

Oct. 30, 1923.

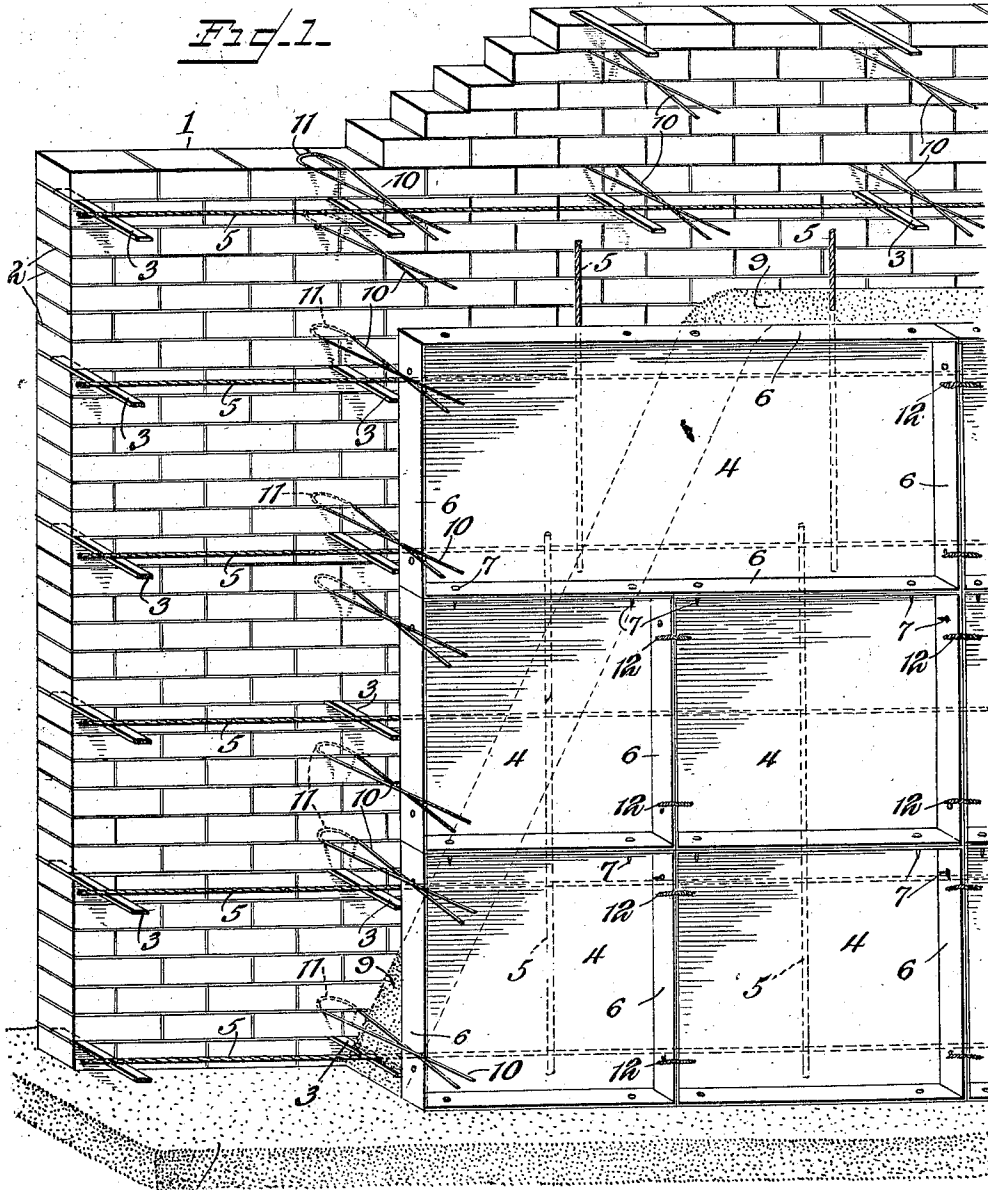
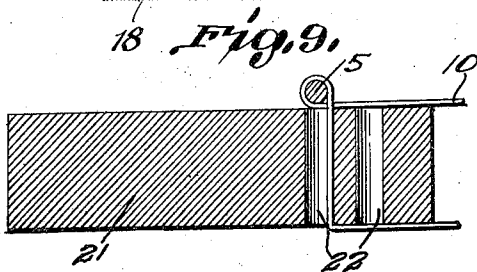
W. L. EVANS, JR

