

May 31, 1938.

A. MALINOVSKY

2,118,936

WALL STRUCTURE

Filed Sept. 7, 1937

2 Sheets-Sheet 1

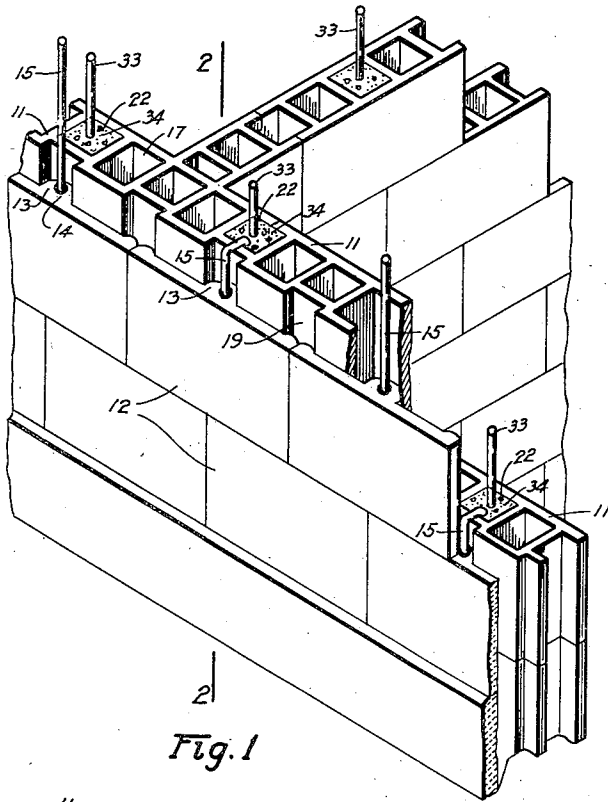


Fig. 1

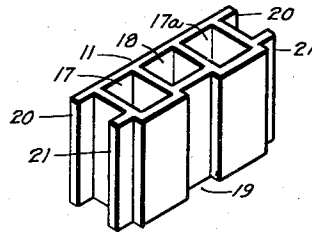


Fig. 7

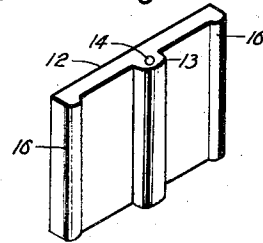


Fig. 8

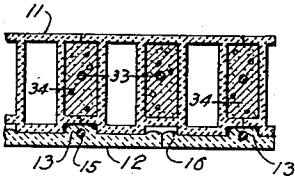


Fig. 4

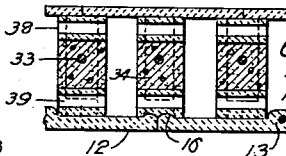


Fig. 5

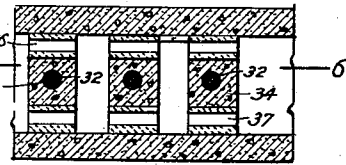


Fig. 3

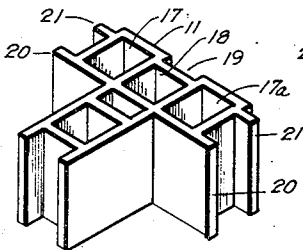


Fig. 9

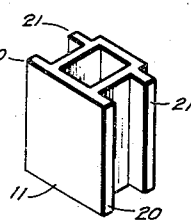


Fig. 10

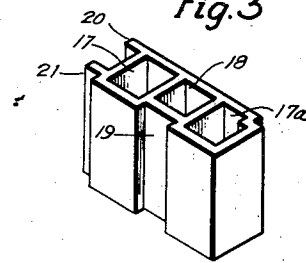


Fig. 11

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May 31, 1938.

