April 1, 1930. M. JAEGER, JR 1,752,342

WALL CONSTRUCTION AND STRUCTURAL UNIT THEREFOR

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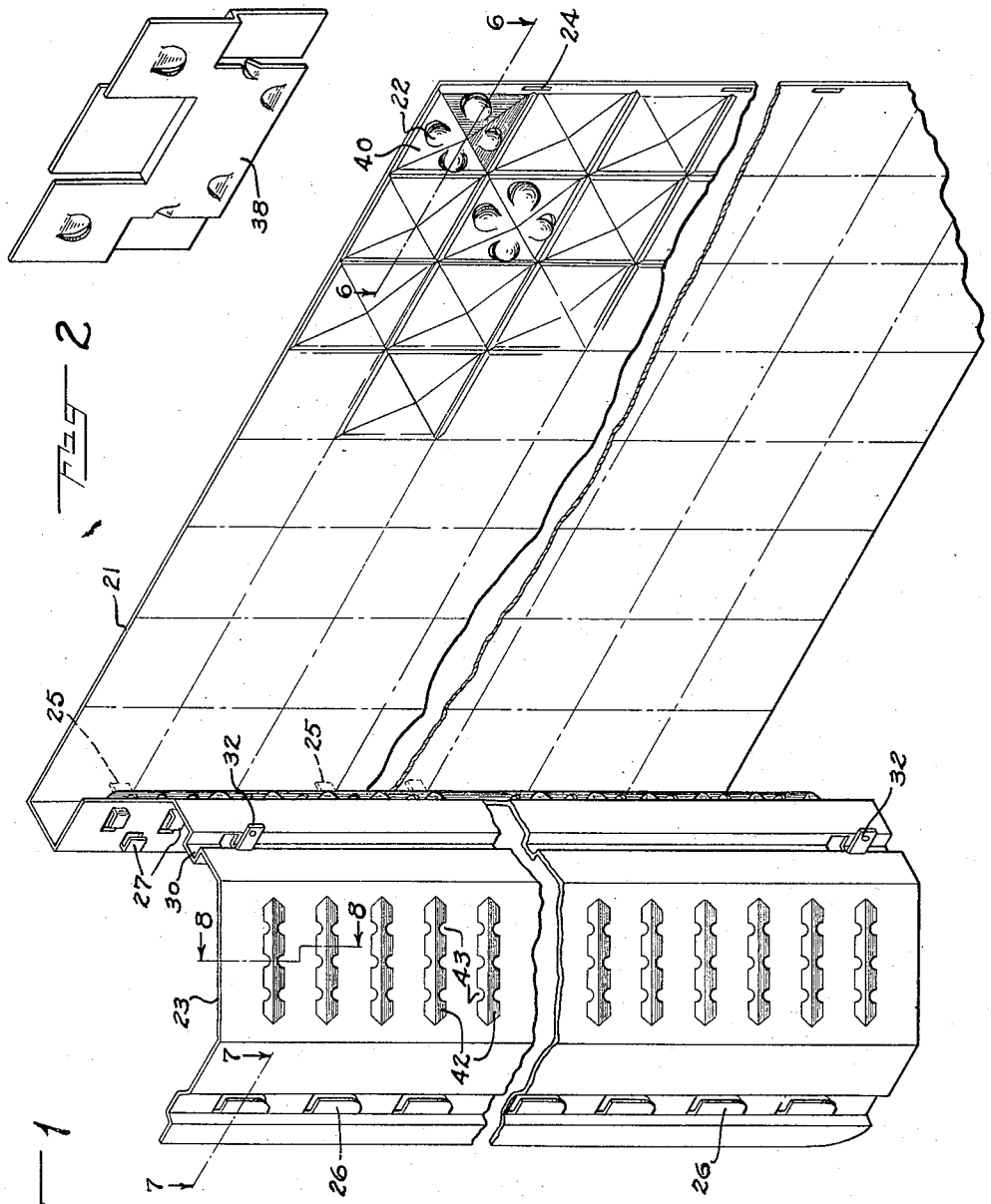


Fig. 2

Fig. 1

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Filed Oct. 7, 1926 5 Sheets-Sheet 2