1,472,642

COMPOSITE WALL AND METHOD OF CONSTRUCTING IT

Filed May 4, 1921

4 Sheets-Sheet 1



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4 Sheets-Sheet 2

Fig. 2-

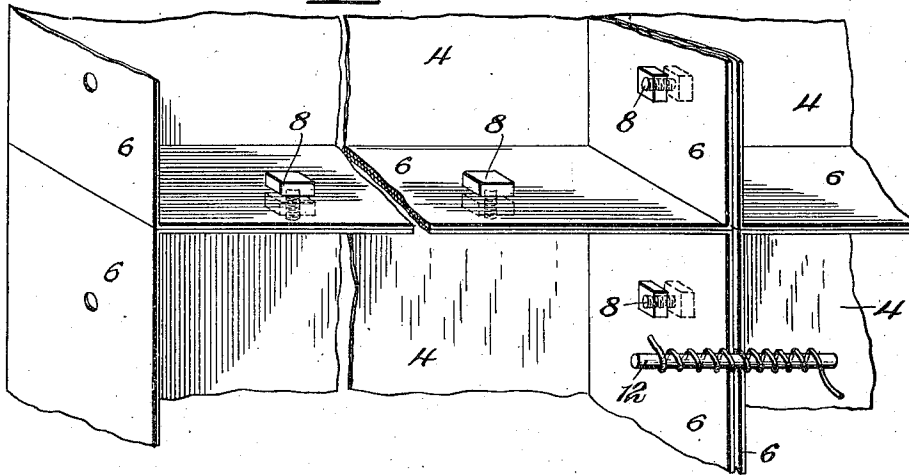


Fig. 3-

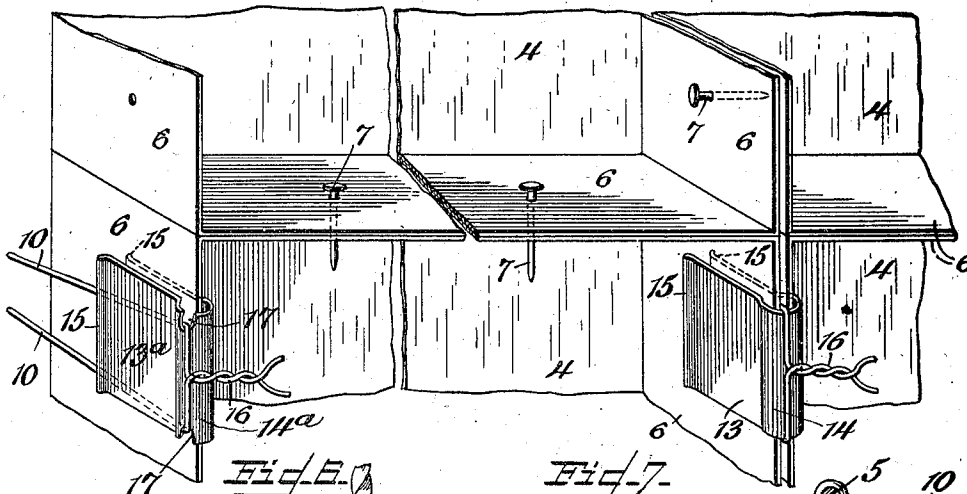


Fig. 4-

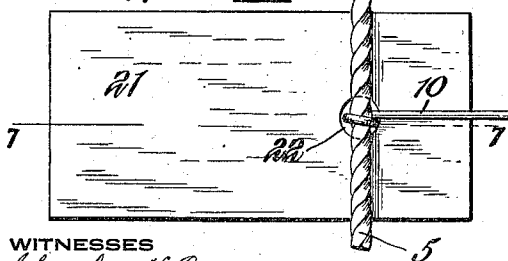
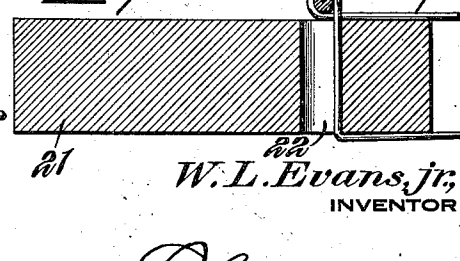


