

W. WILSON.
REINFORCED CONCRETE.
APPLICATION FILED JAN. 27, 1917.

1,259,698.

Patented Mar. 19, 1918.

2 SHEETS—SHEET 1.

Fig. 1.

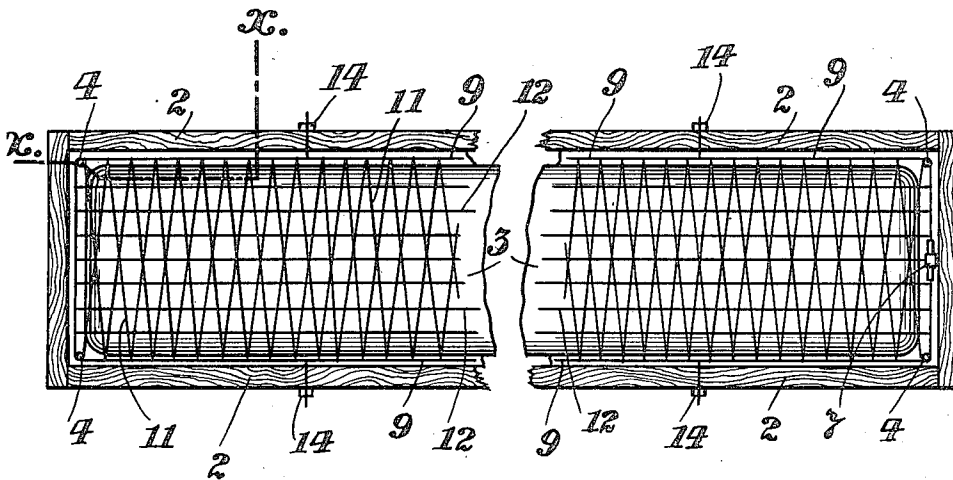
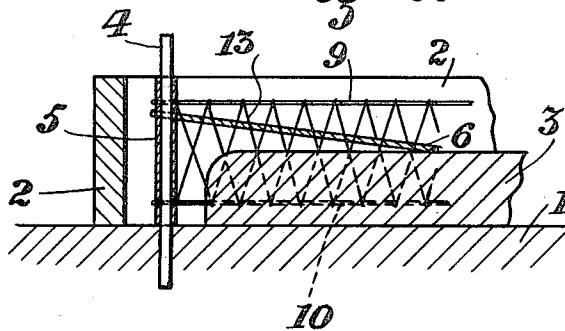


Fig. 2.



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Att'y.

Witnesses:

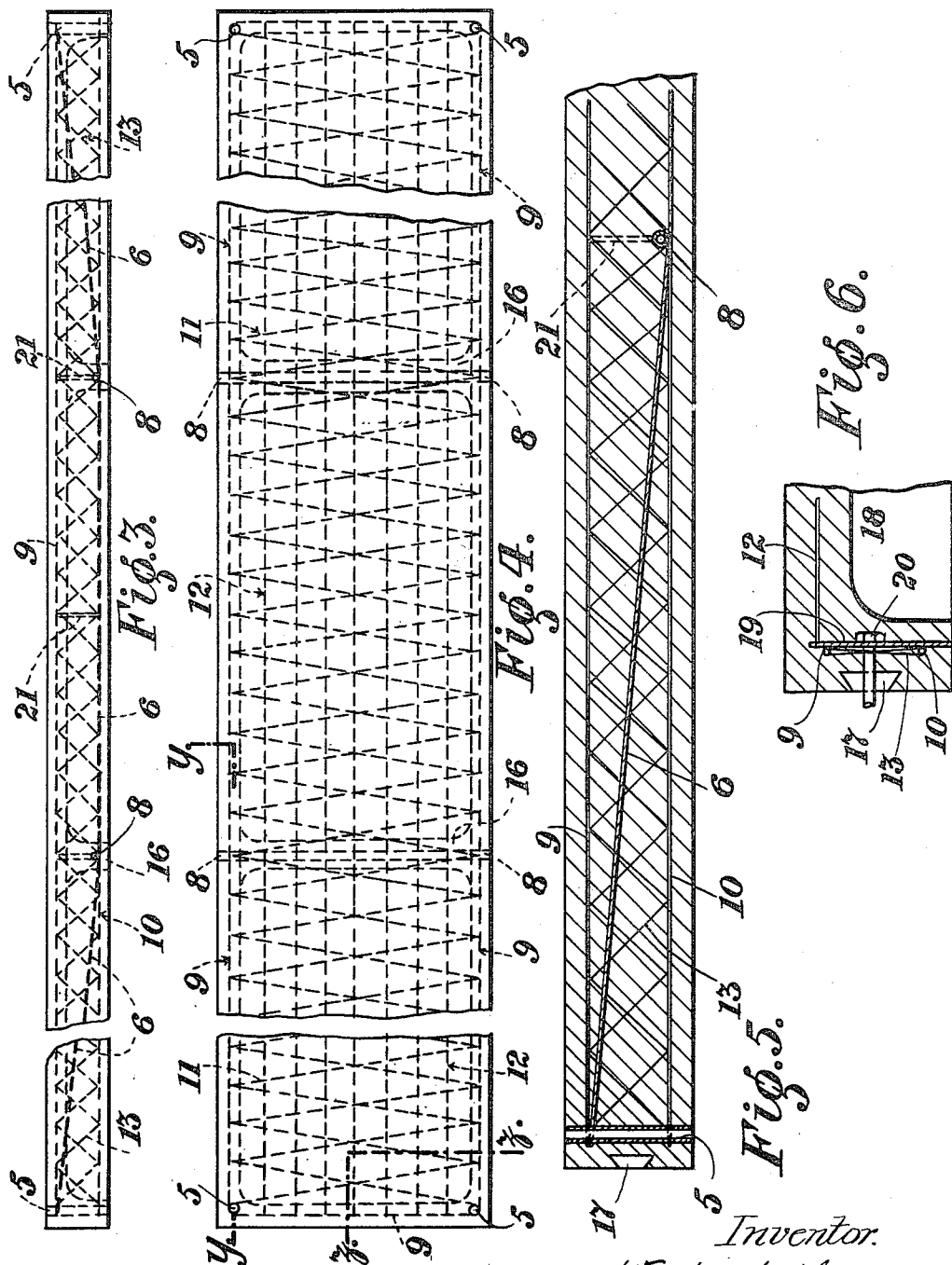
Elsie Willocks.

