No. 712,841. Patented Nov. 4, 1902.

W. C. PARMLEY.

PROCESS OF BUILDING CONCRETE AND MASONRY STRUCTURES.

(Application filed Apr. 10, 1902.)

(No Model.) 2 Sheets—Sheet 1.

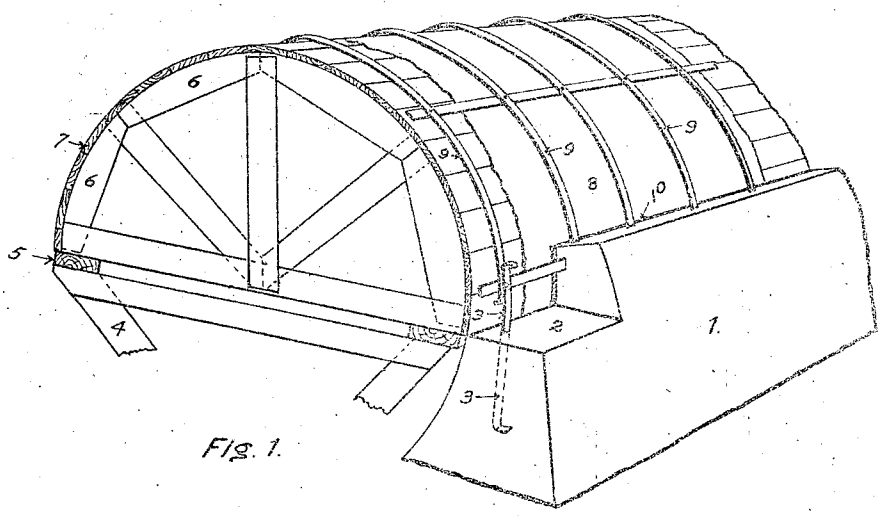


Fig. 1.

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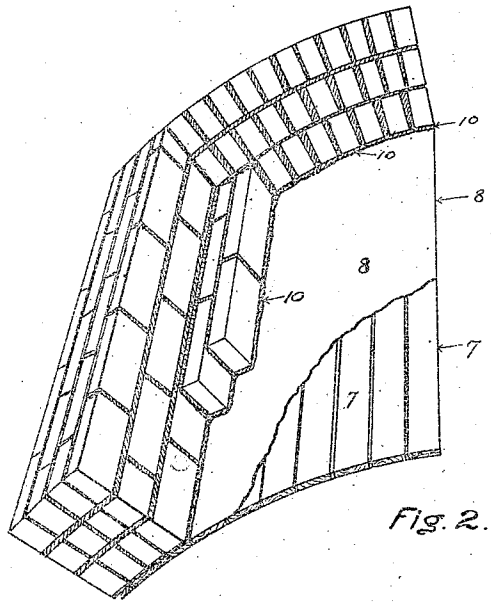


Fig. 2.

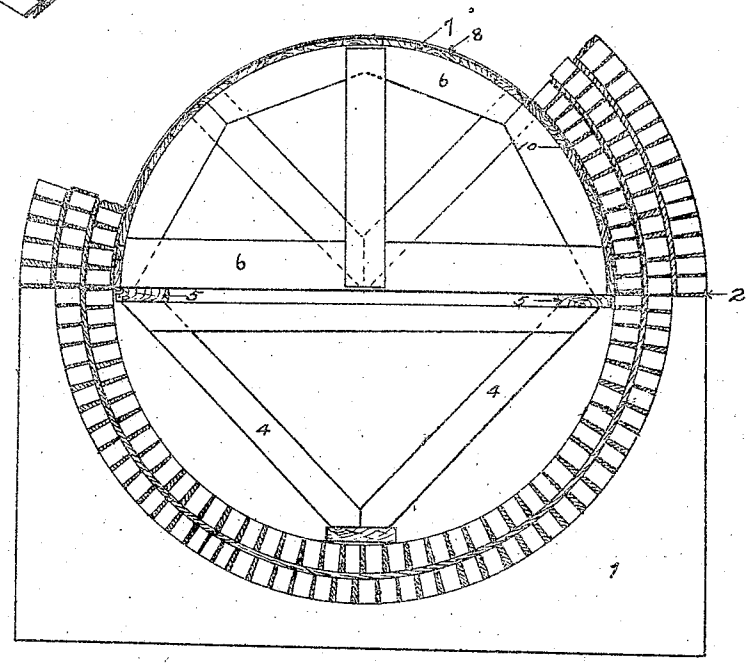


Fig. 3.

