No. 889,870. PATENTED JUNE 2, 1908.

A. Z. CHIODO.

REINFORCED WALL.

APPLICATION FILED NOV. 26, 1907.

Fig. 1.

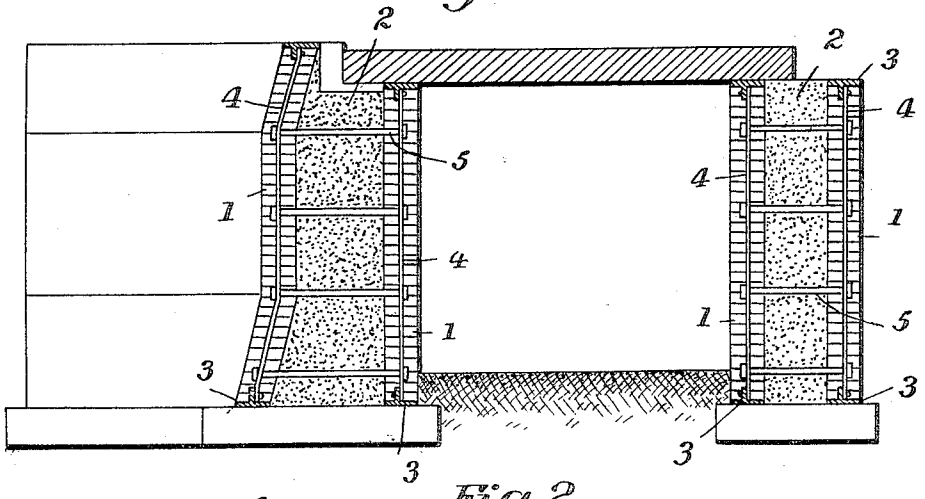


Fig. 2.

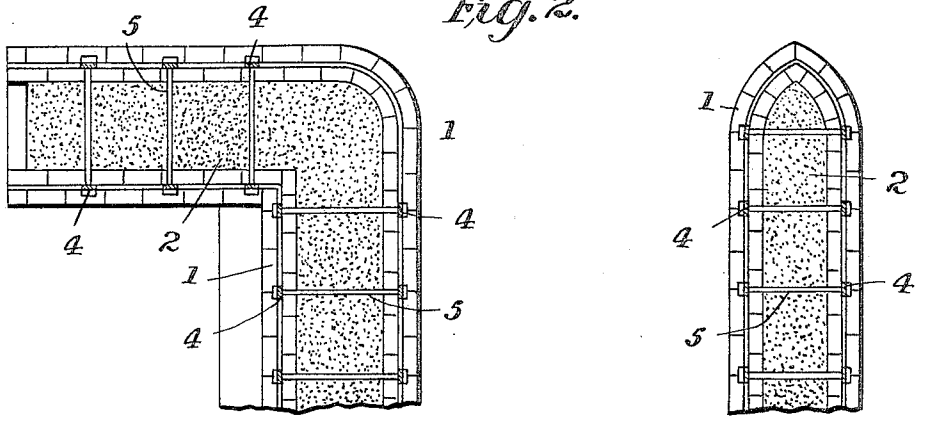
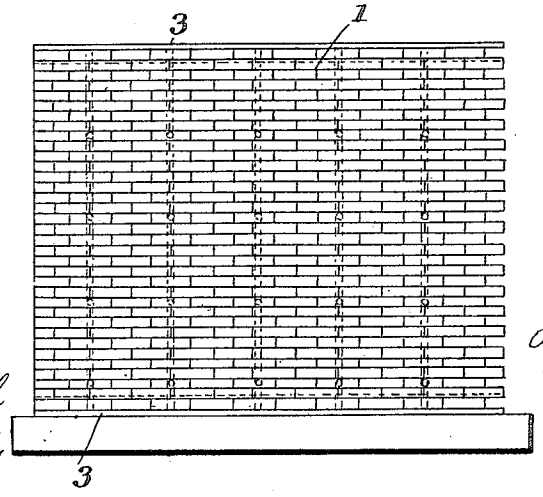


Fig. 3.



Witnesses

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ANTOINE ZIYNO CHIODO, OF CAIRO, EGYPT.

REINFORCED WALL.

No. 889,870. Specification of Letters Patent. Patented June 2, 1908.

Original application filed October 4, 1906, Serial No. 337,456. Divided and this application filed November 25, 1907. Serial No. 403,794.

To all whom it may concern:

Be it known that I, ANTOINE ZIYNO CHIODO, an Italian subject, residing at Cairo, Egypt, have invented certain new and useful Improvements in Reinforced Walls, of which the following is a specification.

This invention relates to reinforced walls made up of bricks, cement and a system of strengthening metal bars.

It may be applied to various uses, but has particular advantages in building hydraulic structures such as bridge-pillars, quay walls, dikes, retaining walls, etc.

It consists of reinforced hollow walls having the interior filled with the proper material.

This application is a division of my application Ser. No. 337,456, filed October 4, 1906.

In the accompanying drawings I have shown my invention applied to bridge pillars.

Figure 1 is a cross section of such a structure embodying the invention; Fig. 2 is a horizontal section; and Fig. 3 is an elevation.

