F. S. WENDELKEN.

SECTIONAL CONCRETE STRUCTURE.

APPLICATION FILED SEPT. 21, 1915.

1,220,305.

Patented Mar. 27, 1917.

2 SHEETS—SHEET 1.

Fig. 1.

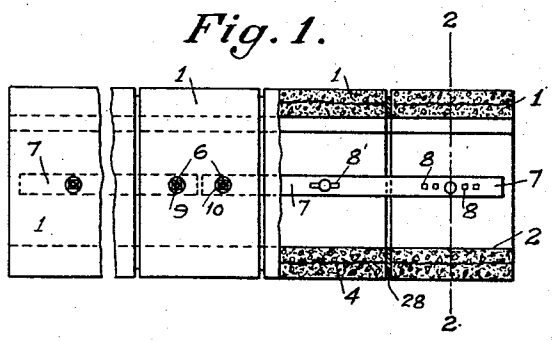


Fig. 2.

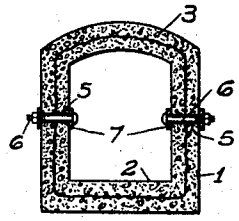


Fig. 3.

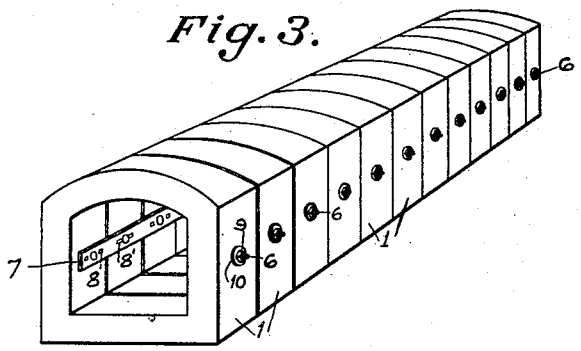


Fig. 4.

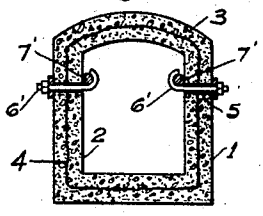


Fig. 5.

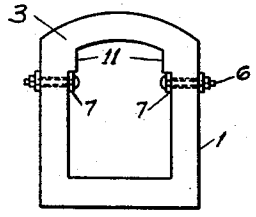


Fig. 7.

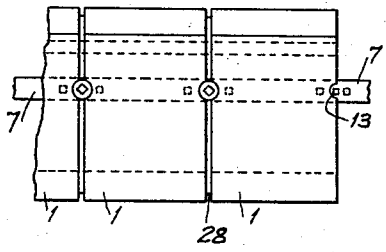


Fig. 8.

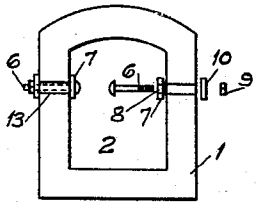


Fig. 6.

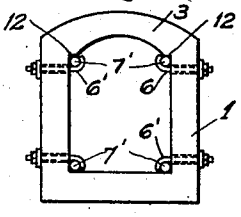
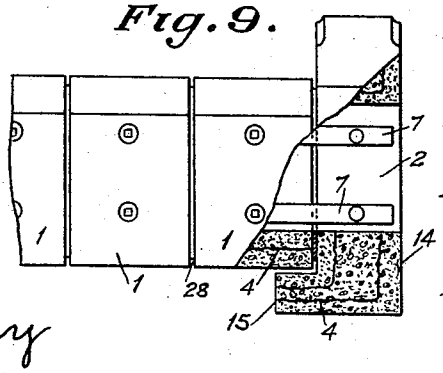


Fig. 9.



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Fig. 10.

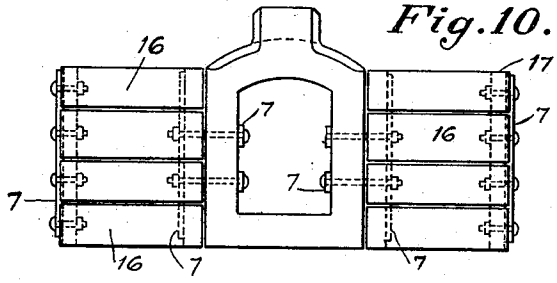


Fig. 11.