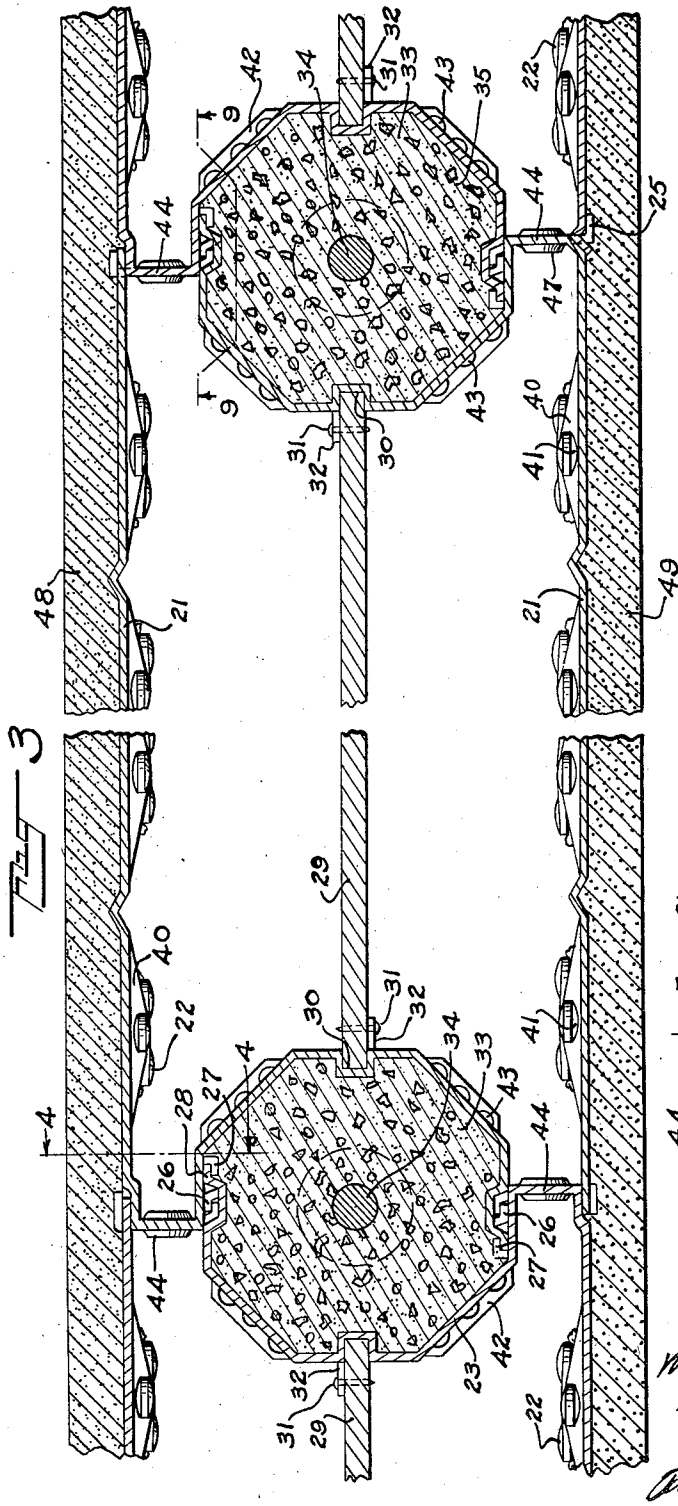


Fig. 3

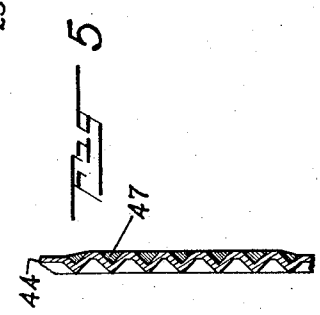


Fig. 5

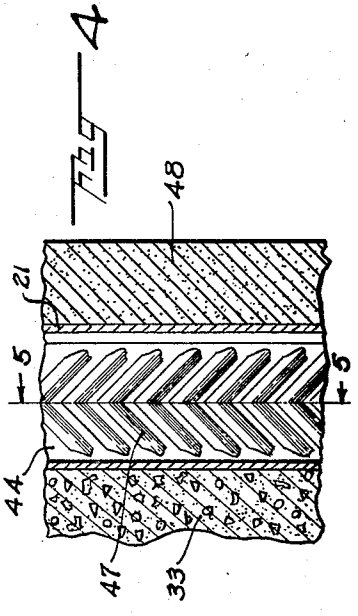


Fig. 4

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WALL CONSTRUCTION AND STRUCTURAL UNIT THEREFOR

Filed Oct. 7, 1926 5 Sheets-Sheet 3



Fig 6

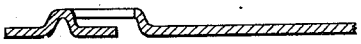


Fig 7

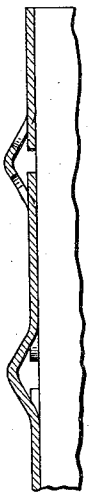


Fig 8

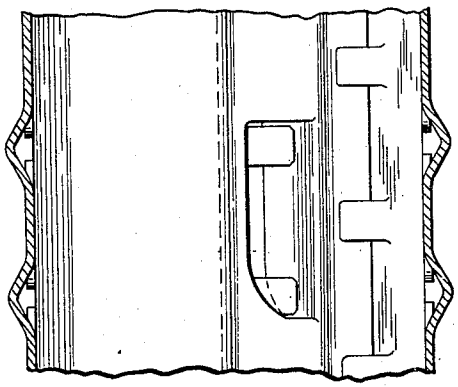
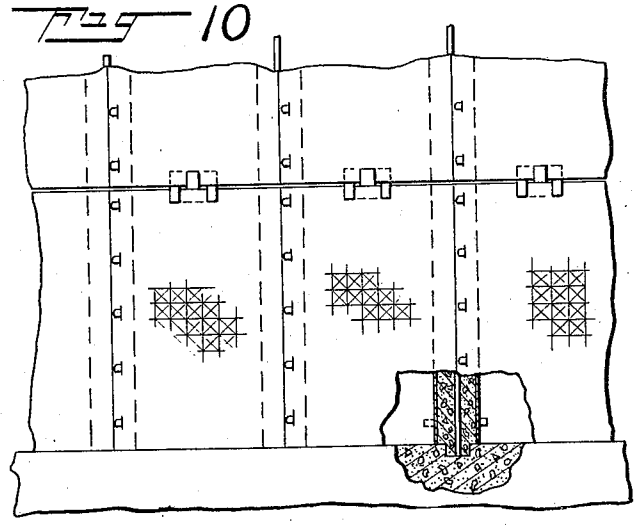
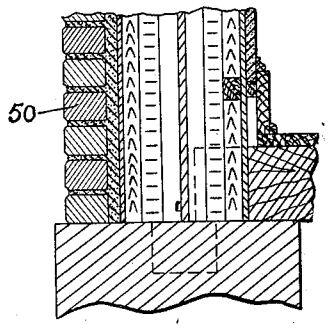