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PROCESS OF BUILDING CONCRETE AND MASONRY STRUCTURES.

SPECIFICATION forming part of Letters Patent No. 712,841, dated November 4, 1902.

Application filed April 10, 1902. Serial No. 102,346. (No specimens.)

To all whom it may concern:

Be it known that I, WALTER C. PARMLEY, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and useful Improvement in Processes of Building Concrete and Masonry Structures, of which the following is a specification.

This invention relates to an improved process of forming structures wherein one side at least is formed of mortar, concrete, masonry, &c., and has particular reference to the construction of sewers, mortar conduits in general, arches, ceilings, and the like. Heretofore in the building of these structures it has been impossible to secure a smooth and permanent interior surface, with the result that the capacity of the sewer or arch has been greatly diminished, owing to the friction of the water against the rough walls. By my process I am able to build these structures with an interior surface that is smoother than can be made of brickwork without adding materially to the cost of labor.

In the accompanying drawings, which show portions of sewers in process of construction according to my method, Figure 1 shows in perspective a portion of a concrete sewer having metal strengthening-bars which is under construction according to my method. Fig. 2 is a view similar to Fig. 1, illustrating the application of my process to the construction of masonry arches or sewers, and Fig. 3 is a transverse vertical section through the same.

While the drawings show and the description will be applied to the construction of sewers or arches, I desire it to be understood that the invention is not limited thereto, these structures being selected merely for purposes of illustration.

The desirability of having the inner wall of sewers and arches smooth in order to increase their carrying capacity and to improve their appearance has long been recognized and many attempts have been made to secure this result, such as by applying a coat of mortar or plaster after the structure is completed. These have proven to be failures in practice owing to the character of the surface, which affords no anchorage or hold for the plaster, which soon drops off. By this process this coating of mortar is supplied as the arch is constructed and is one continuous mass with that in the body of the arch in concrete structures or with that between the bricks in masonry arches. This being the case the inner coating is securely anchored and remains permanently in position.

In the drawings, in which similar reference characters designate corresponding parts throughout the several views, 1 represents the foundations or abutments of the sewers or arches built up in the usual manner as far as the springing line 2, with the exception that in the concrete arches shown in Fig. 1 short sections of metallic bars 3 are shown as embedded therein as the work progresses, the upper ends of these bars projecting above the springing line. These bars may also be used in masonry arches; but for simplicity of illustration the drawings do not show them in that form. When the arch has been built up to the springing line, the usual centering is provided, so that the upper half of the arch may be added. This centering consists of the inverted-A-shaped frames 4, which rest with their apices in the bottom of the arch and the ends of the legs at the springing line. Longitudinal beams 5 are laid upon these frames at the sides of the arch, and upon these beams are placed the centering 6, which is covered with lagging 7, said lagging being of the same form as the interior of the intended arch. Heretofore it has been customary to apply the mortar of the concrete arch directly to this lagging, which adheres thereto so strongly that frequently patches of the concrete are torn away when the lagging is removed, thus necessitating considerable patching. Furthermore, the cracks between the boards constituting the lagging cause the surface to be very rough and unsightly.

To prevent the mortar from adhering to the boards and from entering or leaking through the cracks therebetween, I cover the lagging with paper or other suitable thin and flexible material 8, and to prevent the moisture in the concrete from expanding and wrinkling and weakening the same I preferably coat it with paraffin, tar, or other substance impervious to water. After doing this I attach to the upper ends of the vertical bars 3 other bars 9, which extend around throughout the arch from side to side, as shown. These bars are

intended to strengthen the arch by passing through regions of tension, the lower ends of the short bars 3 being securely anchored in the foundation as the latter is constructed. If the bars 3 are continued from side to side of the arch through the crown when the foundation is formed, it will be difficult to place the centering in position, and for this reason the short bars are anchored in the abutments as they are formed and the bars 9 secured thereto after the centering is in place. When these bars are in position, the mortar and concrete is applied to the paper and is carefully rammed to make it compact and to force it closely about the bars. The outer surface is then finished in the usual manner and the structure permitted to stand for several days, when the centering is removed. Inasmuch as the mortar has never come into contact with the lagging, the latter is readily removed, the paper adhering to the mortar. This can generally be removed with little trouble, however; but if it should be difficult to detach it can be left in position, as it will shortly rot and drop away, leaving a hard and smooth interior surface. In all structures of this kind the cement in the concrete tends to settle or gravitate to the inner side, and when my process is not used, especially if there should be an excess of water, much of it escapes through the lagging with the dripping water. The paper, however, being impervious to water holds it and the cement in place until the concrete sets, and as the cement is the part of the concrete that gives it its cohesiveness its presence at the inner surface renders the same very hard.