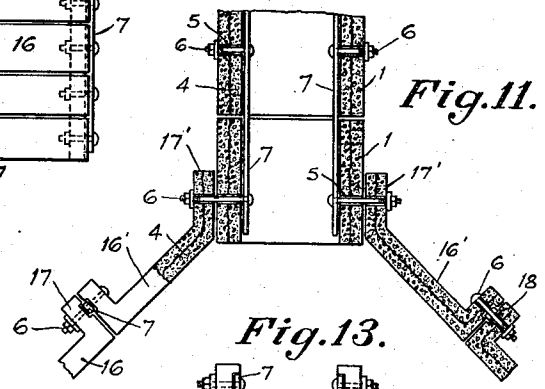


Fig. 13.

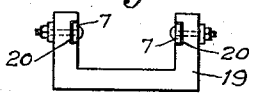


Fig. 12.

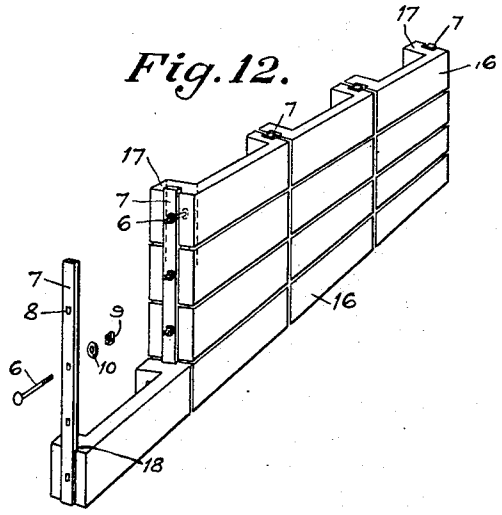


Fig. 14.

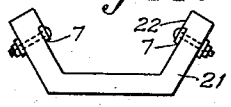


Fig. 15.

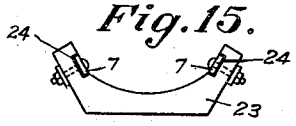


Fig. 16.

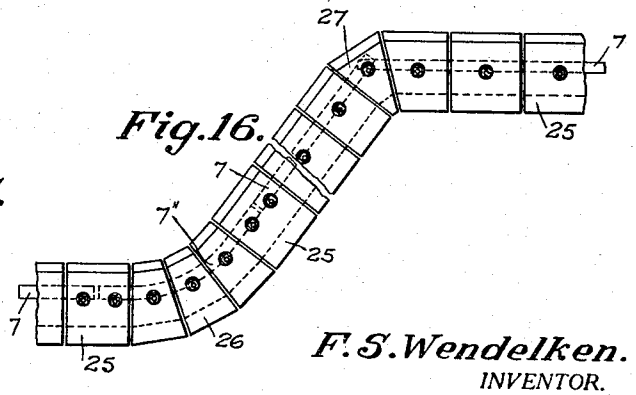
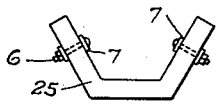


Fig. 17.



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SECTIONAL CONCRETE STRUCTURE.

1,220,305. Specification of Letters Patent. Patented Mar. 27, 1917.

Application filed September 21, 1915. Serial No. 51,768.

To all whom it may concern:

Be it known that I, FREDERICK S. WENDELKEN, a citizen of the United States, residing at Fort Collins, in the county of Larimer and State of Colorado, have invented new and useful Improvements in Sectional Concrete Structures, of which the following is a specification.

My invention relates to concrete or other plastic block structures and is adapted especially to the construction of waterways, culverts, bridges and other conduits. The objects of my invention are to provide a concrete block that may be positively alined and anchored in a sectional structure. In the construction of water ways, such as ditches, culverts, sewers and the like, the objects are also to provide a simple and economical means of assembling and positively anchoring the sections in place in the structure, and especially to insure the inner faces or channel surfaces of the sections being flush forming a smooth and uniform water channel. Also to provide sectional blocks that may be easily and quickly assembled into a strong and permanent structure. Other objects and advantages will be apparent from the following specification and explanation.