Fig 9

Fig 11

Fig 10





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WALL CONSTRUCTION AND STRUCTURAL UNIT THEREFOR

Filed Oct. 7, 1926 5 Sheets-Sheet 4

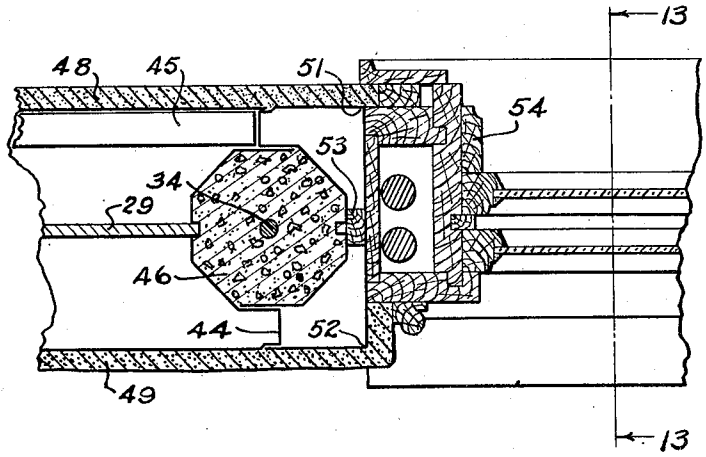


Fig 12

Fig 13

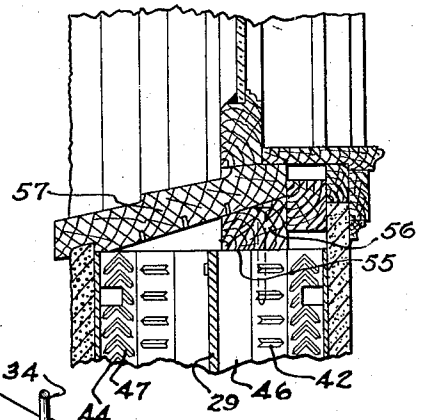


Fig 14

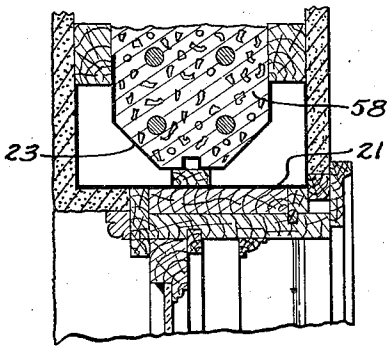
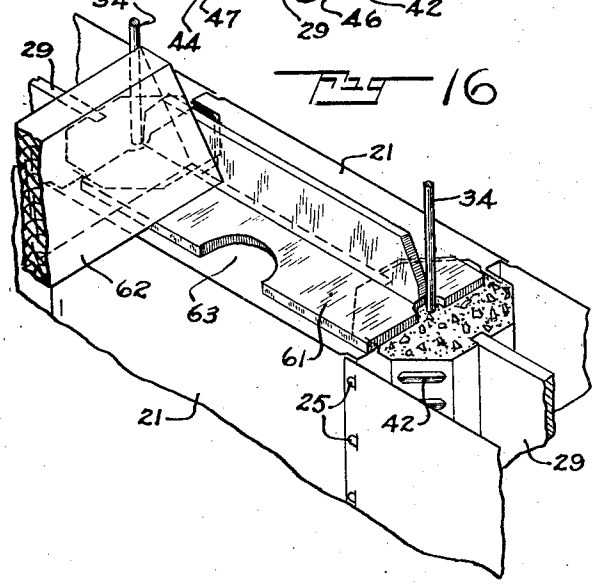


