A. RATNER.

CONCRETE REINFORCING PLATE.

APPLICATION FILED NOV. 22, 1916.

1,242,039.

Patented Oct. 2, 1917.

FIG. 1.

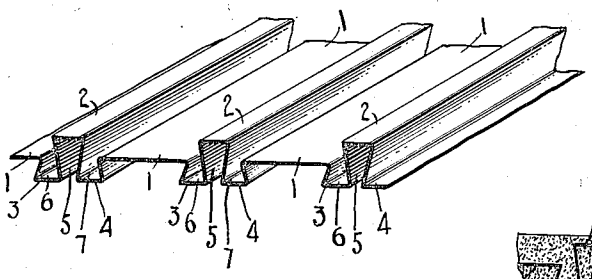


FIG. 2.

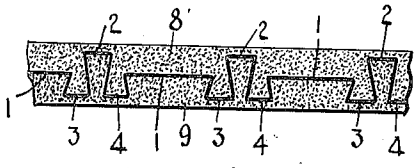


FIG. 3.

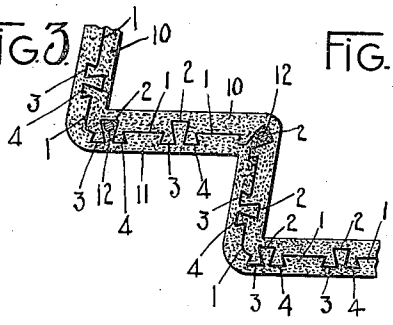


FIG. 4.

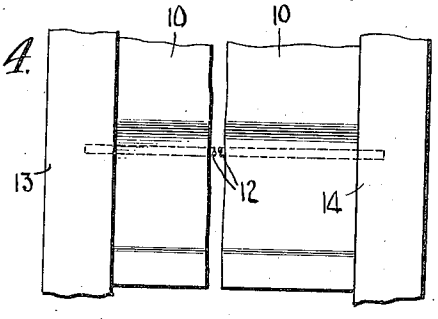


FIG. 5.

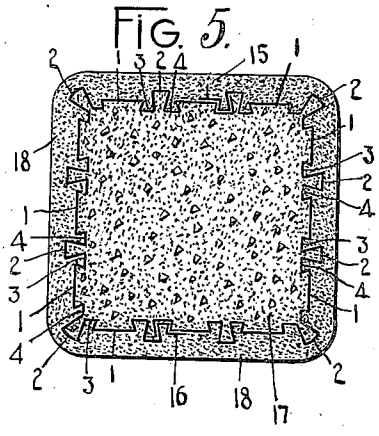
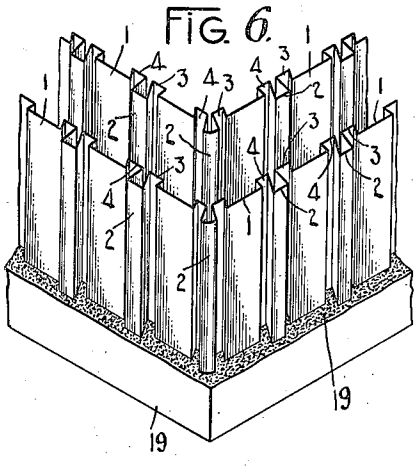


FIG. 6.



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CONCRETE-REINFORCING PLATE.

1,242,039. Specification of Letters Patent. Patented Oct. 2, 1917.

Application filed November 22, 1916. Serial No. 132,779.

To all whom it may concern:

Be it known that I, ABRAHAM RATNER, a citizen of the United States, and a resident of the county of Bronx, in the city and State of New York, have invented a certain new and useful Improvement in Concrete-Reinforcing Plates, of which the following is a full, clear, and exact description, reference being made to the accompanying drawings, forming part of this specification.

This invention relates to improvements in ribbed and channeled plates which are embedded in plastic material, such as concrete, to bind layers of it together and reinforce it when it is made into walls and analogous formations, many of which it is desirable to have thin as well as strong. The main objects and advantages of the invention will be explained in the following description of the plate in which it is embodied, and of different ways in which such plates may be used. The invention consists of the ribbed and channeled reinforcing plate which is hereinafter described and particularly defined in the claims.

On the accompanying sheet of drawings, on which like reference-numerals designate like parts of different views:

Figure 1 is a perspective view of a reinforcing plate, or part of such a plate, embodying the invention in its preferred form;

Fig. 2, an edge view of a fragment of a wall composed of concrete with reinforcing plates embedded therein;

Fig. 3, an edge view of a fragment of a flight of stairs formed of concrete in which angulated reinforcing plates are embedded;

Fig. 4, a front view of a fragment of the staircase;

Fig. 5, a top view of a column composed of concrete and angulated reinforcing plates; and

Fig. 6, a perspective of a fragment of a partly constructed wall comprising outer and inner reinforcing plates, some of which are angulated.

A reinforcing plate embodying the invention is best to be made of thin sheet-metal, which may be either plain or crimped, and either black or galvanized. To form the plate the sheet-metal is subjected to bending operations by which groups of hollow ribs are formed from it so that unribbed portions, flat or in some cases curved, alternate with the groups of ribs. Each unribbed portion is, or usually would better be, of greater width than a group of ribs, which are ternate, or in other words arranged in groups of three ribs each.

