts of real or imitation brick or stone in place of material 64. In the same manner tiles could be moulded in place in wall or floor units. If the design of the floors, walls or partitions, and the materials used, require such, reinforcing 65, may be placed inside of the outer part 58, or inner part 59, or both of these parts, during the manufacture of the units.

If it is desired to use material such as concrete for the construction of floor units and, at the same time, to provide a floor surface of a material such as wood, this may be accomplished in the manner shown in Fig. 11, where fastening strips 66, of suitable material such as wood, are cast or moulded as inserts in the body 67, of the floor unit. Finished surface 68, of thin wood or such, is then fastened to strips 66, preferably before the floor unit is assembled into the building.

My method of construction of wall units greatly facilitates the provision of conveniences, such as cabinets, flower boxes, etc., in these as illustrated in Figs. 12 and 13. A recess 69, is provided in the wall unit 29, to form the cabinet while ornamental moulding 70, is provided on the wall face 61, around this recess. Door 71, is provided with hinges 72, set into 61, and with catch 73, which engages strike 74, this strike being set into 61. In manufacturing units of walls, partitions, etc., I prefer to use this method of inserting hinges, strikes, fastenings and other such fittings, in the units during the process of manufacture in order that the use of skilled labor in fitting such parts in the assembled building may be eliminated.

In the construction of roofs of buildings, my system may be applied in exactly the same manner as heretofore described for the construction of walls, partitions and floors. In the case of roof units, however, it is very

important that these be properly watertight and I propose to accomplish this object in the manner illustrated in Fig. 14. Roof units 75, and 76, are provided with stiffening beams 77, and a flange 78, on unit 75, which is arranged to abut flange 79, on unit 76, and to be fastened thereto by bolt 41, and nut 42. The outer surface 80, of the roof may be designed and colored to imitate any desired type of roofing, an imitation of Spanish tile being shown in Fig. 14. Irregular grooves 81, or such, are provided in 78, and 79, and adapted to be filled with suitable waterproofing material 82, to prevent leakage of water through the roof at the joints. Leakage of water through the material of which the roof units 75, and 76, are made, may be prevented either by using a waterproof material in their construction or by waterproofing their surfaces. Thus the entire roof may be suitably waterproofed.

It will be obvious that the methods of assembling buildings may be greatly modified without departing from the use of my method of construction and I have shown, in Fig. 15, another of the several methods which might be used in the construction of the joints. Wall units 29, are abutted against column unit 83, and 29, and 83, are each provided with suitable grooves or recesses 84. Parts 29, and 83 can thus be fastened together by sliding locking tongue 85, into recess 84, or by casting 85, in place after the other parts have been assembled. In Fig. 16, wherein I have shown my method of construction as applied to buildings in which a steel frame is used, the columns 86, and floor beams 87, which comprise the frame, are used to partly or wholly support wall units 29, and floor units 31. Units 29, and 31, may be provided with integral housings 88, or separate housings 89, may be used to surround the steel frame and thus protect it from the heat in case of a fire breaking out. The various units 29, and 31, are fastened to the steel frame members 86, and 87, either by being clamped around these as shown in Fig. 16, or by being bolted directly to them. In steel frame buildings, the weight of the walls and the floors represents a large proportion of the total load which the frame is designed to carry. Accordingly, my system of construction permits great economies through reducing this load.

Another advantage of my method of building construction is the economical use of the materials which it makes possible by facilitating more scientific design of the floor and wall members. As an example, I have shown, in Fig. 17, a cross section through a floor unit of a type which is particularly suited to use with materials which may be cast or moulded to any desired form. This floor unit is provided with a floor or upper portion 90, a ceiling or lower portion 91, these being connected by parts 92, the rest of the space between 90, and 91, being left open so that the complete structure forms a truss. If the material used requires internal reinforcing, as would be the case with concrete, I also provide such reinforcing 93, to form a part of the whole truss. This reinforcing 93, may be carried to the ends of the unit and arranged around bolt holes 94, in such manner that any stresses in 93, are transmitted directly into the bolts in 94, when the unit is assembled into the building.

With my system of construction, vertical and horizontal seams will usually be located in the building walls, and it is desirable to either adapt these to form part of the design of the building or to otherwise render them less conspicuous. In several of the accompanying drawings, such as Fig. 3, I have shown part of the floor unit 31, extended slightly outside of the line of the wall units 29, thus giving the appearance of a water table to what would otherwise be an unsightly seam. Similarly, in other of the accompanying drawings, such as Fig. 8, I have shown one of the wall units 29, slightly extended beyond the surface of the other wall unit 29, thus causing the seam to appear to be an ornamental line on the building wall. In Fig. 18, I have illustrated another method of preventing the seams from marring the appearance of the walls. In this case, abutting wall units 95, and 96, shown slightly separated in the drawing for purposes of illustration, are surfaced in imitation of brick construction 64, in the manner heretofore described, and the abutting edges of 95, and 96, are provided with alternate projections 97, and recesses 98, which are arranged to fit together in such manner as to give the appearance of a continuous brick wall when units 95 and 96 are assembled together, the seam in the outer face following the lines of the apparent seams between the imitation bricks.

Having thus described my invention. I claim as new and desire to secure by Letters Patent:—

1. A building comprising a series of moulded portable units, means for securing the assembled units together to form the building, duct sections extending through the units in alignment with each other in the assembled building, couplings interposed between aligned sections of ducts for the fluid-tight connection thereof, and recesses for accommodating the said couplings.

2. A building comprising a series of moulded portable units, means for securing the assembled units together to form the building, duct sections extending through the units, in alignment with each other in the assembled building, couplings interposed between aligned sections of ducts for the

fluid-tight connection thereof, recesses for accommodating the couplings, and means for accessibly inclosing the said couplings.

3. A building comprising a series of moulded units of the character described, aligned pipes extending from edge to edge of the units and forming an integral part thereof, coupling pieces on the pipe ends for the attachment of the aligned ends of the pipes in adjacent units, and openings for permitting communication between said pipes and the inside faces of the units.

4. A building comprising a series of moulded units of the character described, aligned pipes moulded between the outer and inner faces of the units and extending from edge to edge thereof, and means for providing a fluid-tight connection between the aligned ends of the pipes in adjacent units.

5. A building comprising a series of moulded units of the character described, aligned conduits for water, gas, electric conductors or the like, coupling pieces for the connection of aligned conduits in adjacent units, and right angle sections extending from the said conduits through the inner side face of the units.

6. A building comprising a series of moulded units of the character described, aligned metal pipes extending from edge to edge of the units between the inner and outer side faces thereof, coupling pieces between the aligned edges of the pipes in adjacent units, recesses for giving access to the said couplings and covering means for said recesses.

In testimony whereof, I have signed my name to this specification, this 29th day of May, 1923.

ARCHIBALD BLACK.