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BUILDING CONSTRUCTION

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4 Claims. (Cl. 72-16)

This invention relates to building construction and more particularly to an improved type of monolithic building and method of erecting same, which may be advantageously utilized in the construction of structures, such as residences and the like.

This application is a substitute for and a continuation in part of my co-pending United States application Serial No. 100,240, filed September 11, 1936. It is among the objects of my invention to provide a building structure which is weather-proof, fire-proof and vermin-proof, which requires a minimum of material for a given sized building, and which may be easily erected with a minimum of skilled labor.

Other objects of my invention are: the provision of an improved type of building structure which may be readily adapted to a different building plan or design and which may be modified to suit various conditions of load, climate, etc.; the provision of a wall structure which has great strength whereby relatively light, thin walls will withstand extraordinary loads and stresses.

Prior to my invention houses and the like have been built having reinforced concrete walls. So far as I am aware, however, these walls have always been of the cast type in which forms or molds are built up, reinforcing members put in place in the molds, and the concrete then poured in and allowed to set in the desired form after which the molds are removed. In the manufacture of houses of this type the usual formulae for calculating the strength of a concrete wall have been used. Due probably to the use of the accepted formulae and to the difficulty of constructing and filling wall molds which are less than about 4" in thickness these poured or cast concrete structures have had walls which are much thicker than necessary.

In order to take advantage of the fact that the accepted formulae do not properly indicate the strength of relatively thin reinforced concrete walls and that such walls actually have sufficient strength to be useful in residential and the like building constructions, I have devised a wall structure and building construction arrangement whereby relatively thin reinforced concrete or cement walls may be effectively utilized and these walls may be constructed without concrete forms at a very low cost. Several embodiments of my thin wall monolithic structures are illustrated in the accompanying drawing, in which—

Figure 1 is a diagrammatic ground floor plan

of a small residence of the type adaptable to my improved building construction.

Figure 2 is a fragmentary cross-sectional elevation of one wall and the floor of a building embodying my improved construction.

Figure 3 is a partial cross-sectional elevation of another building arrangement embodying my improved construction illustrating a roof arrangement and window frame setting.

Figure 4 is a horizontal cross-section taken on line 4-4 of Figure 3 and illustrating my improved pilaster arrangement.

Figure 5 is a view generally similar to Figure 3 but illustrating an arrangement for a multi-story structure and showing a slightly different window setting.

Figure 6 is a vertical cross-sectional view of another embodiment of my girder wall construction.

Figure 7 is a vertical cross-sectional view of my girder wall construction supported on a separate foundation.

Referring to the drawing, I preferably erect a frame work or skeleton of perforated or other metal lath of any suitable type defining the walls of the structure being built. As is diagrammatically shown in Figure 1 scaffolding 1 may be erected from which vertical panels of metal lath are suspended (see Fig. 2). These vertical panels 2, in the type of construction illustrated, extend down into a trench 3, which is excavated around the outer contour of the structure. This trench is filled in after the cement mortar is applied to the lath to form the footings for the walls and in the drawing this trench is indicated as re-filled. A metal lath angle member 4 may be welded or otherwise suitably secured to the wall reinforcement lath 2 at the ground floor level and the floor lath 5 is supported on the angle member 4 which preferably extends along each wall of the structure. Bottom reinforcing bars 2^a cooperate with the web 2 to form a girder wall structure, as is more fully described later. In building up the structure of Figure 2 the trench 3 is excavated, the scaffolding 1 erected and the vertical panels 2 suspended therefrom to define the outline of the structure. The reinforcing members 2^a and angle members 4 are also installed at the proper level and cement mortar, preferably water-proof, is then applied from the bottom of the trench up to the underside of the angle member 4 on the inside, and as high as convenient on the outside of the lath 2. As is clearly seen in the drawing, the bottom of the wall structure is enlarged

at 6 to form a proper base or footing for the wall. After the cement mortar has set a layer of tar 7, or other suitable waterproofing material, is preferably applied to the outside of the wall below the ground line. Next the excavation will be filled in and the floor reinforcing lath 5 may be laid in place on the angle supports 4 and suitably supported on its underside on the ground, fill, or other prepared foundation. The top surfaces of the floor reinforcement 5 may now be covered with concrete. After the floor concrete has set, scaffolding is erected thereon and the metal lath to form the walls to or above the next floor or roof level is secured thereto and the beams to support the next floor or roof are properly placed and supported thereon. At the top of the wall additional reinforcement (not shown in Fig. 2 but clearly seen in Figs. 3, 6 and 7) is added to complete the girder wall. The plastering of the outer walls of the structure with waterproof cement mortar may now be completed.

