Dec. 11, 1928.

1,694,542

V. D. HEDDEN

METHOD OF AND MEANS FOR CONSTRUCTING BUILDINGS

Filed May 25, 1926

2 Sheets-Sheet 1

Fig. 5

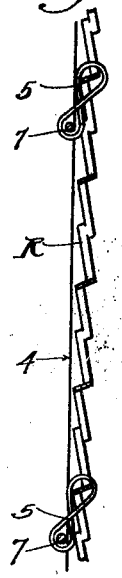


Fig. 3

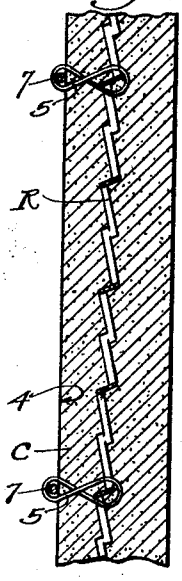


Fig. 4

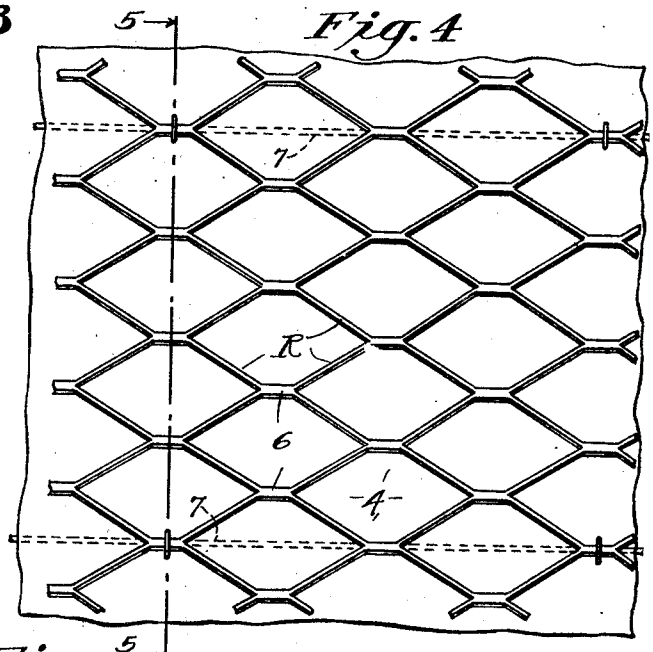


Fig. 1

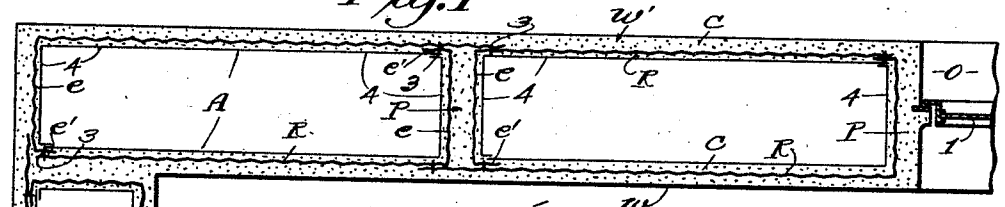
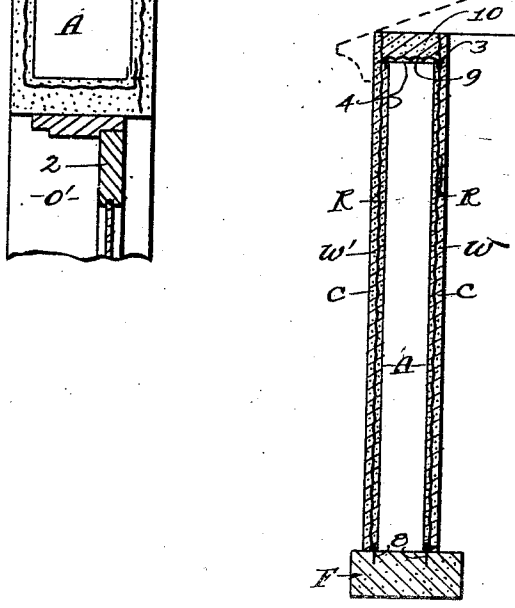