Fig. 5-



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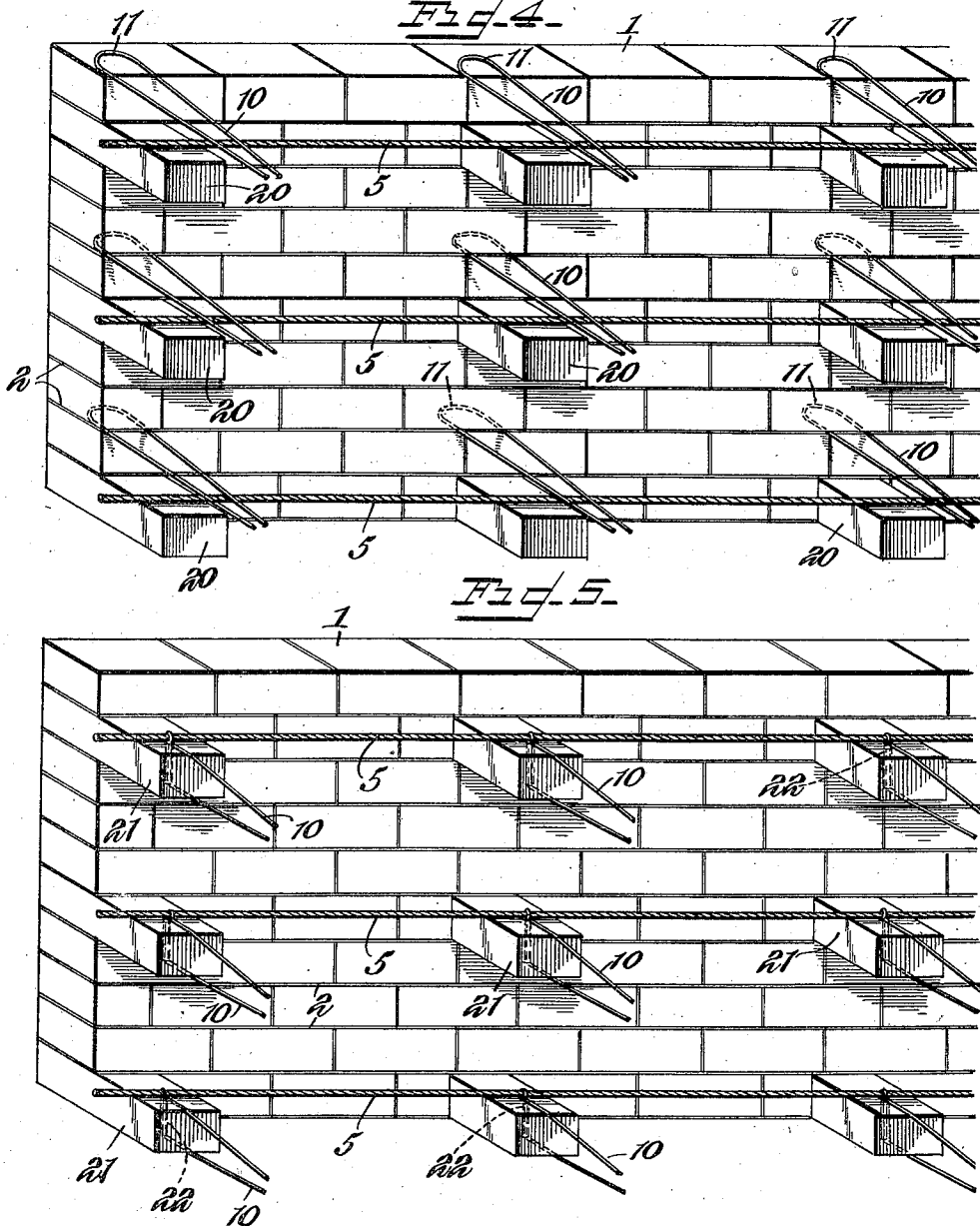
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