J. H. KNIGHT.

REINFORCED CONCRETE CONSTRUCTION.

APPLICATION FILED MAR. 17, 1909.

961,619. Patented June 14, 1910.

2 SHEETS—SHEET 1.

Fig. 1

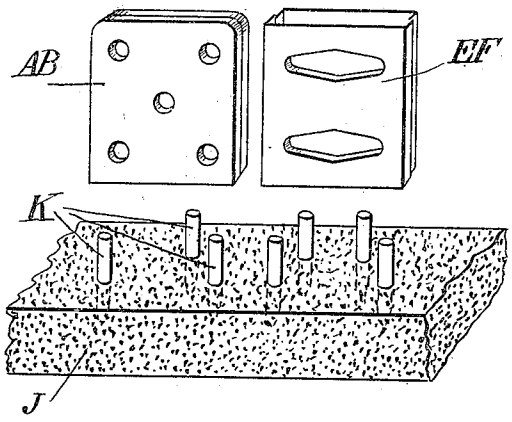
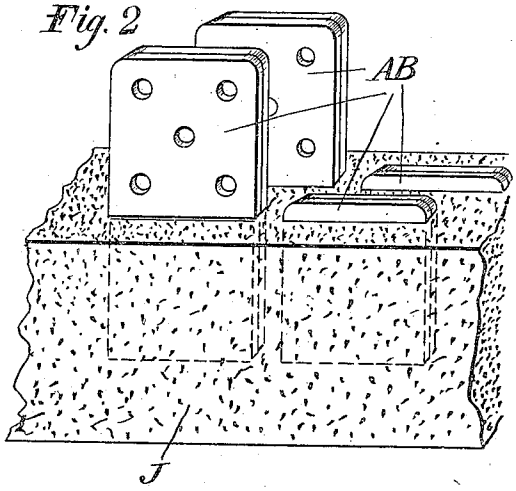


Fig. 2



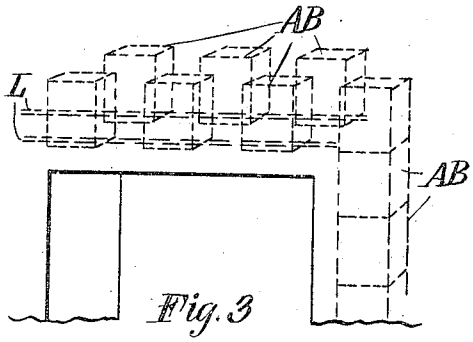


Fig. 3

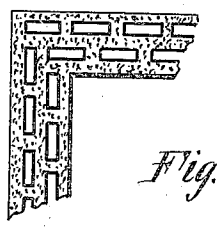


Fig. 4

Fig. 5

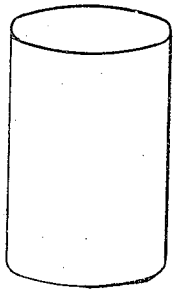
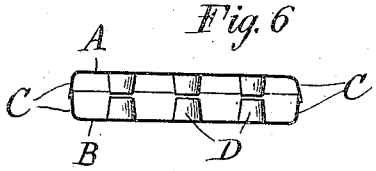


Fig. 6



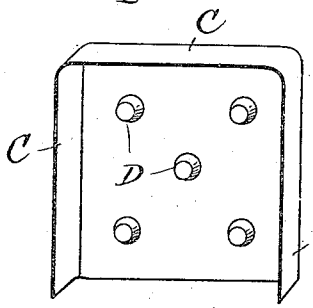


Fig. 7

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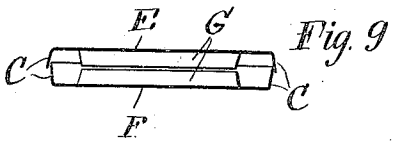