In the accompanying drawings:

Figure 1 is a side view of a simple sectional concrete culvert constructed according to my invention, the right half of the figure being shown in vertical center longitudinal section.

Fig. 2 is a vertical transverse section through a culvert section, on the line 2—2 of Fig. 1.

Fig. 3 is a perspective view of a simple sectional concrete culvert constructed according to the showing in Figs. 1 and 2.

Fig. 4 is a vertical transverse section of a culvert showing a form of anchoring the blocks to a round anchoring or tie rod.

Fig. 5 is an end view of a culvert with modified form of block.

Fig. 6 shows another form of culvert and culvert block, the figure showing an end view of the culvert.

Fig. 7 is a side view of a culvert having anchor bolts extending through grooves at the ends of the sections.

Fig. 8 is an end view of a culvert shown in Fig. 7.

Fig. 9 is a side view and part center section of the end of a culvert with a peculiar form of end block and a plurality of anchoring rods at each side of the channel.

Fig. 10 is a front end view of a culvert with sectional wing walls constructed according to my invention and anchored to the end block of the culvert.

Fig. 11 shows a longitudinal cross section of the end of a simple culvert with divergent sectional wing walls, the extreme left hand portion of the figure showing a top view of one form of wing wall joint.

Fig. 12 indicates in perspective an extended wing wall or retaining wall, indicating the manner of construction.

Figs. 13, 14, 15 and 17 show several forms of blocks for use in ditch linings, the figures indicating an end view of a ditch or water way.

Fig. 16 is a side view of a water way constructed of blocks of the form shown in Fig. 17, the figure indicating a chute for use in place of drops along a ditch line.

In general my invention consists of concrete or other plastic blocks to be placed end to end or side to side in a series in a structure and the series of blocks securely anchored to a metal or other suitable longitudinal tie rod or strip.

Figs. 1 to 9, inclusive, show an application of my invention to blocks for culverts or other similiar conduits and the construction of an assembled culvert.

In Figs. 10 to 17, inclusive, my invention is shown as applied to ditch linings and retaining walls and other similar structures.

Throughout the several figures in the drawings the same numerals refer to like parts.

Numeral 1 is a hollow culvert block comprising a cross section of a culvert, and a uniform longitudinal channel opening 2 through the block forming a transverse section of the water channel of a culvert. Blocks 1 may be of any desired shape but are preferably arched at 3 to withstand heavy overhead loads.

The blocks used in the several structures may be made with the usual metal or any desired reinforcement 4.

5 are transverse holes through the sides or walls of the blocks to receive anchor bolts 6 to anchor the blocks in a culvert to longitudinal tie rods or strips 7.

7 are suitable rods or strips, preferably

of iron or steel, provided with holes 8 at proper distances along the rods to receive the anchor bolts 6. If desired, the tie rods may be provided with a series of holes 8 or elongated holes or slits 8′, as indicated in Figs. 1 and 3, to allow adjustment and proper spacing of blocks of varying length.

In place of flat tie strips, as shown in Figs. 1, 2 and 3, the tie strip or rod may be round, as shown at 7′ in Figs. 4 and 6. When a round tie rod is used, or any rod not having the holes 8, the anchor bolts 6′ have hooks or bent ends to engage with or hook over and draw around the rod. This construction has the advantage of anchoring the sections without reference to any hole in the tie rod.

9 are suitable nuts to screw on anchor bolts 6 or 6′. 10 are washers or plates to go on the anchor bolts under nuts 9.

To insure more rigid anchoring of the sections and to better insure exact alinement of the sections in a conduit, the inner faces of the blocks may be provided with shoulders 11 to rest upon the tie rods. The transverse holes or grooves through the walls of the blocks are adjacent to the shoulders and so placed in this construction that the tie rods, when anchored, will fit snugly up against these shoulders. Another manner of accomplishing a similar result is shown in Fig. 6; the blocks being provided with off-sets 12 at the upper corners of the channel opening in which the tie rods may be placed. Two sets of tie rods are shown in Fig. 6, one set in the upper corners of the channel opening and the other set at the lower corners. This arrangement is particularly desirable in larger culverts and where the culvert sections are of considerable weight.