Fig 16



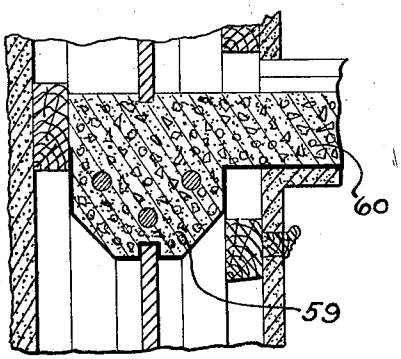


Fig 15

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WALL CONSTRUCTION AND STRUCTURAL UNIT THEREFOR

Filed Oct. 7, 1926 5 Sheets-Sheet 5

Fig 17

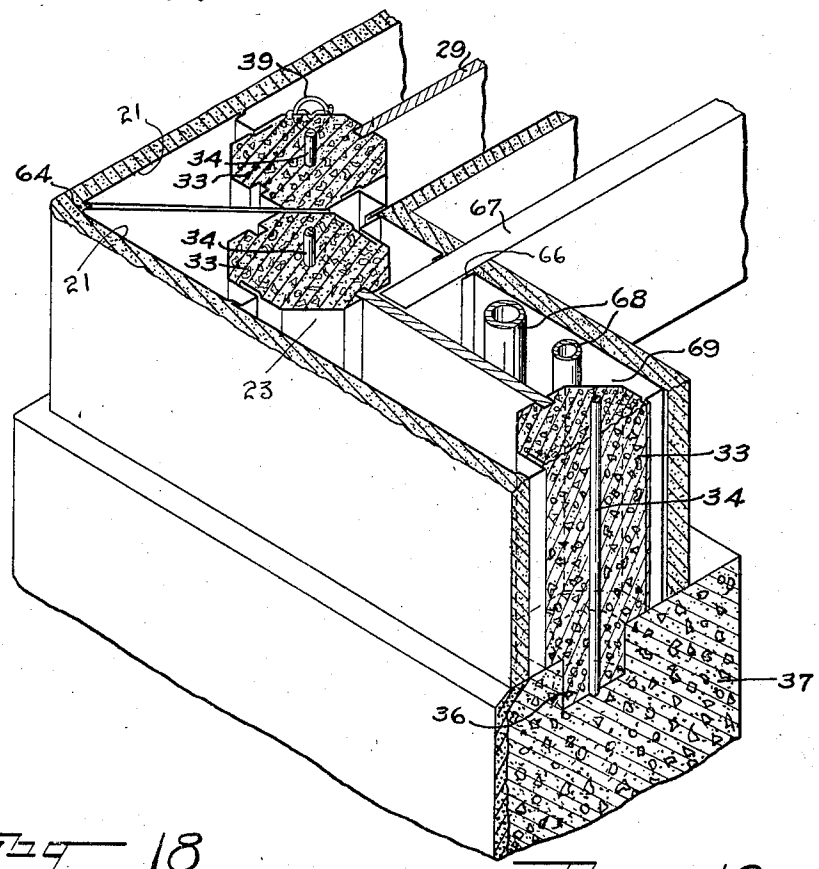


Fig 18

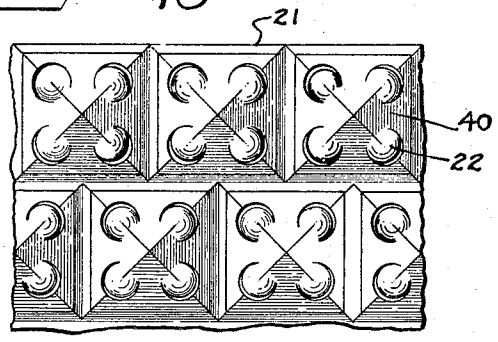


Fig 19

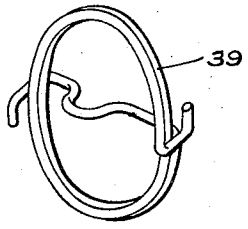
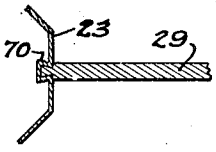


Fig 20



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UNITED STATES PATENT OFFICE

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WALL CONSTRUCTION AND STRUCTURAL UNIT THEREFOR

Application filed October 7, 1926. Serial No. 139,990.

This invention relates generally to the construction of buildings and more particularly to a structural unit or form for use in building operations, together with a method for using the unit in construction work.

It is well known that the cost of construction of houses and other buildings has undergone a substantial increase in recent years so that the problem of constructing houses, and more particularly houses of the smaller type in which people of relatively moderate means reside, has become troublesome and serious. The cost of the construction of wood or frame houses has, of course, increased because of the growing scarcity of material as the forests have become depleted but perhaps the more important item of increased cost in the construction of frame buildings, as well as buildings of brick, stone, concrete, or any other type, is due to the great increase in the cost of skilled labor employed in the construction work as well as in the construction of the materials themselves.

It is a general object of the present invention to provide a structural unit or form for use in buildings together with a method of construction which will permit of the carrying on of building operations with relatively unskilled and, therefore, inexpensive labor.

Another object of the invention is to provide a means and method of construction in which the cost of the completed structure is relatively lower than that of corresponding structures heretofore built in the matter of the cost of materials employed in the building operation.

Still another object of the invention is to provide a construction which will be fireproof; which will afford an increased degree of heat insulation; and which in general will provide a substantial and satisfactory building.