The inner surfaces of the walls 9 of the structure may be plastered either with the same type of cement mortar which is used for the outer walls or they may be plastered with insulating mortar of which there are a number of satisfactory types. Such insulating mortars provide, even in relatively thin layers, very effective heat and sound insulation so that even though the inner mortar layer 9 be quite thin a structure will be provided which may be economically heated in cold weather and which will remain reasonably cool in hot weather.

In Figure 3 the wall lath 10 is cut out to provide an aperture for the window frame 11. As the frame illustrated is slightly thicker than the wall the plaster at 12, adjacent the frame, is thickened to provide a smooth and slightly joint. In Figure 3 a roof arrangement is illustrated in which I-beams 13 extend transversely from wall to wall. In the building shown these I-beams are supported on the wall structures and also on pilasters 14 which assist in carrying the load.

As is best seen in Figure 4 these pilasters are constructed by bending a vertically extending piece of metal lath 15 into a generally C shape and securing it by welding or otherwise to the wall lath 10. The column thus formed may be filled with concrete 16 to increase its strength and is covered on the outside with the regular cement mortar and on the inside with a layer 17 of cement or insulating plaster. In some cases the pilasters may be omitted completely. If necessary or desirable similar pilasters may also be placed on the outside of the structure or, in some cases, the inner pilasters may be replaced by outside pilasters.

Referring still to Figure 3, a horizontal layer of metal lath 18 is supported on the beams 13 and the side wall lath 10 extends up above the roof level to form a balustrade. In the illustrated structure a metal lath member 19 is secured around the top of the wall member 10 and covered with the outer cement layer 20 thus providing an enlarged section around the top of the structure which forms a top, additionally reinforced flange for the girder wall. A horizontal strip of lath 10^a provides the necessary additional reinforcement at the bottom of the wall. The roof reinforcement lath 18 is plastered on top with cement or concrete in the manner previously described and this material is extended up on the inner side of the side wall lath 10. Tar and gravel roofing material may be effectively applied to

the roof surface and carried up around the inner corner of the roof, as is seen at 21. A metal flashing 22, of copper or other suitable material, may be secured at the inner surface of the wall lath 10 and extended down over the upwardly extending portion of the cement or concrete roof covering. The structure may be completed by carrying the cement covering of the wall lath 10 down around the inside of the balustrade and over the flashing 22, as is seen at 23. In the drawing, the footings for the walls are illustrated as reinforced by transversely extending metal lath members 10^a and the upper edge of the wall (Fig. 3) is also reinforced by the additional metal lath member 19 which supports the flange around the top of the wall. Thus, the wall structure is in the nature of a girder, the wall forming the web between the top and bottom flanges. It will be understood, of course, that in some instances (see Figs. 6 and 7) it may be desirable to use metallic reinforcing rods either as substitutes for the metal lath members at the top and bottom of the girder structure or in addition thereto.

The beams 13 may be enclosed by metal lath members 24 which are in turn plastered over with a suitable covering 25. Likewise, the underside of the roof lath 18 is preferably plastered with insulating mortar, as indicated at 26, or may be otherwise insulated and finished.

It will, of course, be understood that the construction just described and illustrated in Figure 3 may be readily modified to suit various conditions and to conform to various types of roof designs.

In Figure 5 a type of construction adapted to multistory building is shown. In this arrangement the wall lath 27, the pilaster 28, and the wall footing and floor arrangement are substantially the same as those previously described. A narrow window frame 29 is illustrated in this embodiment whereby the necessity of increasing the wall thickness adjacent the window frame is eliminated. Beams 30 are supported on the pilasters 28 and metal lath 31 may be secured to the underside of the beams 30 and plastered as at 32 to form a ceiling for the first floor of the structure. On top of the beams 30 I prefer to lay the type of material known as "high-rib" metal lath. This consists of flat sheet metal sections 33 having bent rib portions 34 which act to reinforce the lath and make it capable of supporting the required load. If thought necessary or desirable added reinforcements may be obtained by placing reinforcing rods 35 on the high-rib lath in suitable locations. This high-rib metal lath floor is then covered with a layer of concrete 36, thus providing a floor structure which will support the maximum load imposed in this type of building. The pilasters are extended around or past the floor beams up to the next floor or roof to support similar floor or roof beams. In cases where the floors and roof are supported by joists or beams reasonably close together so as to avoid concentrating large loads at any point I may dispense with the pilasters and support the floors and roof on the thin wall slabs of metal lath and plaster or mortar. It will be understood that in this specification and claims the terms "plaster" and "mortar" are used in their general sense and more or less synonymously. The bottom reinforcement for the girder wall of Figure 5 is shown at 27^a and it will be understood that a top reinforcement (not shown)

will also be incorporated in the wall structure.

