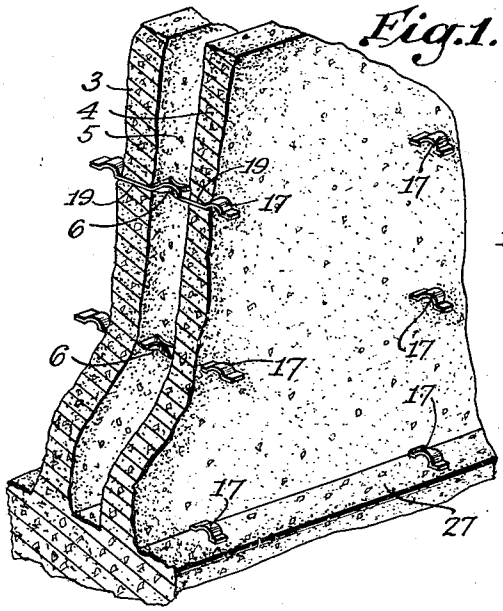
June 8, 1948. R. W. RUMBLE 2,442,962

FORM FOR MOLDING HOLLOW CONCRETE WALLS

Filed Feb. 14, 1945

Fig. 1.



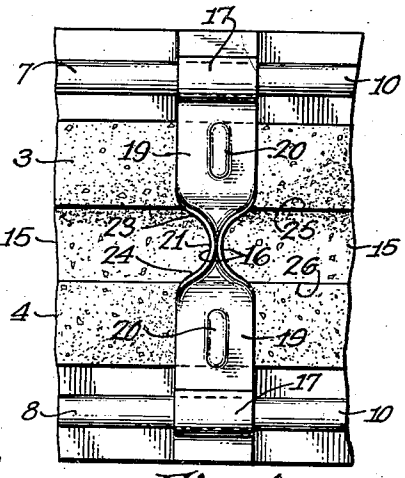


Fig. 4.

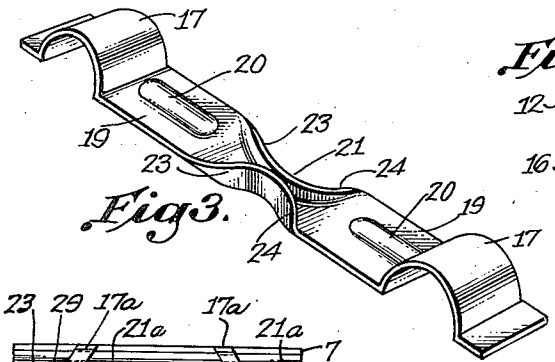


Fig. 3.

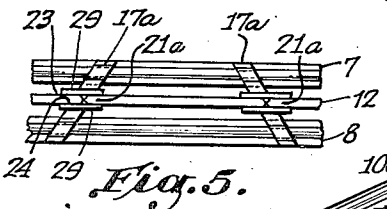


Fig. 5.

Fig. 2.

Inventor,
ROY WILLIAM RUMBLE

By. Haseltine, Lake & Co.
AGENTS

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FORM FOR MOLDING HOLLOW CONCRETE WALLS

Roy William Rumble, Pretoria, Transvaal, Union of South Africa

Application February 14, 1945, Serial No. 577,899
In the Union of South Africa March 9, 1944

1 Claim. (Cl. 25—131)

1

This invention relates to shuttering for hollow walls and similar building elements made of set moulded material such as concrete; and particularly for such walls or building elements moulded in position.

A shuttering assembly for a cavity wall or similar hollow building according to the invention comprises external shutter walls and core shuttering for forming the cavity, said core shuttering being positioned between and spaced from the external shuttering, and being retained in position against transverse movement by cross ties which are detachably secured to the core shuttering and to the external shuttering walls.

The external shutter walls and the core shuttering are each composed mainly of separate panels or units connected to one another at their edges; and the ties have ends of tongue and groove section with which they are detachably secured to the said external walls by being engaged between the jointed edges of said panels or units.

The ties thus ensure rigid tying of the score shuttering to the external shuttering walls by being made continuous and carried through the core shuttering.

The middle portion of the ties which passes through the core shuttering is provided at each side of said middle portion, with pairs of shoulders that engage the opposite faces of the core panels or units, around the joints. Said middle portion may be thin enough to pass through the joints without opening the latter to an extent that is material in concrete shuttering. Similarly the ends of the ties may be thin to engage in the joints of the external shuttering without materially opening them. It is convenient to engage said ends with horizontal joints in the outside shuttering and with vertical joints in the core shuttering; and said thin middle and end portions of the ties being correspondingly formed at right angles to one another.

It is a feature of the invention that the ties are adapted to serve the two purposes of tying and spacing apart the three shuttering walls, and of remaining in the moulded hollow wall to brace together the two thicknesses of said wall. A tie suitable for this purpose may be made of flat strip. It comprises end portions adapted to be engaged with the two external shutter walls to brace them together, a middle portion providing opposite shoulders adapted to engage with the core shuttering and position the latter against transverse movement, and intermediate portions adapted to be embedded in and key with the thicknesses of the moulded wall.

2

The panel joints are preferably of the tongue and groove type so as to be shaped correspondingly to tongue-and-groove cross-sectional form of the tie ends. By means of such tongue and groove joints it is possible to erect the outside shuttering, and consequently the core shuttering, without the assistance of pre-erected scaffolding.