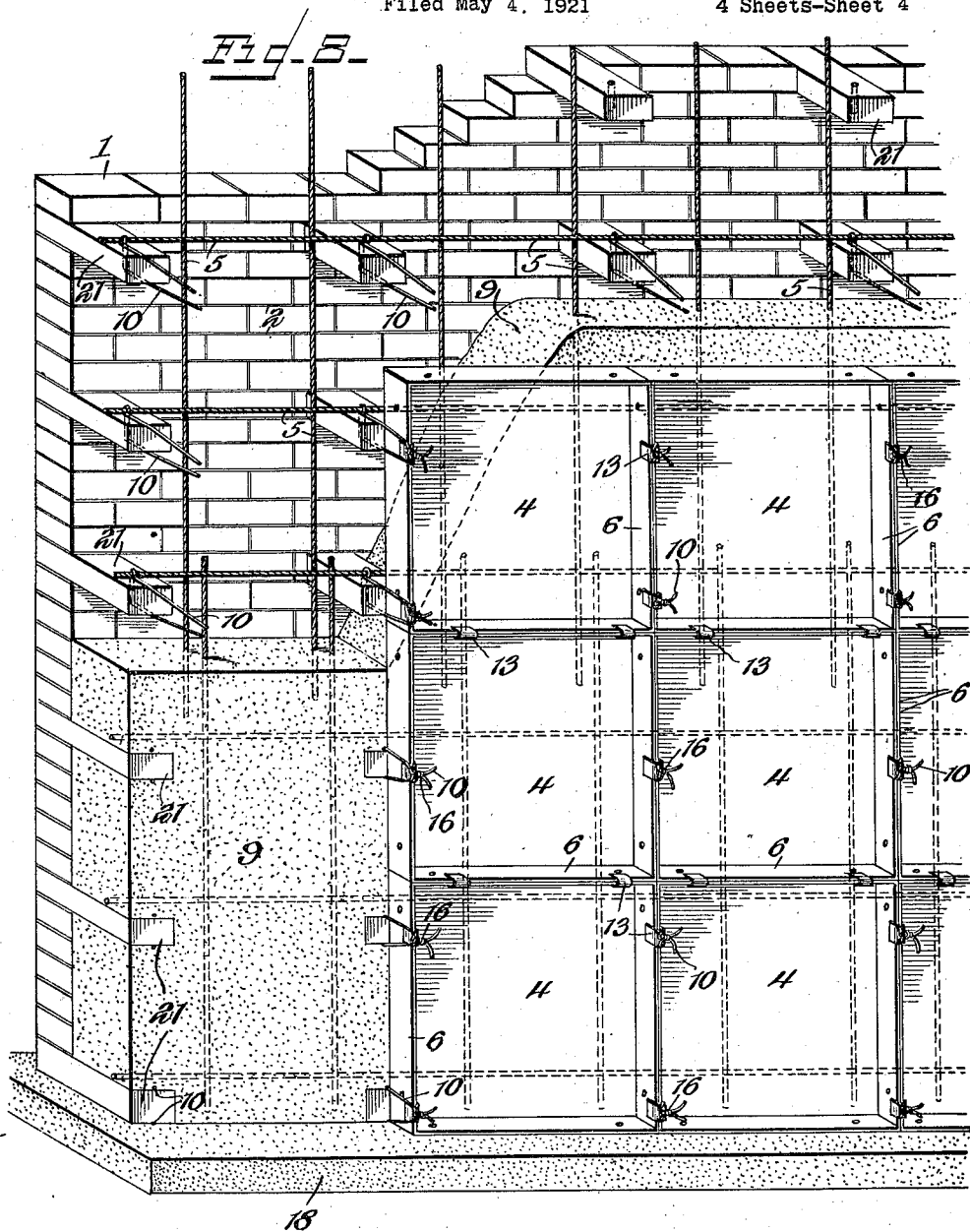
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UNITED STATES PATENT OFFICE.