With this and other advantages and objects in view, the invention includes the provision of a structural form or standard which is produced and used in repeated units to build up any desired form or size of wall structure used in a building or other construction. This form or structural unit has a two-part construction, one part forming a section of lathing or plaster-receiving surface and the other part forming a longitudinally divided section of a shell into which concrete can be poured to form a column or post. The formation of the two-part unit thus described is such that individual units having exactly the same formation or size can be coupled or interlocked with each other to form a wall structure continuous both laterally and vertically to form a wall structure of the desired length and height. More particularly the structural unit includes a section of perforated sheet metal having preferably a rectangular section and adapted to form a backing support for a coat or layer of plaster. One end of this plaster-receiving section is provided with a semi-enclosed column forming shell displaced laterally with relation to the plaster-receiving section to share in forming a column or post midway between the plaster-receiving section of the unit and a similar plaster-receiving section of the next laterally adjacent unit. A similar unit brought into relation to any given unit in order to produce a column forming section therewith will be arranged with its plaster-receiving section at the other side of the wall with relation to the plaster-receiving section of the first unit. The indefinite repetition of an arrangement of this character will produce wall sections and intermediate column sections to produce a standard wall construction.

Another feature of the invention resides in the provision of vertical grooves in the confronting wall faces of the column forming molds in which to receive the edges of sheets or sections of insulating material, such as asbestos board, or the like.

Another feature of the invention resides in the provision of cut-out tongues so formed in the plaster-receiving sections that plaster applied to one face of the section will pass through the orifices from which the tongues are bent to form interlocking or anchoring portions with the opposite face of the section. The plaster-receiving sections may be used to receive ordinary plaster, when forming the inner surface of the wall, and to receive stucco or the like when forming the outer surface of the wall structure.

A feature of the invention resides in the separation of the column forming sections from the wall forming sections by means of a section of metal taking the form of a furring strip and which forms a convenient spacing member to permit of the insertion between the plaster-receiving surface and the column section of wood strips or foundation members into which nails can be driven through the adjacent wall section for any desired purpose.

The two laterally separated air chambers, which are produced in the wall structure by the use of the insulating partition member referred to, provide useful insulating functions in that heat produced in the building can be retained therein in cold weather and, on the other hand, heat can be excluded from passing through the walls into the building in warm or hot weather. At the same time, a high degree of insulation against the passage of sound is provided because of the two air chambers separated by the partition member formed itself of insulating material.

The adaptability of the sheet metal structure to be bent into any desired form is useful in providing for the passage through or in the walls of pipes, wiring conduits, and the like, and also in the formation of windows, doors, and other openings in the wall structure. The columns are preferably formed in pairs at the corner portions of a building or wall and in other parts where additional strength is required. The structure also is well adapted for supporting lintel members as well as floor and ceiling beams.

An important feature of the invention resides in the simplicity of construction wherein relatively unskilled labor can set the forms into place, pour the concrete into the column forming molds, and connect the members in interlocked relation to receive the plaster or stucco on the opposite surface thereof.

Other features of the invention will be hereinafter described and claimed.

In the drawings, in which a number of embodiments and adaptations of the invention have been selected for illustration:

Fig. 1 is a view in perspective and partly broken away showing a structural unit which forms the basis of the invention;

Fig. 2 is a perspective view showing a clip member adapted to be used in attaching adjacent units to each other;

Fig. 3 is a view in horizontal section showing a portion of a wall structure in which the structural unit shown in Fig. 1 has been used;

Fig. 4 is a view in vertical section taken on the line 4—4 of Fig. 3;

Fig. 5 is a view in vertical section taken on the line 5—5 of Fig. 4;

Fig. 6 is a view in horizontal section and on an enlarged scale taken on the line 6—6 of Fig. 1;

Fig. 7 is a view in horizontal section and on an enlarged scale taken on the line 7—7 of Fig. 1;

Fig. 8 is a view in vertical section and on an enlarged scale taken on the line 8—8 of Fig. 1;

Fig. 9 is a view in vertical section and on an enlarged scale taken on the line 9—9 of Fig. 3;

Fig. 10 is a view in elevation and partly broken away of a wall section construction in accordance with the invention;

Fig. 11 is a view in vertical section of the lower end of a wall section constructed in accordance with the invention;

Fig. 12 is a view in horizontal section of a wall section adjoining a window opening and constructed in accordance with the invention;

Fig. 13 is a view in vertical section taken on the line 13—13 of Fig. 12;

Fig. 14 is a view in vertical section of a portion of a wall structure above and adjacent to a window opening;

Fig. 15 is a view similar to Fig. 14 showing the arrangement for a floor beam structure;

Fig. 16 is a view in perspective showing a structural arrangement for use with ceiling beams;

Fig. 17 is an isometrical view showing an arrangement of structure at the corner portions of the wall of a building;

Fig. 18 is a face view showing a modified form of lathing or plaster-receiving section;

Fig. 19 is a perspective view of a modified form of clip member used in holding adjacent wall sections together;

Fig. 20 is a sectional view of a detail showing a modified form of connection between a post forming section and an insulating partition member.

Referring to the drawings for a more detailed description of the invention, in Fig. 1 there is shown a structural unit which forms the basis of the invention and which is adapted to be used in repetition to provide forming elements used in the construction of wall and column members in building operations. This unit consists of a flat wall face section 21 formed preferably of a rectangular section of sheet metal having tongues 22 formed therein to receive and anchor a coat or layer of plaster or stucco in accordance with whether the section 21 is used to form the outer or the inner face of the wall in the building operation. The wall section 21 has integrally formed at one end thereof a semi-circular or semi-octagonal shell 23 which is adapted to co-act with a similar formation on another unit to provide a form for a section of a vertical column or post which is incorporated in the wall structure.