Fig. 9

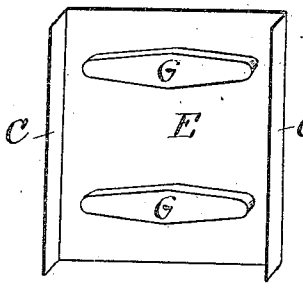

Fig. 8

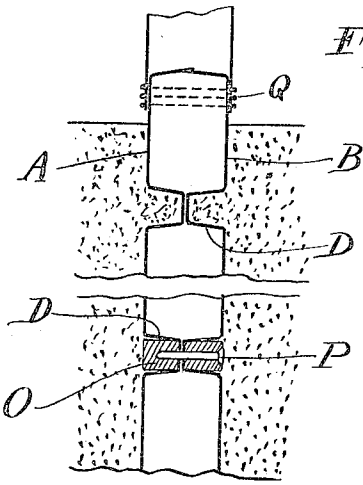

Fig. 12

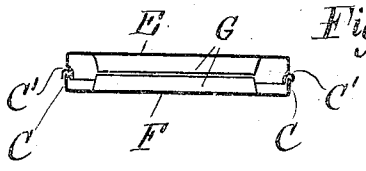

Fig. 10

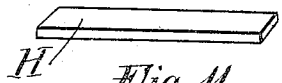

Fig. 11

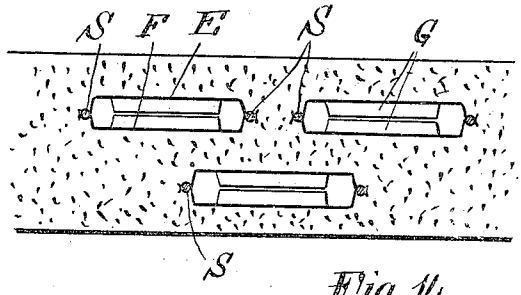

Fig. 14

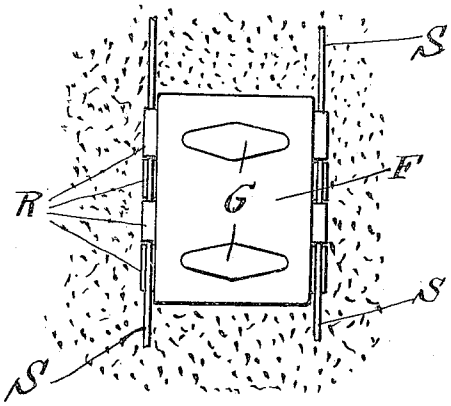

Fig. 13

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UNITED STATES PATENT OFFICE.

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REINFORCED CONCRETE CONSTRUCTION.

961,619. Specification of Letters Patent. Patented June 14, 1910.

Application filed March 17, 1909. Serial No. 483,981.

To all whom it may concern:

Be it known that I, JAMES HARMER KNIGHT, a citizen of the United States, and a resident of Westtown, Pennsylvania, have invented certain new and useful Improvements in Reinforced Concrete Construction, of which the following is a specification, accompanied by drawings.

This invention relates to improvements in reinforced concrete construction and also to the forms or cores to be combined with the concrete. The forms or cores are hollow for molding air spaces in monolithic concrete walls and the construction is such that all parts of the wall surface are protected by added air spaces or cells, so that heat, cold and dampness cannot penetrate to the inner surface. To accomplish this object in a simple and inexpensive manner in a single wall, a double row of air spaces should be provided in which the spaces or cells of one row are wider than and overlapping the intervals between the air spaces or cells in the adjacent row.

The invention relates particularly to monolithic concrete construction distinguished from molded cement blocks, and I am enabled to construct a wall without undue thickness, thus saving expense.

One of the chief aims of the invention is to do away with the usual more or less complicated and costly supports for holding the cores for molding the air spaces, because these supports interfere with pouring and tamping the concrete mixture and require more skill and ingenuity in use than is ordinarily available in most localities, as in the case of the erection of farm buildings, in which concrete is advantageously used.

The simplicity of my invention enables my construction to be set up by the usual farm laborer with a little intelligent direction which can be furnished in the form of printed instructions or in other ways.

The tubular or box-shaped form or core which forms the basis of the invention, is preferably of plain or perforated sheet metal and these hollow cores can be placed in courses as each course of concrete is laid and remain permanently embedded in the wall. The first course of these cores or air cells is preferably anchored to the footing course by any suitable means, as by pins located and driven into the concrete before the mixture is set, or by attaching the core to reinforcing rods. The usual wood or iron forms may be used for molding the outside and inside surfaces of the wall, but the construction of the outside surfaces forms no part of the present invention. The first course of concrete or wall mixture is poured and tamped to within a few inches of the top of the cell forms. When this layer has set sufficiently to pour the next layer, another course of air cells is telescoped over the top of the previous course and suitably secured thereto, and this method of construction is continued to the top of the wall.

The invention consists of the construction shown in the accompanying drawings, in which—

Figure 1 is an elevation in perspective, partly broken away, illustrating the method of laying the first row of cores or air cells; Fig. 2 is a similar view showing the second course of cores in place upon the first course; Fig. 3 illustrates the arrangement of the cores around and over an opening; Fig. 4 is a top plan view illustrating the arrangement of cores at the corner of a wall; Fig. 5 illustrates an open tubular form of core; Fig. 6 is a top plan view of a closed form of core; Fig. 7 is an inside view of one section of a core; Fig. 8 is an inside view of one section of an open form of core of continuous air spaces; Fig. 9 is a top plan view of the core shown in Fig. 8 having lap joints; Fig. 10 is a top plan view of a modification having a different form of joint; Fig. 11 is a view of the temporary cover used for the cores, while pouring concrete; Fig. 12 is a vertical transverse sectional view through a wall construction, illustrating different forms of holding the sections of the core together; Fig. 13 is a side elevation of a wall construction showing the use of reinforcing rods in connection with the cores; Fig. 14 is a horizontal sectional view taken through Fig. 13.

Referring to the drawings, Figs. 5 to 10 inclusive illustrate different forms of cores or air cells and the remaining figures illustrate modes of using said air cells in reinforced concrete construction.