The plate represented by Fig. 1 has ternate hollow ribs of suitable shape, and the flat unribbed portions 1 alternating with the groups of ribs. Each of the groups is composed of the ribs 2, 3 and 4, the central rib 2 being twice as deep as the others. Each of the lateral walls of the deep rib 2 of any plate forms a lateral wall of one of the shallow ribs of that group, which spring from the sides of the deep rib and from the unribbed portions of the plate which are adjacent to the group, so that the channel 5 of the deep rib extends between the channels 6 and 7 of the shallow ribs. The ribs of a plate might differ somewhat in shape from the dovetail ribs shown, but the shape of each rib is to be such that the walls of the channel in the rib shall diverge as they recede from the open side of the rib. The open sides of the shallow ribs 3 and 4 of each group are at one side of the plate and even with the adjacent unribbed portions 1, and the open side of the deep rib 2 is at the other side of the plate. Although the deep rib might be more or less than twice as deep as the shallow ribs, the relations between the groups of ribs and the unribbed portions preferably are such that each group of ribs is cut from end to end midway between its front and back by the adjacent unribbed portion or portions produced through the group.

The wall represented by the fragment shown in Fig. 2 is composed of layers 8 and 9 of concrete formed on and engaged with reinforcing plates like that shown in Fig. 1. The width of this fragment is less than that of an entire plate, and includes only a part of one plate. The layer 8 fills the channels of the shallow ribs 3 and 4 and covers the deep ribs 2, and the layer 9 fills the channels of the deep ribs and covers the shallow ribs, so that each layer is engaged with and firmly attached to the plate, the unribbed portions 1 being in the middle of the wall. The thickness of the concrete is such, next to the unribbed portions 1, and between the face of each layer and the bottoms of the channels which it fills, that the concrete cannot separate from the plate, even where the ribs are quite close to the faces of the wall. There the metal surfaces with which the concrete makes contact are

so small and the thin portions of the concrete which cover them are so narrow and so held at their edges by the thick portions adjacent to them, that they will not draw away from the ribs. These ternate hollow ribs, filled with concrete as shown, are essentially strong and stiff columns, each of which is composed of sections firmly united from top to bottom of the column. These columns not only increase the rigidity of the wall but also render it capable of supporting great weight. Such a wall, when it forms a thin partition, will be found to be firmer and more durable than thicker walls of reinforced concrete, as they are commonly made. The width of the unribbed portions 1 of the plate may be greater or less, with relation to the width of a group of ribs, than it is shown herein. When it is less the cost of making the plate will of course be increased. It should not be so great as to prevent the groups of ribs from properly stiffening the unribbed portions.

A plate may be angulated, as indicated in Figs. 3, 5 and 6, by bending it so that one of the deep ribs shall be at the angle, the open side of the rib being at the inner side of the angle, or by bending unribbed portions of the plate as is also indicated in Fig. 3. When a plate is angulated as shown in Figs. 5 and 6, the forms of the shallow ribs close to the angle and the form of the deep rib at the angle differ somewhat from their original forms. The layers 10 and 11 of concrete which constitute the front and back of the stairs (Fig. 3) are attached to and bound together by the reinforcing plates, substantially as are the layers 8 and 9 of the wall above described. The stairs may be connected to the walls 13 and 14 of the staircase by supporting rods 12 extending through deep ribs of the reinforcing plates and secured at their ends in the walls, as illustrated in Fig. 4.

The reinforcing plates of the column (Fig. 5) are interlocked as shown at 15 and 16. They form a case in which the central concrete portion 17 of the column may be molded, and which may be covered with a layer 18 of concrete or other plastic material, so that the central portion 17 and layer 18 shall be attached to and bound together by the reinforcing plates, as will readily be understood.

The outer and inner reinforcing plates (Fig. 6) form sides of a mold in which a portion of a thick wall may be cast by filling the mold with concrete. This will bind the two series of plates together. Their exposed faces may then be covered with concrete or other plastic material. A small portion of the outer facing 19 of the wall is shown at the bottom of Fig. 6. The outer and inner plates may be temporarily held in proper positions by cross-bars extending into and engaging with ribs of the plates.

It will be understood that the invention may be embodied in plates having groups of ribs differing more or less in form from those shown in the drawings of this application.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A reinforcing plate having ternate hollow ribs, and unribbed portions alternating with the groups of ribs, the walls of the three ribs of each group forming three open channels one of which is deeper than and extends between the others and said walls including parts capable of continuously engaging fillings of hardened plastic material at opposite sides and from end to end of each filling, and thus coacting with the fillings in producing a column composed of sections firmly united from top to bottom of the column.

2. A reinforcing plate having ternate hollow ribs, and unribbed portions alternating with the groups of ribs, one rib of each group being deeper than the others, the open sides of the two shallow ribs of each group being at one side of the plate and the open side of the deep rib being at the other side of the plate, and the plate being angulated and having one of the deep ribs at the angle, the open side of that rib being at the inner side of the angle.

ABRAHAM RATNER.