The unit thus described in provided at one end with slits or openings 24 which are arranged to receive tongue members 25 formed at the opposite end of another wall section in order to provide an interlocking arrange-

ment of adjacent wall sections to build up the desired wall face. This interconnected relation of the wall sections 21 is clearly shown in Figs. 3 and 10 of the drawings.

Provision is made for a similar interlocking of the column forming shell sections 23. It will be seen that the free end of the shell section 23 is formed with hook or tongue members 26 in Fig. 1 of the drawings and that the opposite face of the shell section 23 is provided with two sets of hook or tongue members 27 which occupy an opposing relation to each other. This respective arrangement of the hook members 26 and the hook members 27 provides for an interlocking of the shell sections as is clearly shown in Fig. 3 of the drawings in which the hook members 26 on the free end of one shell section interengage with one set of the hook members 27 on another shell section, the extreme end portion 28 of the face bearing the hook members 26 being arranged to interlock with the other set of hook members 27, as will be seen. By this arrangement the interlocking of the hook members may be brought about by the mere sliding of one shell section axially along the other until the opposite faces of each section have become interlocked throughout their length.

It will be seen that by the interconnecting of structural units in the manner described, a wall tier or forming member can be indefinitely prolonged, the sections 21 of the units at one side of the row of column forming sections being extended in one direction while the wall sections 21 at the opposite side of the intervening column forming section extend in the opposite direction. This arrangement or relation of parts is clearly shown in Fig. 3 of the drawings.

In addition to the wall forming sections 21, provision is made for making use, when desired, of an intervening partition member 29 which may take the form of a sheet or plate of asbestos board or other non-heat-conductive material. The partition member 29 may be mounted by sliding its end portions into grooves 30 formed in the confronting vertical faces of the shell sections 23. The partition members 29 may be anchored in the grooves, in order to provide a tension or pull as well as a compression effect, by driving nails 31 through tongue members 32, provided for the purpose, into the partition members 29, as is shown in Fig. 3.

When a tier of units has thus been interconnected in the manner described to form a desired portion of a wall, concrete 33 is poured into the form produced by the interconnected shell sections 23 so that a row of column or post sections is formed between the wall sections 21. Preferably the wall sections are reinforced as at 34 with a metal rod which, together with a mass 35 of concrete, occupies a recess 36 formed for the purpose in the foundation member 37 of the wall structure. This interlocking of the post or column sections with the foundation member obviously adds strength to the wall structure as a whole in that the post units are thereby securely anchored or tied to the base or foundation member 37. The recesses 36 formed in the concrete foundation member 37 may be produced in any desired manner preferably when the foundation member is formed.

Another tier of structural units may be added above the first tier when the post or column sections have been poured, the wall sections 21 being attached to each other at their upper and lower edges by means of clip members 38, such as is shown in Fig. 2 of the drawings, the arrangement of the clip members with relation to the wall sections 21 being shown in Fig. 10. The vertical alignment of the wall sections is thus established and maintained so that the completed wall face is made up of wall face sections occupying a common plane to which plaster or stucco may be applied to produce the finished wall surface. It will be seen that the clip member 38 is formed of sheet metal and may be produced in a simple stamping operation. A modified form of clip member useful for the purpose is shown at 39 in Fig. 19 of the drawings. This type of clip member is formed of adjacently coiled wire loops terminating in hook members, the ends of the adjacent wall sections 21 being received between the loops as will be clear.

In order to facilitate the holding or anchoring of a coat or layer of plaster or stucco on the surfaces of the wall sections 21, depressed areas 40 are produced in repeated series throughout the outer faces of the wall sections. In these depressed areas the tongue members 22, which have already been referred to, are formed. The tongue members 22 have a concave or spoon-shaped formation on their plaster engaging surfaces, this formation serving to deflect plaster pressed thereagainst into engagement with the inner faces of the wall sections. The plaster which thus passes through the openings 41 between the free edges of the tongue members 22 and the inner faces of the wall sections 21 and engages the inner faces of the sections, provides anchoring sections or lugs of plaster which serve to hold the plaster coating or layer as a whole in position against the outer wall of the section.

It will be seen that the depressed areas 40 which are formed in the plaster-receiving surfaces of the wall sections 21 occupy relatively small areas. For example, the sections may extend two inches along each edge, this unit serving as a measure, which facilitates the cutting or dividing of the wall sections when necessary without the use of a rule or other measuring device. In addition to the form of

the wall section 21 shown in Fig. 1 of the drawings, the depressed areas 40 may be arranged in an offset relation to each other, as is indicated in Fig. 18 of the drawings. This arrangement forms a relatively stiff or rigid section and obviates any tendency for the section to fold or bend along continuous lines. In addition to the formation shown in Fig. 18, the tongue members 22 are formed on the diagonals of the square sections instead of on the flat faces as shown in Fig. 1 of the drawings.

The post or column forming sections 23 are preferably reinforced by transverse bead members 42 which may also have tongue members 43 formed therein to facilitate an interlocking relation with the concrete poured into the shell formed by two inter-engaged sections.