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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

WALTER WILSON, OF DUNFERMLINE, SCOTLAND.

REINFORCED CONCRETE.

1,259,698.

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To all whom it may concern:

Be it known that I, WALTER WILSON, a subject of the King of Great Britain, residing at Dunfermline, Scotland, have invented certain new and useful Improvements Relating to Reinforced Concrete, of which the following is a specification.

This invention relates to reinforced concrete for building structures of the kind in which the reinforcement of the concrete blocks, beams, joists, slabs, arches, etc., consists of one, or more, wire ropes or cables tightened and held under tension. In conjunction with the wire ropes, or cables, it has been proposed to use steel lattice work, or wires, or wire netting, or the like, as an additional reinforcement. In many cases the wire ropes or cables have been used in conjunction with wood or metal frames, or beams, or the like. It has also been proposed to make such slabs, blocks, etc., hollow with a thickened marginal edge or flange.

Heretofore, with such structures, the work has generally been done *in situ* and, in consequence, shuttering or timbering has been necessary, the work being slow in execution and expensive to carry out. I make and reinforce the concrete blocks, slabs, partitions, frames, beams, etc., in the yard, or other convenient place, where I mold each article to the desired shape or formation, ready for use, and then convey or transport it to the place where it is to be employed.

Under this invention, the blocks, slabs, etc., are not made in the usual way but are each cast, or formed, in a mold having the reinforcing, or main reinforcing, wire cable or cables secured therein so as to be near the edges of the finished block or slab which is made more or less hollow at the center, constituted by a thin web or part, while the sides or edges are thickened to such extent as may be found desirable or necessary to properly cover and embed the reinforcing, or main reinforcing cable, or cables. These thickened edges constitute reinforced marginal ribs or flanges which give great strength to the blocks or slabs while serving as means whereby they can be readily secured together by means of bolts or otherwise. Preferably the flanges or ribs would be reinforced by a main cable reinforcement while the

thin central part would be reinforced by a subsidiary reinforcement composed of wires passed around or attached to the cables at the sides and (or) ends of the block or slab.

With these blocks or slabs I can construct a building, such, for instance, as a dwelling house, with little or no wood in its structure and without bricks, stonework, or iron beams, with the result that the construction is not only facilitated and expedited, but the cost is very much reduced, and, moreover, a better and stronger building is produced. The outside walls and also partition or inner walls as well if so desired, as the ceiling, or ceilings, and floor, or floors, of the building would be composed of concrete slabs, or blocks, preferably of rectangular formation and these would be bolted and keyed or otherwise fastened together, so as to form a strong and permanent structure while the window and door and other frames, etc., would be also molded and reinforced in the yard and then fitted in position and secured by bolting, keying, or otherwise. In this way, woodwork may be wholly or partially eliminated from the building while the usual wood or metal beams can be dispensed with as well as bricks and stonework unless in cases where these might be desired or found necessary, the idea being to make the building or structure, as far as possible, of the reinforced concrete slabs, or blocks, etc., alone.