Fig. 2



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METHOD OF AND MEANS FOR CONSTRUCTING BUILDINGS

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Fig. 6

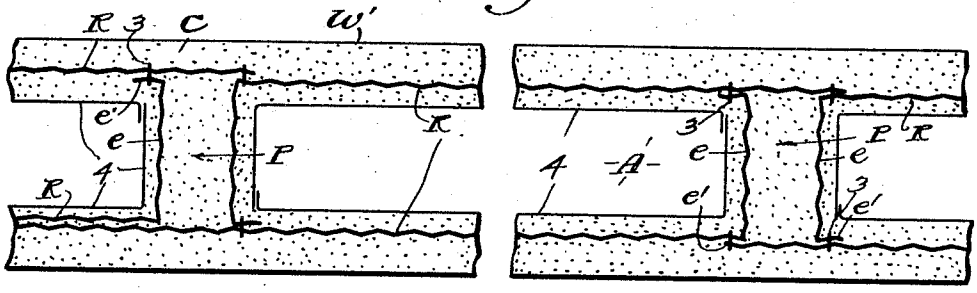


Fig. 7

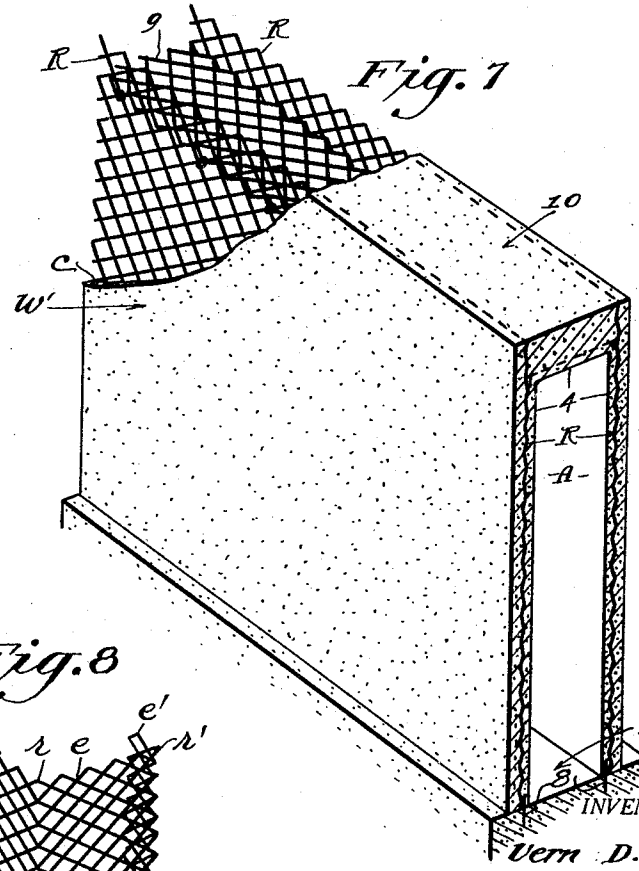
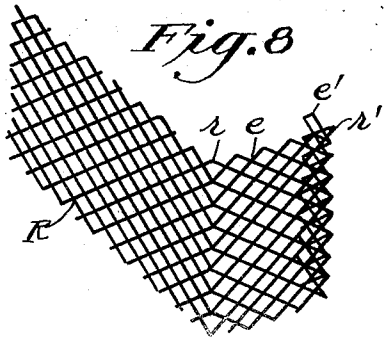


Fig. 8



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Patented Dec. 11, 1928. 1,694,542

UNITED STATES PATENT OFFICE.

VERN D. HEDDEN, OF SANTA BARBARA, CALIFORNIA.

METHOD OF AND MEANS FOR CONSTRUCTING BUILDINGS.

Application filed May 25, 1926. Serial No. 111,535.

This invention relates to and has for a main object the provision of a new and improved type of building construction, particularly adapted to the construction of concrete buildings and embodying means of arranging and forming metallic reinforcements for the walls, whereby the same may be quickly and economically positioned for receiving and holding the concrete without the necessity of wooden forms, frames or supports of any kind.

An object is to provide a type of building construction in which a well known form of expanded metal lath is employed, and to which and on both sides of which concrete is applied after the reinforcement has been erected.