WILLIAM LEWIS EVANS, JR., OF WASHINGTON, INDIANA.

COMPOSITE WALL AND METHOD OF CONSTRUCTING IT.

Application filed May 4, 1921. Serial No. 466,843.

To all whom it may concern:

Be it known that WILLIAM L. EVANS, JR., a citizen of the United States, residing at Washington, in the county of Daviess and State of Indiana, has invented new and useful Composite Walls and Methods of Constructing Them, of which the following is a specification.

This invention has reference to composite walls for buildings and to a method of constructing them, and its objects are to reduce the cost of construction by dispensing with inner courses of bricks, and to provide a wall which is superior to an all brick or tile wall, whatever may be its thickness.

In accordance with the invention, the wall is built of a single course of brick or tile constituting a facing, following which there is produced an inner wall or backing of concrete of suitable thickness, the brick or tile facing and the concrete being anchored together in contact.

As the brick or tile facing wall is built, special spacing devices or separators are included, being built into the facing wall and projecting away therefrom to such distance as may be determined by the proposed thickness of the concrete wall, while the distance apart of these spacers is such as experience may determine.

When the single course of brick or tile is built and the spacing devices are placed, tie wires and reinforcing bars or rods are included, and finally molding forms are secured by the tie wires against the ends of the spacing devices to hold the forms in position, whereupon concrete is run or deposited between the inner face of the brick or tile wall and the faces of the forms toward the brick or tile wall. The concrete is allowed to harden or set, and then the tie wires are severed to permit the removal of the molds and the trimming off of the projecting portions of the tie wires, after which the exposed face of the concrete wall which forms the inner face of the composite wall may be finished in any suitable manner, as by papering or painting, or the application of the numerous wall finishes to be found on the market. These materials may be applied to the concrete surface without other preparation thereof, although, in the case of papering, the wall may be advantageously smoothed and filled.

By forming the facing wall one brick or tile in thickness and providing spacing

means carried by the brick or tile wall, either in the form of metallic bars partially or wholly embedded at one end in the brick wall and projecting rearwardly therefrom to the requisite distance, or by building brick spacers in the brick wall and projecting rearwardly therefrom, and then constructing a temporary molding surface for the concrete back of the brick wall, the concrete may be deposited between the molding surface and the rear or inner face of the brick wall to produce the composite wall, with anchoring and reinforcing devices included, so as to insure an intimate interconnection between the facing and backing walls. At the same time firm adherence is obtained between the two walls, each carrying its part of the load, and the whole forms a strong wall capable of not only sustaining heavy loads, but of withstanding strong wind pressures and shocks.

The wall construction is advantageous in its cheapness, and in the rapidity with which the wall may be formed, and besides the necessity of highly skilled labor is in most part avoided.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings forming part of this specification, with the understanding, however, that the invention is not confined to any strict conformity with the showing of the drawings, but may be changed and modified so long as such changes and modifications mark no material departure from the salient features of the invention, as expressed in the appended claims.

In the drawings:—

Fig. 1 is a perspective view of a wall constructed in accordance with the invention, showing the brick facing more advanced than the concrete backing, with but a portion of the forms or molds in place.

Figs. 2 and 3 are fragmentary perspective views of the forms or molds illustrating different modes of connecting the forms together.

Fig. 4 is a perspective view of a portion of an outer wall or facing with spacers of like formation to the bricks or blocks composing the outer wall, and also showing the wires and reinforcing strands or bars employed in building the wall.

Fig. 5 is a perspective view of an outer wall or facing embodying features shown

in Fig. 4, and illustrating a preferred form of spacing elements with tie wires and reinforcing bars carried thereby.

Fig. 6 is a plan view of one of the spacing elements used in the construction shown in Fig. 5.

Fig. 7 is a section on line 7—7 of Fig. 6.

Fig. 8 is a view of a structure similar to that of Fig. 5, but more complete and including molds or forms such as are indicated in Fig. 1, with some parts of the wall wholly completed.