As shown in the drawings my improved construction embodies the side walls 1 which are comparatively thin, and the filling material 2 filling the space between those walls. Each wall has within it a system of strengthening metal bars, and the bars of one wall are joined to the bars of the opposite wall by tie bolts which pass through the filling material. I have shown angle irons 3 placed at the bottom and top of each wall which angle irons are connected by vertical flat bars 4 which are bolted at their ends to the angle bars, these vertical bars being placed about 80 centimeters apart. Each vertical bar is connected to a corresponding vertical bar in the opposite wall by tie bolts 5 which are also placed about 80 centimeters apart along the length of the bars. It will be noted that this makes a frame work of iron which so reinforces the structure that it is not necessary to have thick walls of brick, but as shown thin layers of brick may be placed on opposite sides of the vertical bars to form the retaining walls for the filling material.

In making the structure the bricks are placed upon a layer of mortar which surrounds the vertical bars and fills the spaces between them. The bricks are placed in a layer adhering to the mortar, and if desired more than one layer of bricks may be used, mortar being placed between the courses, and the bricks being placed preferably at an angle. Where the structure is to be exposed to moisture, the mortar should have a silicate base, and in structures exposed to the sun it should have a carbonate base.

It will be understood that bricks or briquets may be used, and that they may be made of clay or cement. The box-like structure which is formed as above described is covered inside and out with a layer of cement 5 millimeters thick, and when this is dry the interior is filled with lean concrete prepared with semi-hydraulic mortar. The box-like structure is finally closed at the top by a thin layer of concrete to prevent the influx of water or mud to mix with the filling. The whole will quickly set to a homogeneous mass of high resistant power, all infiltration being precluded.

In the event of the walls being intended to be faced with mosaic, the coating of cement is replaced by briquets, of hexagonal shape for instance 1½ centimeters thick made of cement and the same mortar as is employed in the rest of the construction. It is to be understood that either bricks or thin briquets may be used, or they may be combined.

Where exposed to moisture the mortar used should be cement mortar on a silicate base (two parts of cement and three of sand). The following cement should be used in preference to others: (1) Ferrara cement (Italian); (2) Boulogne cement (French); (3) Portland cement (English). These cements should contain 70 to 76 per cent. of silicate and carbonate in order to insure instantaneous powerful oxidation.

The following method is adopted for purifying the cement and obtaining the desired 76 per cent. of silicate and carbonate. The cement powder is passed over a screen with a mesh of 1 sq. millimeter to remove the burned clayey matter, and the cement thus purified can be employed for hydraulic mortar compounded of two-fifths of cement and three-fifths of sand, the latter having first been washed and screened to remove all the saline constituents and mud.

Care should be taken to prevent the mortar drying in the making, by adding a sufficient quantity of mortar, and mixing it immediately, in order to prevent any fermentation. The mortar should be applied in a somewhat liquid state, so that the joints between the briquets are not more than 4 to

5 millimeters thick. The water used for thinning down should be clear and free from impurities of any kind, and should be mixed with 3 per cent. of silicate of potash just before use, the resulting solution being used up the same day to prevent risk of alteration by atmospheric agency.

In the case of lime mortar the method of purification is as follows: When the limestone has been ascertained to contain 58 per cent. of carbonate at least to 42 per cent. of granular lime it is burned and reduced to powder as soon as drawn from the kiln. The powder is passed through a screen of 1 millimeter mesh and then stored in a dry place to be used within twelve days. According to the invention the cement bricks used in the work are also purified by the same method.

The clay bricks should be well burned and pressed, and they should be properly wetted so as to be still damp at the time of setting. They should have a rough surface so as to bind well with the mortar. Red-blue clay should be used in preference and all external incrustation liable to alteration by the sun should be removed. This brick earth should be left to dry in the sun for several days, then powdered, passed through a screen of 2 millimeters mesh, and finally mixed with the necessary quantity of water. At the end of 48 hours the mass will be in proper condition for working up into bricks. In order to prevent crystallization the bricks should not be over fired and the surfaces should be rough, in order to increase the adhesion of the mortar. When uncompressed bricks are used they should first be steeped in the following solution: Silicate of potash, 1 part. Purified cement, 5 parts. Water, 50 parts, which will coat them with an impervious layer, giving them an increased resistance by filling up the porous portions.

For walls that are exposed to the sun or to the heat the mortar used is compounded of: Best hydraulic lime, 2 parts. Pure sand, 3 parts. The best lime for this purpose is made from limestone, containing in the raw state 76 parts of marl, 14 of clay and 10 of sand.

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

1. In reinforced construction, the combination with the side walls spaced apart, of filling material between said walls, strengthening rods within said walls, and tie bolts connecting the strengthening rods of opposite walls.

2. In reinforced construction, the combination with two sets of parallel angle irons adapted to contain filling material between them, of cross bars connecting said irons, and tie bolts connecting the cross bars of the two sets.

3. In reinforced construction, the combination with the side walls formed of blocks, of filling material between said walls, longitudinal strengthening metal bars for said walls, cross bars attached to said longitudinal bars, and tie bolts connecting the cross bars of opposite side walls.

4. In reinforced construction, the combination with the side walls formed of blocks, of filling material between said walls, longitudinal angle irons at the top and bottom of said walls, vertical bars within said wall at intervals attached to said angle irons, and tie bolts connecting the vertical bars of opposite side walls.

5. In reinforced construction, the combination with the side walls composed of bricks, of a thin layer of cement covering said walls, longitudinally strengthening angle irons in said walls, vertical bars within said walls attached to said angle irons, tie bolts connecting the vertical bars of opposite walls, and a cement composition filling the space between said walls.

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

ANTOINE ZIYNO CHIODO.

Witnesses:
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