Another object is to provide a type of building construction embodying a metallic reinforcing material, initially formed in comparatively stiff sheets similar to the metal lath now in use and bent at the extremities at right angles or curved for a distance corresponding to the proposed thickness of a wall, and again at right angles into a plane paralleling the body portion thereof. Thus the sheets of reinforcing material when positioned vertically will be self-supporting without the use of frames and sufficiently rigid to support a wall. Adjacent sheets may be secured together for forming a continuous reinforcement throughout the length and area of the wall.

Another object is to form said sheets of reinforcing material that the bent end portions thereof may be spaced with respect to each other so as to provide an occasional and necessary pier throughout the length of the wall.

A further object is to provide means supported on the reinforcing material, such as sheets of building paper or the like, and adapted to be substantially spaced from a sheet of material so as to form a backing for and when the concrete is applied to the building material, for the purpose of eliminating the necessity for forms on the rear sides of the reinforcing material.

A further object is to so form and arrange the reinforcing material that hollow concrete walls may be formed around and supported on the reinforcing material so as to provide air spaces in between the two thicknesses of the walls for the purpose of insulating a building against sound, heat and cold.

Having the hereinbefore mentioned objects in view, together with other objects which will appear as the description progresses, I have shown a preferred embodiment of my invention, with certain minor modifications and adaptations to different purposes, in the accompanying drawings, in which:

Fig. 1 is a fragmentary sectional plan of a wall constructed in accordance with my invention, showing a corner in the wall with window and door openings.

Fig. 2 is a fragmentary sectional elevation of a portion of the wall.

Fig. 3 is an enlarged fragmentary section of a wall embodying my improvements, and showing particularly the concrete supported on both sides of a sheet of metallic reinforcing element, with a backing of paper spaced therefrom.

Fig. 4 is a fragmentary face view of the same, before the concrete has been applied.

Fig. 5 is a fragmentary section of the reinforcing material with the paper backing supported thereon, before the concrete is applied thereto.

Fig. 6 is a fragmentary section of a hollow wall embodying my improvements.

Fig. 7 is a perspective view of a section of wall embodying my improvements, partly broken away to show the reinforcing material, and means for supporting the wall on and binding the same to the foundation.

Fig. 8 is a fragmentary section of a sheet of reinforcing material formed in accordance with my invention.

It will be understood at the outset that it is common practice in building construction to use a wire or metal lath of the character shown herein, to which concrete is applied, but the present practice in building construction necessitates the provision of either temporary or permanent forms, or wood or steel construction for the purpose of supporting the metallic reinforcing material, and it is contemplated in the present invention to provide a system which will eliminate all unnecessary and expensive framing, forms of wood or steel, in order that the erection of a building by the employment of my improved method may be expedited and more economical than in other types of construction.

As shown in Figs. 1, 2, 6, and 7, a typical wall and one which has a sufficient strength for supporting a building of one to

four stories, and at the same time has benefits of insulation against heat, cold and sound is a hollow wall, embodying an inner wall W and an outer wall W′ formed of concrete as at C, and sheets of reinforcing material as at R, spaced apart so as to provide a series of air spaces A, A, etc., between the wall portions W and W′. The inner and outer walls are connected at frequent or necessary intervals by means of transverse sections or piers, as at P, P, etc., and this type of construction lends itself readily to accommodate openings as at O and O′ for windows 1, and doors 2, respectively.

The reinforcing material R, as shown clearly and in detail in Figs. 4 and 5, is of the character of the wire mesh, but is in effect cut from sheets of iron and stretched as shown in Fig. 4. When so cut and stretched the material being made of substantial thickness, it provides a very rigid sheet of material and may be formed in lengths and widths suitable to proposed types of construction.

The material R is well known in building construction, and is made in different sizes and of different thicknesses of material, the lighter material being designated commonly as metal lath, while the heavier material is designated as metal reinforcement.

As shown in Fig. 8, after the material R has been formed into desired widths and lengths, the sheets of material are then bent as shown at r, at right angles, or curved forming end portions e, and thereafter bent at r' inwardly in planes parallel with the sheets of material R for short distances to provide extensions e'. The material may be laid either horizontally or vertically of the sheets, and the bends r and r' are made to correspond to the position the sheets are to occupy in a proposed wall structure.