Fig. 9 is a sectional view similar to Fig. 7, but illustrating a modification.

Referring to the drawings, there is shown a wall 1, assumed to be formed of brick of ordinary form, with the understanding that the brick may be replaced with tile. For simplicity of description, the wall 1 will hereinafter be termed a brick wall without, however, limitation to such specific material.

The bricks are, or may be, laid in mortar, indicated by mortar lines 2, with the bricks laid flat after the usual custom, but without the usual binding courses, which are replaced by other means.

In the construction shown in Fig. 1, the wall 1 is a facing wall and need only be of a thickness corresponding to the width of a brick. Set at intervals in the mortar lines 2 at about the usual altitudes of binding courses in the ordinary brick wall, are bars 3, which may be metallic bars and spaced apart lengthwise of the wall by appropriate distances. These bars may extend entirely through the wall but are preferably inserted from the rear face of the wall for a distance less than the width of a brick, and are embedded in the mortar 2. The bars or spacers or spacing means 3 serve two functions. One is to act as stops for forms or molds 4, and the other is to act as carriers or supports for reinforcing rods or bars 5, which latter may be made of the usual twisted form, or of some other form.

The molds 4, for which no novelty is claimed, are conveniently made of sheet metal with edge flanges 6 projecting to the rear and joined in face to face relation. In order to connect the mold forms and prevent displacement thereof, the flanges are traversed by pins 7, as shown in Figs. 1 and 3, or by bolts 8, as indicated in Fig. 2, in either case providing a relatively rigid structure to serve as a wall against which concrete may be deposited or run, thus forming a concrete backing wall 9 for the facing brick wall 1. The concrete wall 9 may be made of any desired thickness, to be determined by the projection of the spacing bars 3 from the rear of the facing wall 1. In order to hold the forms to the facing wall and also to reinforce the concrete wall 9, there are provided tie wires 10, each having

an intermediate loop 11 embedded in a mortar line 2, and of a length not only to reach to the mold forms 4, but to extend beyond them between the meeting flanges 6, where the ends of the tie wires are twisted about rods or pins 12, thus anchoring the forms or molds 4 to the facing wall. This leaves a space between the molds and facing wall for the deposition of the concrete 9.

In the arrangement shown in Figs. 1, 2, 3 and 8, the tie wires 10 pass between adjacent flanges 6, with the tie wires twisted about rods 12 in Figs. 1 and 2, while in Figs. 3 and 8, U-shaped clips 13 embrace the meeting flanges 6, with the clips having elastic closed ends 14 imparting a gripping tendency to the opposite ends or edges 15 of the clips, which edges are outturned to cause the easy application of the clips. In the arrangement shown in Fig. 3, which may be taken as applicable to other figures of the drawing, the closed end 14 is a plain partially cylindrical end about which neighboring ends of the tie wire 10 are placed and brought together and fastened by a twist 16, thereby permitting a tightening of the tie wires to hold the molds or forms 4 in firm engagement with the spacers 3. At the left hand side of Fig. 3, there is shown a clip 13^a with a closed end 14^a having notches 17 at opposite ends in which the twisted ends of the tie wires seat, thereby preventing slipping.

In constructing a composite wall, similar to the showing of Fig. 1, a foundation 18 is built and on this foundation the facing wall 1 is erected to a workable height. Spacers or spacing means 3 are built into the facing wall 1 and project from the rear thereof to an appropriate distance, and tie wires 10 are also built into the facing wall 1 and project from the rear thereof. The forms 4 are erected and anchored against the spacers 3, as described, after which reinforcement rods 5 are laid upon the spacers and other reinforcement rods set upright, are located in the space between the facing wall 1 and the forms 4. Then concrete is deposited in the space between the facing wall 1 and forms 4, filling such space, and the concrete is then allowed to set or harden, after which the tie wires 10 are severed so that the forms or molds 4 may be removed. The projecting ends of the tie wires may be cut off flush with the rear or exposed face of the concrete wall.

Such concrete wall needs no lathing or plastering, but may be directly tinted or papered or provided with some thin wash, if it be desired that the inherent roughness of the concrete be obliterated, although such roughness is frequently desired.