In Figure 6 I have illustrated a girder type wall which includes a metal reinforcing web 40, a bottom transversely extending additional metal reinforcement and bottom rods 41 disposed at the bottom edge of the girder wall and a top edge reinforcement comprising a plurality of rods 42. The entire structure is embedded in an integral covering 43 of concrete or the like and the bottom enlarged flanged portion 44 forms a footing for the wall.

In Figure 7 another embodiment of my improved girder wall is shown in which the reinforcing web 45 is provided with longitudinally extending reinforcing rod members 46 and 47 at the top and bottom edges thereof respectively. It is to be noted that in this girder wall the top and bottom edges are not enlarged or flanged outwardly as in some of the other embodiments. The advantages of my improved structure are obtained, however, because the combination of the web 45 and the reinforcing members 46 and 47 forms a girder structure which, even in the very thin wall illustrated, provides the requisite strength to withstand severe loads. The monolithic concrete or cement covering 48 encloses the metal web and top and bottom reinforcing members and the bottom edge of the wall rests upon a separate concrete foundation 49. With this construction, even though the foundation 49 might fail at certain places, the wall supported thereby will not sag and crack as the girder construction thereof will prevent such failure. It will be understood, of course, that windows and other openings may be incorporated in the walls shown in Figures 6 and 7 in any suitable manner, such as illustrated in Figures 3 and 5.

Where the term metal lath is used in this specification and appended claims it is intended to include all of the perforated sheet, welded or woven metal materials which are commonly known as metal lath. In some of these the perforations are formed by slitting and expanding the metal, and in others by punching, pressing or otherwise deforming the material, or by weaving or welding wire into a suitable lath structure, so that it will form a suitable base for plaster. In the appended claims where reference is made to thin wall structures it is intended to include walls having an average thickness of not over about 4". Of course, where window frames are installed or in other special situations parts of the walls may be made thicker than 4". Generally speaking, a thin wall is intended to mean one which is thinner than that ordinarily built by the method of pouring concrete between spaced forms.

It will be seen that my improved building construction, in which a metal lath skeleton, frame or outline is first erected and a relatively thin outer coating of cement mortar or plaster applied to the outside of the walls and a similar relatively thin covering of mortar or plaster, either insulating or not as desired, applied to the inside, is extremely economical of material, does not require the services of a great number or variety of skilled artisans and results in a structure which, if desired, completely eliminates the use of wood or other combustible materials. Steel window frames may, of course, be used, although I have illustrated wooden frames. Moreover, my improved building structure is not subject to destruction by termites or other vermin and may be readily made sufficiently strong to withstand se-

vere loads including winds of very high velocities.

It will be readily understood that my thin, girder walls have very great strength in themselves, and, as I join the walls of the building in a monolithic structure having walls extending at right angles, the intersecting walls stiffen the webs of the adjoining girder walls and when the floors and roof are also integrally connected to the walls, we have a cellular box structure of great strength to resist the strains and stresses imposed by the floor loads, wind loads, etc. I have already demonstrated that winds of hurricane velocity may be safely withstood by a structure of this nature.

Although I have illustrated and described several embodiments of my improved building, it will be understood by those skilled in the art that variations and modifications may be made without departing from the spirit of my invention, and I do not, therefore, wish to be limited to the particular forms herein illustrated and described, but claim as my invention all embodiments thereof coming within the scope of the appended claims.

I claim:

1. In a building structure, a wall including a skeleton of metallic reinforcing material, said skeleton having a vertical web or wall forming portion and additional flange reinforcing portions at the top edge and at the bottom edge of said web portion, said skeleton being embedded in a covering of cement mortar forming an integral monolithic girder and the bottom flange of said girder being supported upon the ground and forming a load distributing footing for the wall.

2. In a building structure, a plurality of intersecting girder type walls each having a skeleton of metallic reinforcing material, said skeletons having vertical web or wall forming portions and additional reinforcing portions at the top edges and at the bottom edges of said web or wall forming portions, said skeletons being embedded in an integral monolithic covering of cement mortar to form girder walls, the bottom flanges of said girder walls being supported upon the ground and certain of said walls intersecting other walls and acting as stiffeners for the webs of the walls intersected, said ground supported integral bottom flanges providing a load distributing footing for the entire structure.

3. In a building structure, a plurality of intersecting girder type walls each having a skeleton of metallic reinforcing metal, said skeletons having vertical web or wall forming portions, additional reinforcing portions at the top edges of said wall forming portions and additional reinforced flange portions at the bottom edges of said wall forming portions, said skeletons being embedded in an integral monolithic covering of cement mortar to form girder walls and said integral bottom flanges providing a load distributing footing for the entire structure.

4. A house having thin reinforced intersecting concrete walls, substantially free from projecting ribs or columns, with top and bottom edges of said walls additionally reinforced for tensile and compressive strength whereby each wall forms a girder member, the bottom edge of said walls being thickened and said walls being stiffened by integral monolithic connections to adjoining intersecting walls.

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