As shown in Figs. 1 and 6, the end portions e are bent so as to extend transversely through the wall, while the extensions e' are bent so as to extend horizontally and in parallelism with the body of the material R. It will be observed that, preferably, only one of the ends of each sheet is bent as shown in Fig. 8, and when erected in a wall as shown in Figs. 1 and 6, one sheet of material is placed in the wall W and another in the wall W′ in reversed positions, so that the extensions e' may be tied by loops of wire or other means, as at 3, to the bodies R of the reinforcing material adjacent thereto, the material overlapping at such points. The piers P will be spaced apart to correspond to the lengths of the material R, and each of the piers will be reinforced by two of the end sections e of the reinforcing material.

As shown in Figs. 3, 4 and 5, sheets of building paper or the like, as at 4, are attached to the sheets of reinforcing material R by means of wire loops 5, 5, which are bent around the portions 6, 6, of the reinforcing material, and a plurality of said loops are alined through the lengths of said material, in one or more planes, and connected by means of wires 7, 7 on the rear side of the paper. The loops 5 are of sufficient length to space the paper 4 backwardly from the reinforcing material R for a sufficient distance, approximating one-half inch or so.

The paper 4 is attached to the material R prior to the erection of the reinforcing material in the building, and for the purpose of backing, as shown in Fig. 5, the paper 4 will closely fit against the sheets of material R, but when placed in a building it is stretched into position shown in Fig. 3 so as to provide an ample space between the paper and the material R for the reception of concrete.

The material R, when formed as shown in Fig. 8, may be cut so that the body portion thereof may be of any suitable length to accommodate the material to short wall sections, as shown at the left in Fig. 1, for the purpose of forming window or door openings.

As shown in Fig. 2, a concrete foundation F is provided with upwardly extended strips 8, 8, etc., alined throughout the length of the foundation, to which the sheets of material R are adapted to be tied by means of the ties 3 or otherwise, when the same is erected on the foundation, preparatory to forming the walls W and W′.

At the top of each story of a building the sheets of material R in the inner and outer wall sections W and W′, respectively, are connected together by means of an inverted channeled strip 9 of the reinforcing material R, which is tied at 3, 3, etc., to the spaced sheets of material R, and said section 9 is positioned between and below the upper edges of the sheets of material R so as to provide a beam as at 10 of concrete thereabove, for the reception of the rafter of a roof in the case of a one story building, or joists in the case of a multiple story building. The same treatment is practiced by forming the material and the walls under and over the window openings O, and over the door openings O′.

The concrete for the particular type of construction is best applied to the reinforcement R by means of a cement gun which uses a mixture of cement, sand and water applied by means of compressed air through the nozzle of the gun, with suitable pressure on the outsides of the wall sections W and W′, so that a sufficient thickness of the concrete will find lodgment between the paper backing 4 and the reinforcement R in each of the wall sections, and an additional thickness externally of the material R, the air pressure and impact of the mixture being insufficient

to break the paper but sufficient to cause a dense mixture for the wall without forms.

In most cases where concrete walls are used, it is unnecessary to smoothly finish the interior walls, but when it is desired so to do, wooden ground strips, as in usual plastering practice, may be placed on top of the foundation and near the top of the beam 10 of the wall, over which a straight edge may be run for smoothing the exposed portion of the wall, though this is immaterial to my invention.

It will be observed, particularly by reference to Figs. 1 and 6, that shallow wall sections W and W′ may be provided with substantially wide air spaces A therebetween, especially for partitions or exterior walls in one story buildings, or thicker wall sections W and W′ may be provided with shallower air spaces where greater strength is needed for supporting buildings of several stories in height. Also the thickness of piers P, P, etc., may be correspondingly increased in accordance with requirements.

It will be readily understood that the adaptation of my method to the different types of walls and the requirements for different uses is easily accomplished by cutting or forming the sheets of material R to conform to the thickness, height and length of the wall section and the openings therein, and the several sheets of reinforcing material R may be overlapped to a more or less extent without necessitating cutting the material for increasing the thickness of the piers P.