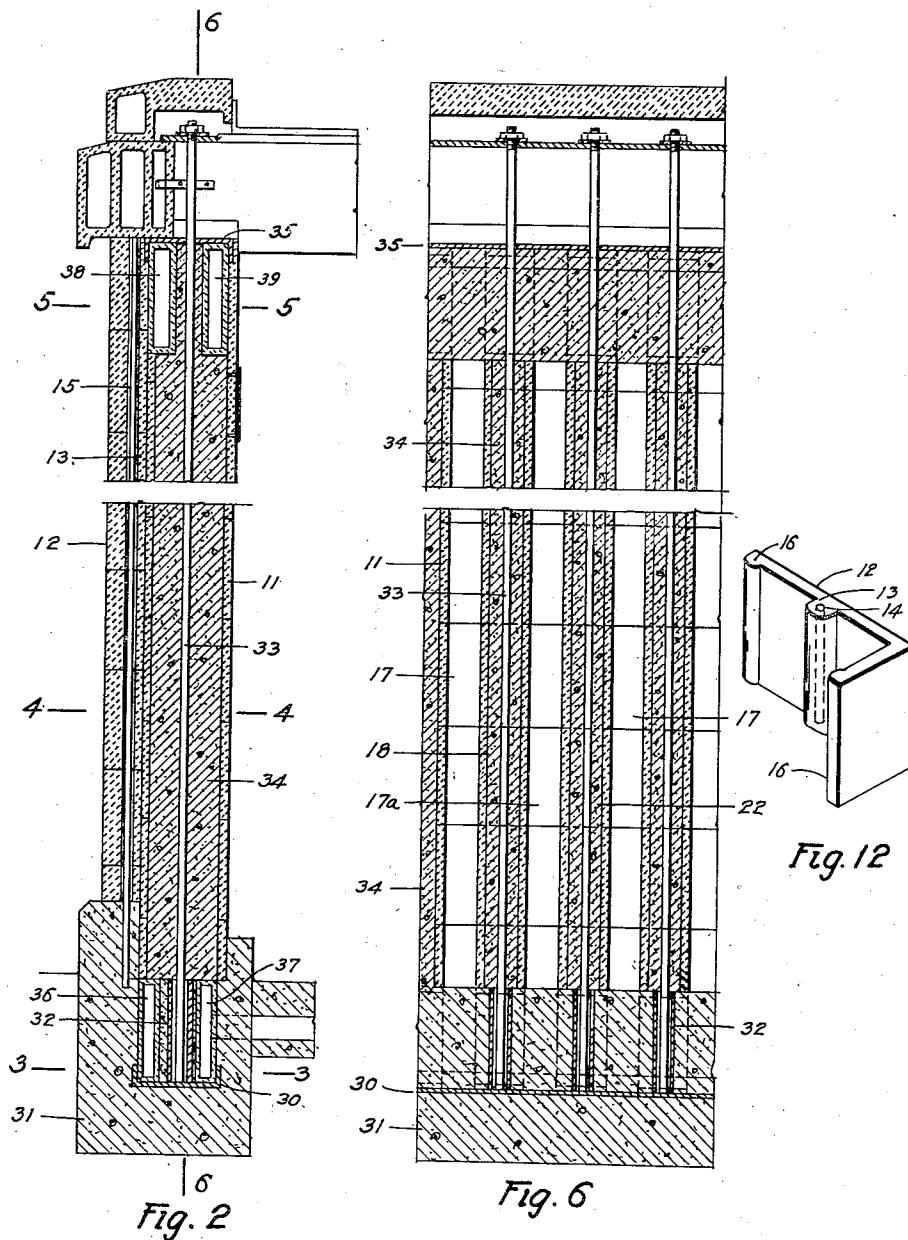
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WALL STRUCTURE

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2 Sheets-Sheet 2



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## UNITED STATES PATENT OFFICE

2,118,936

## WALL STRUCTURE

Andrew Malinowsky, South Gate, Calif.

Application September 7, 1937, Serial No. 162,618

15 Claims. (Cl. 72—30)

My invention relates to building wall structures and in particular to structures utilizing building elements of improved form adapted for reinforcing by concrete and steel members, and to the building elements for producing the same.

One object of my invention is to provide a strong, durable, weatherproof wall structure. Another object of my invention is to provide a wall structure having interconnecting flues part of which may be used as a part of an air conditioning system. Another object is to provide a wall structure having vertical flues part of which may be filled with concrete including reinforcing rods for structural columns. Another object of my invention is to provide a wall structure which is earthquake proof, moisture proof, fire proof, vermin proof, and substantially impervious to infiltration of air. Still another object is to provide hollow flue-forming blocks to which weather proof facing tile may be securely attached.