In the masonry arch shown in Figs. 2 and 3 the bars 3 and 9 are omitted for convenience of illustration; but the foundation or abutments, the centering, including the lagging, and the paper 8 are all employed the same as was described in connection with the other arch. In order to secure the same hard and smooth interior surface, mortar is applied to the paper in small quantities next the bricks last laid, and the new brick is then pushed into place, which forces the mortar up between the bricks, so that the spaces are completely filled. This mortar has all been applied just before the brick is laid and before it has time to set, so that the coat between the bricks and paper and the mortar between the bricks is one continuous and homogeneous body. This process may be continued until the entire course of bricks next the paper is complete, after which the outer courses are applied in the usual way. As in the former case, the arch is permitted to stand until the mortar sets, when the centering is removed and the paper stripped off, as before described.

The foundation or abutments containing the vertical projecting bars may be of any approved construction, and any suitable form of centering for the arch may be employed, and while building-paper is a good material to use to separate the concrete and lagging and to prevent the waste of the cement any other suitable thin and flexible material may be used instead. The term "mortar" as used in the claims is intended to cover lime mortar, cement mortar, concrete, and all other forms of cementing material. The term "bar" is intended to include all forms of plain, corrugated, or other shaped bars, angles, &c., or all forms of built-up sections of bars held together by means of rivets, bolts, or otherwise.

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

1. The process of building arch structures which consists in constructing the abutments or foundations with metallic bars embedded therein and projecting above the upper surface thereof, attaching transverse bars to the ends of the said projecting bars, and forming the upper part of the arch about the said bars.

2. The process of building arch structures which consists in constructing the abutments or foundation with metallic bars embedded therein and extending above the springing line, providing suitable centering for the upper part of the arch, attaching transverse bars to the projecting ends of the aforesaid bars, and forming the said upper part of the arch about the centering and about the transverse bars,

3. The process of building arch structures which consists in constructing the abutments or foundations with metallic bars embedded therein and projecting above the upper surface thereof, providing suitable centering for the upper part of the arch, attaching transverse bars to the projecting ends of the aforesaid bars, forming the said upper part of the arch about the centering with a layer of thin flexible material separating the arch and centering, said arch embedding the transverse bars and having a layer of mortar next to the flexible material, permitting the mortar to harden, and then removing the centering.

4. The process of building arch structures which consists in constructing the abutments or foundations with metallic bars embedded therein and projecting above the upper surface, providing suitable centering for the upper part of the arch, attaching transverse bars to the projecting ends of the aforesaid bars, forming the upper part of the arch about the centering with a layer of paper separating the arch and centering, said arch embedding the transverse bars and having a layer of mortar next the paper, permitting the mortar to harden, and then removing the centering.

5. The process of building arch structures which consists in constructing the abutments or foundations with metallic bars embedded therein and projecting above the springing line, providing suitable centering for the upper part of the arch, covering the said center-

ing with a layer of paper that is rendered impervious to water, attaching transverse bars to the projecting ends of the aforesaid bars, forming the upper part of the arch about the centering and embedding the transverse bars with a layer of mortar next the paper, permitting the mortar to harden, removing the centering, and then stripping off the paper.

6. The process of building arch structures which consists in constructing the abutments or foundation with metallic bars embedded therein and projecting above the springing line, providing suitable centering for the upper part of the arch, covering the said centering with a layer of paper, coating said paper with paraffin, attaching transverse bars to the projecting ends of the aforesaid bars, forming the upper part of the arch about the centering and embedding the transverse bars with a layer of mortar next the paper, permitting the mortar to harden, removing the centering, and then stripping off the paper.

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

WALTER C. PARMLEY.

Witnesses:
S. E. FOUTS,
C. N. FISCUS.