I have ascertained that by the employment of the system of building construction and the reinforcing material and form thereof as shown herein, it is possible to provide concrete walls of a minimum cubical content of concrete, and a maximum strength, with far less expense and much quicker time than is possible with other obtaining types of building construction and the use of other materials. In fact, I have ascertained that a wall section of the character shown in Figs. 6 and 7, for instance, has a carrying capacity of about two and one-half times that of a solid concrete wall with the usual reinforcement. This is true because in my system of construction it will be noted, I employ continuous sheets of reinforcing material throughout the length of the one or more wall sections, with connecting transverse sections and horizontal sections so tied together at frequent intervals, so that no local section of a wall can be crushed or broken away from an adjacent section under a given strain, or by means of impact in local points.

It will also be observed that in my system of construction the air chambers A may be utilized at desirable or necessary points for the accommodation of water and drain pipes, electric light, telephone wires, gas pipes, etc, without necessitating special accommodation for these elements, and suitable openings may be made in either the inner or outer walls so as to afford access thereto.

I have shown a preferred form of my reinforcing material as R, the same being readily obtainable in the market and in common use for other purposes, particularly as wire or metal lath adapted to be used in sheet form and suitably secured to the studs or framework of a building, but it will be understood I may use any suitable sheet reinforcing material of metallic character which is susceptible to the treatment herein named, and for the purpose specified. I may also modify my invention within the scope of the appended claims without departing from the spirit thereof.

What I claim is:

1. The method of constructing a hollow concrete wall which consists in disposing parallel sheets of perforated metal edgewise on a foundation, tying said sheets together and to said foundation, supporting sheets of paper or the like in spaced positions from and on adjacent sides of said metal sheets to form a backing, and applying a cementitious material to the exterior of and through said metal sheets to form a body of substantial thickness on opposite sides of said metal sheets.

2. A hollow concrete wall structure comprising transversely spaced parallel strips of perforated metal reinforcing material disposed edgewise and having inwardly bent overlapping end portions inter-connected for providing a rigid skeleton structure, a backing of paper or the like supported on and spaced inwardly from said sheets of reinforcing material, and a body of cementitious material adapted to be applied from the exterior of and through said reinforcing sheets against said backing for providing a self-supporting rigid hollow structure.

3. A reinforcing structure for hollow concrete walls comprising sheets of perforated expanded metal lath transversely spaced apart arranged edgewise on a supporting surface and having end portions bent inwardly, said end portions being overlapped and portions of adjacent sheets tied together, and a backing formed of paper or the like arranged in sections and supported in spaced planes from and on the inner sides of said sheets of metal lath, said metal lath being substantially stiff and arranged when tied together to provide a rigid wall structure.

4. A reinforcing structure for hollow concrete walls comprising sheets of perforated expanded metal lath transversely spaced apart arranged edgewise on a supporting surface and having end portions bent inwardly, said end portions being overlapped and portions of adjacent sheets tied together,

a backing formed of paper or the like arranged in sections and supported in spaced planes from and on the inner sides of said sheets of metal lath, said metal lath being substantially stiff and arranged when tied together to provide a rigid wall structure, and a body formed of cementitious material and adapted to be applied from the exterior of and through said metal lath, for forming a substantial thickness of body material on opposite sides thereof.

5. A hollow concrete wall structure comprising a plurality of sections, each section formed of a pair of parallel transversely spaced sheets of expanded metal lath arranged edgewise on a supporting surface and having inwardly bent transverse portions, the transverse portions of one section being longitudinally spaced from similar portions of an adjacent section, the ends of adjacent sections being overlapped and secured together, a backing of paper or the like supported on said sheets of metal lath and spaced therefrom, and a body of cementitious material applied on opposite sides of and through said metal lath for forming a hollow wall with transverse connecting portions, as described.

6. A reinforcing structure of concrete walls comprising sheets of metal lath transversely spaced apart arranged edgewise on a supporting surface and having overlapping end portions, means for connecting said sheets transversely of the wall at spaced points to afford rigidity, and a backing formed of paper or the like supported in spaced planes from and on the inner sides of said sheets of lath, and a body formed of cementitious material adapted to be applied from the exterior of and through said metal lath for forming a substantial thickness of body material on opposite sides of the lath.

VERN D. HEDDEN.