In order to provide a column or post member having a less thickness or lateral dimension than the thickness of the wall in which it is used, spacing members or furring strips 44 are provided which connect each wall section member 21 with the shell section 23 which is integrally formed therewith. The space provided between the column sections and the wall sections by the use of the furring strips thus provided facilitates the use of foundation members formed of wood or other appropriate material into which nails may be driven through the wall section for any desired purpose.

An example of such an arrangement is shown in Fig. 12 of the drawings wherein a foundation member 45 is inserted between the column or pier 46 and the adjacent wall section 21. This foundation or block member is adapted to have nails driven therein through the wall section for any desired purpose. The furring strips 44 are preferably provided with inverted V-shaped corrugations 47, as is shown in Fig. 4 of the drawings. The oppositely inclined corrugations thus provided serve to prevent moisture passing either from the plaster or stucco coatings 48, 49 or from the concrete 33 in the pier 46 across the intervening gap provided by the furring strip section.

It will be clear that the wall sections 21 are adapted to receive a plaster coating 48 on the inside wall and a corresponding stucco coating 49 on the outside wall, as is shown in Fig. 12 of the drawings, to thereby provide a finished wall structure. In addition, if desired, a brick facing or veneer for the outside surface of the wall may be provided, as is shown at 50 in Fig. 11 of the drawings.

Referring again to Fig. 12 of the drawings, there is shown an arrangement of the structure where a window opening is provided. It will be seen that the wall forming section 21 has in this case been bent at an angle as at 51 and again at 52 to produce a rectangular section to form an end or terminal portion for the wall. A furring or separating strip 53 may be used as a support to which the wall section 21 may be nailed. At the terminal portion of a wall thus provided the window frame members shown generally at 54 may be placed in position following known arrangements for this purpose.

In Fig. 13 of the drawings there is shown the arrangement of parts just beneath the window opening in which the pier 46 terminates at 55 and forms a seat on which a horizontal beam 56 may be placed to receive the window sill member 57.

In Fig. 14 of the drawings there is shown the arrangement of parts above the window opening, in which a lintel member 58 formed of concrete by the use of shell sections 23, such as are used in forming the piers or columns 46, are used in a horizontal position for the purpose. In this instance again, the wall section member 21 is bent, as in Fig. 12, to provide a terminal member for the upper portion of the window opening into which the window framing 54 can be inserted, as will be clear.

In Fig. 15 of the drawings, there is shown an arrangement of parts wherein a horizontal beam structure 59 forming the upper terminus of a wall is formed in much the same manner that the lintel member 58 in Fig. 14 is formed together with a floor beam member 60 extending at right angles to the beam member shown at 59. It will be seen that the forming units used in producing the standard wall sections are capable of considerable variation in position and configuration in order to adapt the forms for use in producing different details of a building structure.

In Fig. 16 of the drawings there is shown an adaptation of the invention at the upper end of a wall structure wherein a support taking the form of an angle beam 61 is provided on which to rest the ends of ceiling beam members 62. The angle beam 61 rests on the upper ends of the piers or posts 46, as will be clear. The angle members 61 may be cut out as at 63 to provide openings through which vertical pipes or electrical conductor sheathing may be passed, if desired.

Referring to Fig. 17 of the drawings, there is shown an arrangement of structure in the formation of a corner portion of a wall. It will be seen that two piers 46 are arranged in closely adjacent relation to provide a double support at this point. This arrangement of the pier members is easily provided by the bending and cutting of the wall sections 21 in the manner shown to bring the shell sections 23, in which the pillars are formed, in close adjacency to each other and with an angular extension of both of the wall sections 21 to provide the corner or angle 64 which represents the corner of the wall structure. At 66 is shown a cut-out section of the wall member 21 to provide for the reception

of a beam member 67. At 68 are shown sections of pipes which may be placed in the inner space 69 formed between the inner wall section and the partition member 29. The placing of water carrying pipes in the inner space as shown protects the pipes from freezing as will be clear.

In Fig. 20 of the drawings there is shown a modified form of groove 70 in the shell section 23 which provides a dovetail connection between the groove and the engaged edge of the partition member 29, thereby eliminating the nails at 31 and tab at 32 as shown in Figure 1.

The openings which are formed in the furring strip sections 44 by the cutting of the tongues 25 therein may be usefully employed in providing lateral communication between the air spaces. These openings may be supplemented by other openings formed for the purpose so that, in effect, a continuous air space is formed along the whole length of the wall. This air space may be usefully employed in the distribution of heat, hot air being supplied to the inner wall chamber for the purpose and openings being provided for the passage of hot air from the chamber into the rooms.

While I have referred to sheet metal as a preferred material for the purpose, I contemplate also the use of other materials suitable for the purpose. Woven wire, with or without a paper backing, may be employed. I may also make use of cast iron, or fiber, or any other suitable material.

It will be seen that I have provided a structural unit for use in building operations which is capable of indefinite repetition to form a wall structure of any desired size. The unit can be bent or cut or otherwise treated to readily adapt it for use in forming the various details of structure which occur in a building operation. The cost of constructing a building in which the structural unit described is used is less than that by which a building, constructed by any process in current use, can be accomplished.