It will be understood that the reinforced concrete can be made into blocks or slabs of various shapes or forms to suit their places in the building and so that they can be readily and speedily fitted in place and secured, the ordinary expensive timbering dispensed with.

When making the reinforced blocks and slabs it is obvious a single mold may be used over and over again.

In order that the invention may be clearly understood I have hereunto appended explanatory drawings whereon I have shown, merely by way of illustration or example, a reinforced concrete block or slab for use in the construction of a dwelling house, factory, or the like and the method of making the same in accordance with my invention.

On the drawings:—

Figure 1 shows the mold or frame in which the reinforced block is made in the yard, a portion of the frame is broken away at the center.

Fig. 2 is a fragmentary section of the frame, taken on the line x, x , Fig. 1. This section is made to an enlarged scale so as to show the parts more clearly.

Figs. 3, 4, and 5, are respectively, a side elevation, a plan, and a section (the section being taken on the line y, y , Fig. 4) of the reinforced concrete slab or block after it has been molded, the reinforcement being indicated by dotted lines.

Fig. 6 is a fragmentary section of the block or slab taken on the line z, z , Fig. 4.

I will now proceed to describe the mode I prefer to adopt in manufacturing a reinforced building slab or block, for instance, I provide a metal or other foundation 1 upon which I mold or fit a die block 3, of a shape suitable to give the desired hollow formation to the finished slab. Preferably this die block is made of cement. Round about this block, and at a suitable distance therefrom, as shown, I fit a rectangular wood or metal frame 2 which constitutes the sides and ends of the mold. I then fix into the foundation four upright pins or anchors 4, one being located near each corner of the frame. These pins can be held in sockets in the foundation 1 or be otherwise rigidly supported. Having erected these pins I slip upon each of them a metal sleeve 5 (see Fig. 2) of the same height as the frame 2, although the pins 4 may project above it. I now take a length of main wire rope or cable (indicated at 6, Figs. 2 and 3) and pass it round about the four pins and outside the sleeves thereof, the ends being brought together and secured by a screw coupling 7, or by other means. A screw coupling is preferred as it can be readily tightened up and the cable braced taut round about the upright pins. Preferably the cable, after being strained, is, at the center, bent downward and further tightened as shown at Fig. 3, by means of cross tubes 8, weighted down by means of heavy weights applied thereto or forced down by means of screws suitably applied, the idea being to stretch the cable 6 and maintain it under strong tension. I may also pass round about the sleeves of the uprights an upper wire rope 9 and a corresponding lower wire rope 10, these ropes being each joined by couplings or the like so as to be "endless" and being laid parallel to one another and to the top of the frame, as shown clearly at Fig. 2 and thereafter strained tight. I then brace the sides of the wire rope 9 together by means of diagonally arranged cross wires 11 which are pulled tight and then tied in position and these constitute a subsidiary reinforcement for the thin central part of the

slab. The ropes 9 and 10 are or may also be braced together by means of wires 13. As will be seen the wires 11 and 13 constitute a kind of lattice work reinforcement which, if necessary, may be strengthened by longitudinal wires 12 which connect the ends of the rope 9 together.

If desired or thought necessary the cables 9 and 10 may be temporarily braced laterally to the wood framing by means of screws and nuts 14.

When the reinforcement has been properly arranged in the mold the concrete is filled in and thoroughly packed so as to fill up the spaces between the cement 3 and the wood framing 2, and, when the concrete sets, it will have the wire cables or ropes and wires embedded therein in a state of tension. When the concrete has thoroughly set, the pins 4 are removed and the slab is taken out of the mold with the ropes and wires embedded therein and also the sleeves 5 embedded therein. These sleeves appear as holes in the molded block, see Figs. 3 and 4. The cross tubes 8 are also embedded in the block and are indicated by the holes 8, Figs. 3 and 5.

The block, as it appears at Figs. 3 and 4, has two cross ribs 16 dividing the hollow underside into three portions as indicated by the dotted lines. It is thought preferable to have these two cross ribs 16 as they give greater strength to the block under compressive stresses.

In the section, Fig. 5, a sleeve 5 is seen and also the main cable 6 and the auxiliary wire ropes or cables 9, 10, together with the wire lattice work 13 and one of the tubes 8.

Fig. 6 shows clearly the two auxiliary wire ropes or cables 9, 10, and the lattice wires 13 and longitudinal wires 12. 18 shows a portion of the hollow space at the underside of the block.