Other objects and advantages will appear, expressed or implied, from the following description of wall structures constructed in accordance with my invention, which will be best understood by reference to the accompanying drawings in which:

Fig. 1 is an isometric view of a portion of a wall structure built in accordance with my invention;

Fig. 2 is a vertical section of a wall of my construction taken as at 2—2 on Fig. 1 and extending from the foundation to roof;

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

Fig. 4 is a horizontal section taken on the line 4—4 of Fig. 2;

Fig. 5 is a horizontal section taken on the line 5—5 of the Fig. 2;

Fig. 6 is a vertical section taken on the line 6—6 of the Fig. 3;

Fig. 7 is a perspective view of one of my hollow block units;

Fig. 8 is a perspective view of one of my facing tile units;

Figs. 9 to 11 show various forms of my hollow block units;

Fig. 12 shows a perspective view of a facing tile for a corner.

Referring to the figures, my wall structure is composed of specially formed hollow block units 11 laid up horizontally in superposed courses, and facing tile 12 of special structure adapted to be laid up on the outer side of the wall of hollow tile, with the horizontal joints in the inner and outer portions being broken.

The hollow blocks 11 are so laid that the flues

will register perpendicularly in order to give continuous vertical flues for the circulation in the walls and into the room space of warm or cold air generated in an air conditioning unit connected therewith but not shown, and for other purposes hereinafter explained.

The outside wall of my structure is faced with abutting tile or slabs 12 which are made with a semi-circular projecting lug at the center of the back of each tile, the lug 13 having a hole 14 in which is inserted the rod 15 which at its upper end is bent in a downward loop and anchored inside a flue of the hollow block 11, and preferably embedded in the concrete or mortar in the small flues 18. Strengthening lugs 16 are made on the facing tile in the form of a roughly quarter circle bead. The rods 15 which hold the tile units 12 to the hollow blocks 11 may run from the bottom to top of the structure with suitable anchoring in the foundation structure and the capping structure at the top or roof, but in some cases I prefer to have them tied to the blocks 11 at various elevations.

The hollow tile units are each provided with three flues 17, 17a, and 18, the center one, 18, being preferably smaller than the outside flues 17 and 17a and also having its front wall set back from the front surface of the hollow tile to provide space for an open channel 19, adapted to accommodate the lug 13 of the tile unit 12. At each end of the block 11 is provided two extending lugs 20 and 21 which form one-half of a flue with an adjoining block of similar construction to correspond to the smaller or center flue 18. The strengthening lugs 16 of the tile unit 12 are adapted to fit into the one-half channel formed in the corner between the front face of the block and the front projecting lug 21, and not interfere with the tie rod 15.

The flue 18 in the block 11 and the flue 22 formed by the extending lugs 20 and 21 of adjoining units are used for concrete and steel reinforcing. In a preferred form of my structure, a steel channel member 30 is embedded in the concrete foundation 31 and at intervals corresponding to the position of the small flues 18 are welded short lengths of steel pipe 32 extending vertically for a short distance toward and into the continuous vertical flue formed by the openings 18 and 22 of each block unit. Reinforcing iron bars 33 are inserted through the flues 18 and 22 into the short lengths of pipe 32 attached to the channel member 30 in the foundation. After the hollow blocks have been laid up in superposed courses by the usual method, employing a small amount

of cement or mortar in the joints, and the reinforcing bars 33 are in place, concrete mixture is poured into the flues 18 and 22 to form the concrete reinforcing columns 34. An inverted channel 35 is also laid on the top of the wall, and the reinforcing bars 33 are inserted through openings and bolted or otherwise fastened in place on the steel channel member 35. In the foundation 31, horizontal connecting flues 36 and 37 parallel to the wall are formed on either side of the short lengths of pipe. These horizontal flues are conveniently made of rectangular hollow ceramic tile and are put in place prior to the laying of the hollow blocks and the pouring of the concrete to form the columns 34. Likewise at the top of the wall immediately below the inverted channel 35, two horizontal flues 38 and 39 may be provided as the top course of hollow blocks.

The space in the small channels 19 around the flues 13 and also around the end lugs of the facing tile at the abutting ends of adjoining tile in the channel formed by adjoining hollow blocks and corresponding to the open channel 19 may be filled with mortar or concrete.

On interior walls where plaster instead of ceramic facing tile is used, no provision for the channels or grooves for holding the tile are provided, as indicated. Reinforcing bars and reinforcing concrete columns may be used with these simpler tiles in a manner similar to that described for the outside wall blocks. Outlets for connecting the flue with the interior of the room are indicated at 50.