The terms and expressions which I have employed are used as terms of description and not of limitation, and I have no intention, in the use of such terms and expressions, of excluding any mechanical equivalents of the features shown and described, or portions thereof, but recognize that various structural modifications are possible within the scope of the invention claimed.

What I claim is:—

1. In a structural unit for walls, a wall face section having a plaster-receiving surface, and a pier-forming shell section connected to the wall face section and occupying a position parallel thereto, the pier-forming section constituting one-half of the pier form whereby two similar units can be assembled to provide a closed form for pouring a pier.

2. In a structural unit for walls, a wall face section formed of sheet metal and having a plaster-receiving surface, and a pier-forming shell section integrally connected to the wall section to occupy a position on the opposite side of the wall section with relation to the plaster-receiving surface, the pier-forming section constituting one-half of the pier form whereby two similar units can be assembled to provide a closed form for pouring a pier.

3. In a structural unit for walls, a wall face section formed of perforated sheet metal having a plaster-receiving surface, and a longitudinal divided pier-forming shell section connected to the wall face section adjacent one end thereof and occupying a position at the opposite side of the shell section with relation to the plaster-receiving surface, said shell section extending parallel to the adjacent wall face section and being offset with relation thereto, the pier-forming section constituting one-half of the pier form whereby two similar units can be assembled to provide a closed form for pouring a pier.

4. In a structural unit for walls, a wall face section formed of sheet metal, said section being turned at right angles at one end and formed into a substantially semi-cylindrical shell extending parallel to the wall face section, and said semi-cylindrical shell section being adapted to interengage with a similar semi-cylindrical shell section of another unit to provide a closed pier-forming section.

5. In a structural unit for walls, a wall face section formed of sheet metal, said section being turned at right angles at one end and formed into a substantially semi-octagonal shell extending parallel to the wall face section, said semi-octagonal shell section being adapted to interengage with a similar semi-octagonal shell section of another unit to provide a closed pier-forming section, and said shell section being provided with a groove adapted to receive one end of a partition member arranged parallel to the wall face section.

6. In a wall construction, an interconnected series of permanently positioned form units each of which comprises a combined wall face section and a pier section shell formed of sheet metal, the pier sections cooperating to form closed pier forms for pouring isolated piers leaving blank spaces surrounding the same in the finished wall.

7. In a wall construction, a series of permanently positioned form units each of which comprises a combined wall face section and a pier section shell formed of sheet metal, said units being connected together in an edge to edge relation, the pier sections cooperating to form closed pier forms for pouring isolated piers leaving blank spaces surrounding the same in the finished wall.

8. In a wall construction, a series of permanently positioned form units each of which comprises a combined wall face section and a pier section shell formed of sheet metal, said wall face sections being interconnected and forming a plaster supporting surface, and said pier section shells being interconnected and providing forms for concrete piers spaced from said wall face sections.

9. In a wall construction, a series of permanently positioned form units each of which comprises a combined wall face section and a pier section shell formed of sheet metal, said wall face sections and pier section shells being interconnected to form two plaster supporting surfaces spaced apart by the thickness of the wall together with vertical forms for concrete piers, said pier forms being located in the space between the wall surface sections and closed whereby isolated piers are formed in the finished wall.

10. In a wall construction, a series of permanently positioned form units each of which comprises a combined wall face section and a pier section shell formed of sheet metal, said wall face sections and pier section shells being interconnected to form two plaster supporting surfaces spaced apart by the thickness of the wall together with vertical forms for concrete piers, said pier forms being located in the space between the wall face sections and provided with vertical grooves in their confronting faces, insulating partition members fitted to said grooves, and said pier sections being spaced from the wall face sections to provide for the reception of nailing strips between the pier faces and the adjacent wall face sections, the spaces between the pier members and the wall face sections being open and providing air spaces.

11. In a wall construction, plaster-receiving wall face sections, concrete pier members between the sections, and T-plate members arranged to divide the pier members into sections, said T-plate members serving also as floor beam supporting members.

12. In a wall construction, spaced apart wall face sections, concrete pier members placed intermediate the wall face sections, furring strip members spacing the wall face sections from the pier members, and said furring strip members being provided with openings to provide lateral communication between the spaces between the pier members.

13. A hollow wall construction providing wall faces with air spaces therebetween and spaced piers between said wall faces comprising a series of permanently positioned sheet metal form units each of which comprises a combined wall face section and a pier section shell, said wall face sections and pier section shells being interconnected to form two plaster supporting surfaces spaced apart by the thickness of the wall, together with vertical forms for concrete piers located in the spaces between the wall face sections.

14. A hollow wall construction providing wall faces with air spaces therebetween and spaced piers between said wall faces comprising a series of permanently positioned sheet metal form units each of which comprises a combined wall face section and a pier section shell, said wall face sections and pier section shells being interconnected to form two plaster supporting surfaces spaced apart by the thickness of the wall, together with vertical forms for concrete piers located in the spaces between the wall face sections, together with insulating partitions extending between said piers and dividing the open spaces into separate compartments.

MAXIMILIAN JAEGER, JR.