The simplest form of cell is that shown in Fig. 5 which is an open tube of cylindrical or flattened form.

In Figs. 6 and 7 the closed form of core is shown comprising two sections A and B having the inturned flanges C around three

sides and the inwardly projecting depressed portions D which lie opposite and register with each other when the two sections A and B are placed side by side with the flanges C overlapping. Projections D are adapted to resist pressure on the core and prevent it from collapsing.

In Figs. 8 and 9 a modification is shown in which the core comprises the sections E and F provided with flanges C at each side, thus leaving the ends open. The body portions of the section are provided with elongated inwardly projecting portions G which lie opposite each other when the sections are assembled. The projecting portions D and G of the cores may be pressed out of the body of the metal itself and this is the preferable form of construction.

In Fig. 10 the construction is similar to that shown in Fig. 9 with the exception that the flanges C′ on each section are longer than the opposite flanges C and bent into hook-shaped form, forming a modified lap joint. In using the open sections, temporary covers H are provided for preventing concrete from filling the walls.

In building a wall in accordance with this invention, the first course J of concrete is laid as indicated in Fig. 1 and provided with sets of pins K over which the cores A—B or C—D are adapted to be placed. The pairs of pins K are staggered, so that the cores are staggered, as illustrated in Fig. 2, after they have been set in place and embedded in concrete or other cementitious material. The second course of cores A—B is then telescoped over the first course of cores and more concrete poured around the same, leaving the upper ends projecting to enable the third course to be provided, and so on until the wall is completed.

In Fig. 3 the cores A—B are shown arranged around an opening in the wall, as a window. In this case reinforcing rods L are preferably provided with cores on top of the opening and the cores are supported on these rods and embedded in concrete. The cores A—B at the side of the opening are also embedded in concrete.

The hollow projections D of the sections may be provided with wooden blocks O as shown in Fig. 12 and a nail P or other fastening device provided for securing the core sections together. The core sections may also be held together by means of a coil of wire Q as shown in Fig. 12.

In Figs. 13 and 14 vertical reinforcing rods S are shown to which the cores may be connected, thus holding the cores in vertical alinement and holding the sections of the core together. In this construction a modification of the core is used in which the side flanges instead of being continuous are cut away in the form of ears R and bent into hook-shaped form to grasp the reinforcing rods S, thus holding the cores in place. These reinforcing rods may be lighter than in ordinary constructions on account of the reinforcement provided by the cores themselves.

The sections of the cores are of standard construction forming units, so that any two units or sections will fit together to form a complete core. Furthermore the units or sections of any particular construction, as Fig. 6 or Fig. 9, will nest together, thus taking up a small amount of space for transportation. When the unit sections are received at the place they are to be used, they may be unpacked and the desired number of cores formed by placing parts of sections together.

According to this invention each cell is complete in itself and is self-supporting in the wall. The cells are independent of outside wall forms and interior supporting cores are obviated. The cells are preferably of thin material, insuring the maximum air space with minimum thickness of wall. The top of the air space is definitely controlled by the interior separators in each section. The cores are reinforced against collapsing and they materially reinforce the wall, because the concrete interlocks in the depressed portions of the sections.

The claims herein for the form or core being held to relate to a separate invention from the concrete construction combining such core, this latter subject matter is excluded as a separate invention.

I claim and desire to obtain by Letters Patent the following:

1. A unit section for a hollow core for reinforced concrete construction comprising the body portion having side flanges bent at an angle thereto and spacing projections projecting inwardly from the body portion.

2. A sheet metal unit section for hollow cores for reinforced concrete construction comprising a body portion having side flanges and interior spacing projections.

3. A sheet metal unit section for a hollow core for reinforced concrete construction comprising a body portion having side flanges and interior cup-shaped projections formed out of the body of the metal.

4. A hollow reinforcing form or core of box like shape for reinforced concrete construction comprising a plurality of coöperating unit sections, said unit sections being open at at least one end.

5. A hollow reinforcing form or core of box like shape for reinforced concrete construction comprising a plurality of coöperating unit sections, said unit sections being open at at least one end and provided with interior spacing projections.

6. A hollow reinforcing core of flexible material for reinforced concrete construction, comprising a plurality of similar unit

sections provided with side flanges and interior projections adapted to lie opposite each other when the sections are assembled.

7. A hollow reinforcing core of thin flexible material for reinforced concrete construction, comprising a pair of similar opposed unit sections having flanges at each side in the form of ears bent to form hooks, the hooks at each side of one unit section being interlocked with the opposed hooks on the other unit section.

8. A hollow core of thin flexible material for reinforced concrete construction comprising a plurality of similar unit sections having flanges at each side in the form of ears bent to form interlocked hooks, and inwardly projecting portion from the body of the sections adapted to lie opposite each other when the sections are assembled.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

JAMES HARMER KNIGHT.

Witnesses:
ROBERT W. LLOYD,
M. H. HOOD.