The hollow blocks may be made from any suitable structural material but are preferably of fired ceramic composition. The tile are also preferably of fired ceramic composition and may be of any external surface texture, although a glazed or semi-glazed surface is preferred because of its weathering resistance.

By the use of the specially formed building blocks and tile of my invention, a structure is provided in which air may be circulated throughout the entire wall area, thereby effecting uniform heating or cooling. The structure is completely fireproof, vermin proof and resistant to earthquake shocks because of the reinforcing by the iron bars, the concrete columns, and by the steel channel members when these are used. By avoiding dead air-spaces, moisture in the walls by "sweating" is prevented, and the interior will not become damp. The staggering of the joints of the block and also the tile elements prevents the infiltration of wind and rain, and the outward leakage of conditioned air from the interior, and this construction also increases the mechanical strength of the structure.

Hollow floor and ceiling blocks, (not shown), interconnected with the flues in the side walls may also be used to effect greater uniformity of temperature conditions.

While I have illustrated preferred embodiments of my invention, I do not wish to be limited thereby, but restrict my invention only insofar as is necessitated by the prior art and the appended claims.

I claim:

1. A building element comprising a block generally rectangular in shape having top and bottom plane surfaces and vertically disposed flues, and having two vertical lugs extending from top to bottom at each end of the block adapted to form with the two similar abutting lugs of another similar element a vertically disposed flue at each end of the element, the front one of

said lugs being disposed rearwardly from the front surface of said block to form on the front wall a vertical channel with the similar lug of another similar abutting block.

2. A building element comprising a block generally rectangular in shape having top and bottom plane surfaces and vertically disposed flues, and having two vertical lugs extending from top to bottom at each end of the block adapted to form with the two similar abutting lugs of another similar element a vertically disposed flue at each end of the element, the front one of said lugs being disposed rearwardly from the front surface of said block to form on the front wall a vertical channel with the similar lug of another similar abutting block, the front surface of said block having a vertical channel equidistant from the two ends, said channel being of depth approximately equal to the distance the said lug is set back from the front surface, and of width approximately the same as the horizontal length of said lug.

3. A building element comprising a block generally rectangular in shape having top and bottom plane surfaces and having a central vertical flue therethrough, a plurality of other flues therethrough disposed in equal numbers on either side of said central flue, the front wall of said block having a vertical channel opposite said central flue, and end-walls of said block each having two vertically disposed lugs extending therefrom, said lugs being adapted to form a vertical flue similar to said central flue at each end of the block when abutted against the similar lugs of another similar block.

4. A building element comprising a block generally rectangular in shape having top and bottom plane surfaces and having a central vertical flue therethrough, a plurality of other flues therethrough disposed in equal numbers on either side of said central flue, the front wall of said block having a vertical channel opposite said central flue, and end-walls of said block each having two vertically disposed lugs extending therefrom, said lugs being adapted to form a vertical flue similar to said central flue at each end of the block when abutted against the similar lugs of another similar block, the front one of said lugs being set back from the front surface of said block for a distance equal to the depth of said vertical channel.

5. A building element comprising a block generally rectangular in shape having top and bottom plane surfaces and having a central vertical flue therethrough, a plurality of other flues therethrough disposed in equal numbers on either side of said central flue, the front wall of said block having a vertical channel opposite said central flue, and end-walls of said block each having two vertically disposed lugs extending therefrom, said lugs being adapted to form a vertical flue similar to said central flue at each end of the block when abutted against the similar lugs of another similar block, the front one of said lugs being set back from the front surface of said block for a distance equal to the depth of said vertical channel, the width of said vertical channel being approximately equal to the horizontal length of the lugs at the ends of the block.

6. A ceramic building tile comprising a front face of weather-resistant decorative structure, and a vertically disposed integral central rib on the back, said rib being provided with a longitudinal hole adapted for the insertion of a metal reinforcing rod.

7. A ceramic building tile comprising a front face of weather-resistant decorative structure, a vertically disposed integral central rib on the back, and integral reinforcing ribs at either vertical back edge parallel to said central rib, said central rib being provided with a longitudinal hole adapted for the insertion of a metal reinforcing rod.