Where the wall is of considerable height, it is usually applied in sections progressively, so that the forms 4 may be repeatedly

used, as in the present method of building reinforced concrete walls.

There are certain advantages to be obtained from the form of construction shown in Figs. 4, 5 and 8, in which spacers or spacing means 20 or 21 are built directly into the facing wall 1, these spacers extending for a suitable distance beyond the rear face of the wall to determine the location of the molds 4. In Fig. 4, the tie wires 10 are embedded in the wall 1, and are of sufficient length to pass through the mold made up of the forms 4. The spacers 20, in the showing of Fig. 4 are ordinary bricks or blocks at right angles to the bricks constituting the wall 1.

The spacers 21 in Figs. 5 and 8 differ from the spacers 20 of Fig. 4 in that each spacer 21 has a hole 22 preferably extending therethrough from top to bottom about midway of the width of the spacer, and about midway of the projection of the spacer from the rear of the wall 1. It is to be understood that more than one such hole may be employed with the holes appropriately located. This modification is shown in Fig. 9 of the drawings. The reinforcing rods 5 are used in the arrangement of Figs. 5 and 8 and wires 10 are also used. The reinforcing rods 5 are laid across the perforations or holes 22, and the anchoring wires 10 are wrapped at the loop portion about the reinforcing wires 5, with one leg of the tie wire carried directly to the rear to pass between adjacent flanges 6 of the forms, and the other leg of the tie wire carried downwardly through the perforation 22, and thence to the rear and between the flanges of the forms, with the two legs of the tie wires after passing through the forms twisted about a rod 12, as in Fig. 2, or twisted together, as shown at 16 in Fig. 3.

In building the composite wall shown in Figs. 5 and 8, the brick mason is not bothered by having to lay steel spacers or separators or the wire ties in the wall, nor is he bothered by their being in his way after they are laid in the wall. When building the wall, the mason lays the brick or tile spacers 20 or 21 extending from the brick part of the wall inwardly as a part of the wall, thus separating the forms from the brick facing wall, and the tie wires are installed after the brick wall is completed and set. The tie wires pass through the forms, either between them, to one side of them or through them, according to requirements, and the tie wires are twisted at their outer ends around the clips or other devices securing the forms against the ends of the brick spacers.

The concrete rear wall embeds the brick spacers which form practically integral parts of the brick wall, wherefore the brick spacers or separators tie the concrete and

brick walls together, and as the horizontal reinforcing bars are secured to the brick spacers or separators by the wire ties, the brick wall and the concrete wall are in effect, an integral whole.

The composite wall of Figs. 5 and 8 is cheaper to construct and more practical than the wall of Fig. 1, and since such skilled labor as is demanded of a brick mason is not required in the production of the concrete wall, the composite wall may be built cheaper and more expeditiously than a wall of the same dimensions built entirely of brick or tile.

What is claimed is—

1. The method of building composite walls, which consists in erecting an outer facing masonry wall with spacers projecting rearwardly or inwardly therefrom, laying reinforcing means upon said spacers so as to be supported thereby, erecting molding forms against the spacers and separated thereby from the masonry wall, filling in the space between the masonry wall and molding forms with concrete, thereby enclosing the reinforcing means, and finally removing the molding forms, leaving the concrete exposed.

2. The method of building composite walls, which consists in erecting an outer facing masonry wall with spacing means projecting inwardly from the facing wall, supporting reinforcing means by said spacing means, setting up an inner molding surface against the spacing means, temporarily tying the molding surface to the facing wall, filling the intervening space between the masonry wall and molding surface with concrete, and removing the molding surface by severing the tying means therefrom and leaving said tying means and said reinforcing means embedded in the concrete filling.

3. The method of building walls, which consists in erecting a masonry wall, including permanently located spacers in and projecting from the brick wall, setting up molding forms in spaced relation to the rear face of the brick wall, locating tying means in the space between the masonry wall and molding forms with said tying means projecting beyond the rear face of the molding forms, supporting reinforcing elements on said spacers, filling the intervening space between the facing wall and the molding forms with concrete, severing the tying means and finally removing the molding forms.