The shuttering for a moulded hollow wall, which consists in erecting two external shuttering walls by assembling shuttering panels or units in edgewise engagement at horizontal joints, placing core shuttering in position between said external shuttering walls; and, during the erection, engaging the ends of tongue and groove section of loose cross ties with the exposed upper edges of said panels or units of the outer shuttering walls, and also engaging said ties by means of a pair of opposed shoulders opposite faces of said core shuttering panels, so that as the said cross ties are secured by engagement of further panels above such exposed edges, they determine the horizontal spacing apart of the two external shuttering walls and the horizontal spacing of the core shuttering between them.

An example of the invention is shown in the accompanying drawings in which

Figure I shows a hollow concrete wall, with ties spanning the wall cavity and connecting the two thicknesses of the wall.

Figure II illustrates the shuttering assembly for moulding the cavity wall of Figure I.

Figure III is an enlarged view of the ties shown in Figure I.

Figure IV is an enlarged horizontal section through the wall and the shuttering.

Figure V is a plan view showing two diagonal ties.

Referring to Figure I, 2 indicates the wall as it appears after it has been moulded and the shuttering has been removed. The wall consists of the two thicknesses 3, 4 spaced apart by the cavity 5. The thicknesses 3, 4 are braced together by the ties 6, embedded in them and spanning the cavity 5.

Referring to Figure II, the shuttering comprises the two external shuttering walls 7, 8 each consisting of a number of panels 9 connected at their edges. Said panels may be constructed as described in application for Union of South Africa Letters Patent No. 1121 of 1943 and are so shown; with interengaging edges 10, 11 of general tongue and groove form.

The core shuttering, indicated by 12, is positioned between the external shuttering walls 7, 8 to provide, between itself and the external shuttering at each side of it, the moulding spaces

13, 14 in which the two thicknesses 3, 4 of the wall 2 are to be moulded. Said core shuttering is divided into sections 15, jointed by contact or engagement of their vertical edges 16, so that said sections can be separately withdrawn upwardly from the cavity 5 after the wall has been moulded.

The ties 6 are made of flat metal strip continuous from end to end. They are shaped to include two similar end portions 17 bent to a tongue-and-groove form in cross section to fit between the tongue 10 and groove 11 of the horizontal joints 18 between the panels of the external shuttering walls 7, 8. Between said end portions 17 are the pair of intermediate portions 19, which, in the shuttering assembly, cross the spaces 13, 14 and which, after the concrete wall is formed, remain embedded in the wall thicknesses 3, 4. These intermediate portions 19 are preferably stiffened to enable them to act as struts when spacing the shuttering walls 7, 8 and 12; and they may also be shaped to cause them to key firmly into the concrete. These effects are produced in the example shown by means of the pressed up ribs 20.

The central portion 21 of the tie is flattened in a plane parallel but at right angles to the plane of the vertical dimensions of the end portions 17, in order to pass through the vertical joints 22 of the core shuttering 15. At the junction of the central portion 21 and the intermediate portions 19, 19 are the opposed pairs of shoulders 23, 24 spaced apart along the length of the tie according to the thickness of the core shuttering and so that they engage the opposite faces 25, 26 of said core shuttering in the neighbourhood of the vertical edges 16.

A convenient procedure in erecting the shuttering is to place a series of ties, indicated by *a* in Figure II, on the foundation 27 on which the concrete wall 2 is to be erected. Said series *a* may be positioned in predetermined lines to define the plan of the wall. A bottom course *b* of panels 9 is stood upright on these ties with the grooved panel edges 11 engaged with the tongue formations 17 of the ends of the ties; which ties thus determine the proper spacing apart of the feet of the two external shuttering walls.

The core shutter units 15 are also stood on the foundation 27 with their pairs of adjacent edges 16 engaged between the pairs of shoulders 23, 24 of the ties 6. The spacing of the foot of the core shuttering wall relatively to the feet of the external shuttering walls is thus determined.

Another series *c* of ties is now laid on the upper exposed edges 28 of the lower course panels; said ties *c* being brought into position by for example inserting their central portions 21 into the upper ends of the vertical joints 22 and sliding the ties down to rest on the edges 28. The extremities

17 of the ties *c* are properly engaged with the tongue and groove formation of said upper edges 28, whilst their central portions 24 are, as stated, engaged with the edges 16 of the core units 15; with the result that the *c* series ties co-operate with the *a* series ties to cause the external shuttering walls and the core to be held truly parallel with one another. The ends 17 of the ties are secured in the position stated by the weight of the next course of panels.

Upon the concrete mix being inserted into the moulding spaces 13, 14 the intermediate portions 19 of the ties become embedded in the mix; and upon the shuttering being disassembled the intermediate and central portions 19 and 21 of the ties remain as ties between the concrete wall thicknesses 3 and 4. The end portions 17 of the ties are usually cut off flush with the external surfaces of the wall.

Figure V shows ties generally similar to those described, but having their end formations 17^a and their central formations 21^a skewed with regard to the length of the tie; so that said ties take up an inclined position in plan when put into place. As they are left in the wall, they serve as diagonal braces therein. It is preferred to slant them alternately in opposite directions as appears in the figure. In such ties it is convenient to provide the shoulders 23, 24 by plate 29 welded to the tie proper.

I claim:

A shuttering assembly for a cavity wall or similar hollow building element, comprising external shutter walls and core shuttering for forming the cavity, said shutter walls and said core shuttering each consisting of units assembled edgewise, cross ties extended between the assembled edges of said units; said cross ties each formed with a pair of opposed shoulders for detachably engaging the opposite faces of said core shuttering units and thus retaining said core shuttering units against transverse movement, the portion of each tie between said shoulders being of small width suitable to extend through joints between and engage vertical edges of said core shuttering units; said ties further having ends of tongue and groove section adapted to engage detachably horizontal edges of said external shuttering units.

ROY WILLIAM RUMBLE.

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