8. A building wall structure comprising a multiplicity of block-like elements laid end to end in superposed courses with layers of binding material therebetween, each of said elements having top and bottom plane surfaces and vertically disposed flues, the elements being disposed in each course in staggered relation with the courses above and below to form conduits from top to bottom, two lugs on the ends of each element adapted to form with similar adjacent element lugs a flue at each end of the element, continuous reinforcing members extending the full wall height in a portion of the conduits formed by the flues in superposed individual elements, and means for interconnecting at the top and bottom of the wall the conduits not used for reinforcing members.

9. A building wall structure having inner and outer portions, said inner portion comprising a multiplicity of block-like elements laid end to end in staggered superposed courses with layers of binding material therebetween, each of said elements having top and bottom plane surfaces and vertically disposed flues, and having at each end two vertical lugs adapted to form with two similar lugs of an adjacent abutting element a vertically disposed flue at each end of the element, the front one of said lugs being set back from the front surface of said element to form on the front wall an end vertical channel with the similar lug of the adjacent abutting element, the front surface of said element having a central vertical channel equidistant from the two ends, the said outer wall portion comprising a multiplicity of weather-resistant tile, each tile having integral ribs on its back side disposed to lie in said central and end channels, and means for securing said outer wall portion to said inner wall portion.

10. A building wall structure having inner and outer portions, said inner portion comprising a multiplicity of block-like elements laid end to end in staggered superposed courses with layers of binding material therebetween, each of said elements having top and bottom plane surfaces and vertically disposed flues, and having at each end two vertical lugs adapted to form with two similar lugs of an adjacent abutting element a vertically disposed flue at each end of the element, the front one of said lugs being set back from the front surface of said element to form on the front wall an end vertical channel with the similar lug of the adjacent abutting element, the front surface of said element having a central vertical channel equidistant from the two ends, the said outer wall portion comprising a multiplicity of weather-resistant tile, each tile having an integral centrally disposed rib on the back side, said rib being longitudinally apertured and adapted to lie in a channel of the front wall of the inner portion, and rod and hook means cooperating with said apertured rib and the flues of said inner wall portion for holding together the inner and outer wall portions.

11. A building wall structure having inner and outer portions, said inner portion comprising a multiplicity of block-like elements laid end to end in staggered superposed courses with layers of binding material therebetween, each of said elements having top and bottom plane surfaces and having a central vertical flue therethrough and a plurality of other flues therethrough disposed in equal numbers on either side of said central flue, the front wall of each of said block-like elements having a vertical channel opposite said central flue, the end walls of said elements having two vertically disposed lugs extending therefrom, the front one of said lugs being set back from the front surface of the element for a distance approximately equal to the depth of said vertical channel, said lugs being adapted to form with the abutting lugs of an adjacent similar block-like element an end channel similar to said central channel and an end flue similar to said central flue, the said outer portion comprising a multiplicity of weather-resistant tile, each tile having an integral centrally disposed rib and edge reinforcing ribs on the back, said central rib being longitudinally apertured and adapted to lie in one channel of the front wall of the inner wall portion, said edge reinforcing ribs being adapted to lie along with an abutting tile edge rib in the next adjoining channel of the front wall of the inner portion, and rod means cooperating with said central rib for tying the outer portion to the inner portion of said wall.

12. The wall structure of claim 11 in which are concrete columns filling each of the continuous flues formed by the superposed central flues and end flues in the staggered courses of said inner portions.

13. The wall structure of claim 11 in which are concrete columns filling each of the continuous flues formed by the superposed central flues and end flues in the staggered courses of said inner portion, and concrete columns filling the space in each of the channels between the block-like elements and the tile.

14. The wall structure of claim 11 in which are concrete columns filling each of the continuous flues formed by the superposed central flues and end flues in the staggered courses of said inner portion, concrete columns filling the space in each of the channels between the block-like elements and the tile, and means at the top and bottom of the wall for interconnecting the conduits formed from the superposed individual flues not used for reinforcing members.

15. A building comprising walls having a multiplicity of blocks with openings forming continuous vertical conduits part of which are interconnected at the top and bottom of the walls, outlets for discharging air from the interconnected conduits into the space enclosed by the walls, steel channel members disposed at the top and bottom of each wall, metal rod members attached to said steel channel members passing through the portion of said conduits which are not interconnected, and concrete columns formed within the non-connected conduits around said metal rod members and extending vertically between the top and bottom steel channel members.