4. The method of building composite walls of masonry and concrete, which consists in forming the facing portion of the wall of masonry, and the rear portion of the wall of concrete, providing a spacing means between the facing portion and the rear portion by embedding the spacing means in the facing

portion, providing tying means between the facing and the concrete wall of an initial length to extend through and beyond the concrete wall, with the tying means initially embedded in the facing portion, setting up molding forms to define the rear limits of the concrete wall, securing the molding forms in firm spaced relation to the masonry wall through the tying means, depositing concrete in the space between the masonry wall and the molding forms, and finally removing the molding forms to leave the portion of the concrete molded against them exposed.

5. The method of building composite walls, which consists in forming a masonry wall facing, providing spacers projecting rearwardly from the wall facing approximately to the depth of the composite wall, securing tie wires to the spacers at a distance from the facing wall, setting up molding forms in contact with the spacers with the tie wires fast to the molding forms to hold them in engagement with the spacers, depositing concrete in the space between the wall facing and the mold forms thereby embedding the spacers, and subsequently severing the tie wires and removing the mold forms.

6. The method of building composite walls, which consists of forming an outer wall or facing of masonry with spacers of masonry projecting rearwardly approximately to the depth of the composite wall and embedded in the masonry wall, securing tie wires to that portion of each spacer remote from the facing wall, erecting a molding wall of mold forms engaging the spacers and secured thereto by the tie wires, placing reinforcing bars upon the spacers between the facing wall and the molding forms and secured to the spacers by said tie wires, placing concrete in the space between the facing wall and mold forms and thereby embedding the spacers, and subsequently severing the tie wires and removing the forms.

7. A composite wall comprising a masonry facing of a single thickness, spacing means carried by and embedded in the masonry wall and extending rearwardly from the rear face of said wall to the depth of the full thickness of the wall, reinforcing means supported by the spacing means, tie wires connected to the rear face of the masonry wall, and a concrete wall or backing in contact with the facing wall and enclosing the spacing means, reinforcing means and tying means.

8. A composite wall comprising a masonry facing of a single thickness, spacers forming part of the facing and of a length to extend rearwardly from the facing to the depth of

the composite wall, with the spacers each having holes therethrough between the masonry facing and their rear ends, reinforcing bars laid upon and supported by the spacers between the masonry facing and the rear ends of the spacers, tie wires carried by the spacers holding the reinforcing bars, and a concrete wall embedding the reinforcing bars, tie wires and spacers, said concrete wall constituting the rear portion of the composite wall, and in contact with the facing.

9. A composite wall of masonry and concrete, comprising a masonry facing of a single thickness, spacers built into the masonry wall and projecting from the rear face thereof in spaced relation one to the other and extending to the rear face of the composite wall, said spacers having passages therethrough between the rear face of the masonry wall and the rear face of the composite wall, reinforcing bars extending over the spacers and supported thereby adjacent to said passages, tie wires looped over the reinforcing bars and each having a leg extending rearwardly over the top of the spacer and another leg extending through the passage of the spacer and along the bottom of said spacer toward the rear of the wall, said tie wires initially connecting mold forms to the rear ends of the spacers, and a filling of concrete embedding the headers, reinforcing bars, and tie wires and in contact with the rear face of the facing wall.

10. A composite wall, comprising a masonry facing of less thickness than the full thickness of the wall, spacers formed of units similar to the masonry facing and embedded in said facing and carried thereby, with the spacers of a length corresponding to the full thickness of the wall, and a concrete backing in contact with the facing and embedding the spacers, and together with the masonry facing constituting the full thickness of the wall, said spacers extending through the concrete backing to the outer face thereof.

11. A composite wall comprising a masonry facing of less thickness than the full thickness of the wall, spacers embedded in said facing and extending inwardly from the latter to the full thickness of the wall, tie wires connected to the masonry wall and extending inwardly therefrom, and a concrete backing in contact with the facing and embedding the spacers and tie wires and together with the masonry facing constituting the full thickness of the wall.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature.

WILLIAM LEWIS EVANS, JR.