It will be seen from the dotted lines, Figs. 3 and 4, the reinforcement is very complete and that the wires and cables extend through the material in all directions. The sleeves 5 are very useful, as also are the tubes 8, as they form means whereby the slab can be readily raised or lifted by a crane or otherwise, and also in some cases for bolting the slabs together.

In order that the slabs may be interlocked or keyed together when being fitted in position for a floor or a wall, or the like, they are, preferably, made with dovetail grooves on the sides and ends. One of these dovetail grooves is indicated at 17, Fig. 5, and at 17, Fig. 6.

To facilitate the fastening of the reinforced building blocks or slabs together when erecting a wall, a partition, or making a floor or ceiling, or in such like work, they have, as indicated at Fig. 6, metal plates 19 embedded in the ends and (or)

sides and through which bolts 20 can be passed thereby also giving a continuous reinforcement.

If desired distance pieces 21 can be fitted at suitable positions between the ropes 9 and 10 to keep them apart.

With reinforced blocks, slabs, beams, etc., made as hereinbefore set forth it will, as aforesaid, be possible to build concrete building structures without the aid of the usual timber framing or centering or shuttering which is very expensive.

The various cables, ropes, and wires are strained in the yard or other place of manufacture so as to be under tension when the concrete is filled into the mold and they remain under tension in the finished article, so that the building is made with blocks or slabs containing tensioned reinforcement. This obviates the necessity for any tensioning at the building site.

The wire bracing or lattice work may be used or not as desired.

Having now fully described my invention what I claim and desire to secure by Letters Patent is:—

1. A rectangular concrete slab, block, or the like, for structural work, having a continuous marginal flange reinforced by means of tensioned wire ropes disposed in the flange and extending around same the ropes being arranged one above the other in the depth of the flange and being retained in position by means of uprights in the flange.

2. A rectangular concrete slab, block, or the like, for structural work, having a projecting flange extending continuously around the edge thereof the flange being reinforced by means of wire rope strained to tension around uprights disposed one at each corner of the slab or block and located in the flange.

3. A rectangular concrete slab, block, or the like, for structural work, having a flange extending continuously around the edge thereof, the flange being reinforced by a plurality of wire ropes disposed one above the other and held in tension in the concrete of the flange.

4. A rectangular concrete slab, block, or the like, having a flange extending around the edge thereof the flange being reinforced by a plurality of wire ropes disposed one above the other and held in tension, these ropes being connected together by latticed wires.

5. A concrete slab, block, or the like, made of concrete, which is hollow and thin at the center but has a thickened edge all around, wires or rods constituting a reinforcement for the center and wire ropes disposed one above the other in the flange and tensioned around supports therein, these

ropes constituting a suspension reinforcement for the flange.

6. A concrete block or slab having an external flange, tensioned wire ropes embedded in the flange and forming a suspension support therefor means in the block or slab holding the ropes at tension and plates embedded in the flanges whereby adjacent blocks can be fastened together.

7. A concrete block or slab having an external flange, tensioned wire ropes embedded in the flange, means in the block or slab holding the ropes at tension, and plates in the flanges and bolts passing through said plates.

8. A rectangular concrete block or slab having an external marginal flange, wire ropes embedded one above the other in the flange, upright tubular devices embedded in the flange and extending the depth thereof for holding the ropes in position and lattice wires connecting and binding together the ropes.

9. A rectangular concrete block or slab made with an external flange at each edge, wire ropes parallel to and above one another embedded in the flange and extending right around the block or slab, anchoring devices at each corner of the slab for said wire ropes and wires connecting and binding the parallel ropes together.

10. A rectangular concrete block or slab made with an external marginal flange, superposed wire ropes parallel with one another embedded in the flange and extending right around the block or slab, anchoring devices at each corner of the slab for said wire ropes and a rope disposed between the parallel ropes and which is held inclined partially at each end and straight at the center and means for holding the intermediate wire rope in position arranged between the aforesaid ropes and extending around the said anchoring devices.

11. A rectangular concrete block or slab made with an external flange, two superposed wire ropes parallel with one another embedded in the flange and extending right around the block or slab, anchoring devices at each corner of the slab for said wire ropes, a rope which is inclined at each end and straight at the center arranged between the aforesaid ropes and extending around the said anchoring devices and means embedded in the concrete for retaining the last mentioned rope in position.

In testimony whereof I affix my signature in presence of two witnesses.

WALTER WILSON.

Witnesses:

THOMAS RUTHERFORD,
R. RAYMOND HAYNES.