In place of providing holes through the block walls, grooves 13 may be made at the ends of the blocks (Figs. 7 and 8). In such construction the grooves in adjacent blocks are made to coincide and the anchor bolts 6 extend transversely through the culvert walls through the openings made by the grooves.

In an assembled structure each individual section or block is rigidly anchored to the tie rods 7 by means of the anchor bolts 6 independently of the anchoring of the other sections.

14 (Fig. 9) indicates an end block having a lip 15 extending backward from its base to better support the adjacent blocks 1 of the culvert.

16 is a form of block that may be used in wing walls or retaining walls and dam facings and the like. Blocks 16 may be made similar to the base of the blocks 1 used in culverts, the outer face of a block 16 corresponding with the bottom of a culvert block 1. Extending backward from the ends of blocks 16 are bracing or anchoring wings 17 through which the transverse holes are provided for anchoring bolts 6. The outer faces of the wings 17 may be provided with grooves 18 to receive the tie rods 7.

A wing wall or retaining wall is constructed by arranging the blocks 16 in a series and anchoring the blocks to the tie rods, similar to the assembling of a culvert. The tie rods may be arranged on the outer faces of wings 17, as shown in Figs. 11 and 12 and at the extremes of Fig. 10, in grooves or not as desired. Or the tie rods may be arranged on the inner faces of the rings, as shown in dotted lines at the inner ends of the wing walls in Fig. 10.

If wing walls at the ends of a culvert are to be divergent, as shown in Fig. 11, similar blocks 16′ are provided with one anchoring wing 17′ at an obtuse angle with the face of the block.

In extended wing walls or long retaining walls, the several series of blocks are arranged edge to edge, as shown in Figs. 11 and 12, one tie rod between two series anchoring each series, and the anchor bolts may extend through the brace wings 17 of the blocks in adjacent series.

Figs. 13, 14, 15 and 17 show sectional blocks for use in ditch or other water way linings, the figures indicating end views of a ditch lining and showing different forms of blocks. 19 (Fig. 13) shows a block with a longitudinal groove 20 along each inner face of the block in which the tie rods 7 are arranged, the transverse holes for the anchor bolts being placed to draw the tie rod into the groove.

Block 21 is shown with shoulders 22 under which the tie rods fit for the same purpose and similar to the shoulders 11 in Fig. 5, explained above.

23 is another shape of block with longitudinal grooves 24 to receive the tie rods.

In Fig. 17 is shown a simple form of block 25 for ditch linings. And in Fig. 16 is shown a chute for a ditch drop constructed of blocks of the type shown in Fig. 17. Such a chute is used in ditches where the ditch line drops suddenly and provision must be made to prevent washing of the ditch banks and bottom. The tie rods for anchoring the blocks are similar to those in other conduits except that the rods 7″ are bent to form any desired curve in the ditch line. Blocks 26 and 27 indicate tapered forms that may be used at the top or bottom of such a chute.

28 indicates mortar or cement or other material that may be used to fill in the interstices between blocks.

It will be understood that the several modifications of anchoring may be used with any shape of block, depending upon the use intended and the size of blocks used. The blocks for structures according to my inven-

tion may be manufactured at a central plant and transported to the place where they are to be used. The advantages of thus manufacturing the concrete structures in sections capable of being moved and having the material entirely set and the blocks cured before use, both from the standpoint of convenience and economy and durability, are well known.

In molding my blocks for water channels, as in the case of culverts, sewers, ditches and the like, it is important that the transverse holes in the blocks for receiving the anchor bolts be made in the blocks in a fixed relation to the water channel opening in the blocks, in order to insure uniformity and a smooth surface to the channel in an assembled structure. I accomplish this by using a form for molding blocks wherein the bar that makes the transverse hole is fixed with reference to the drum of the form that makes the water channel opening through the block.

By thus having the fixed relation between the water channel and the transverse holes, and especially by the anchoring of the blocks to a longitudinal tie rod extending along the sides of the water channel inside an assembled conduit or culvert, the several blocks in a series are positively and exactly alined with reference to the channel opening and not the outside of the blocks, thus insuring a smooth channel of uniform cross section even though the outside of the blocks may not be true or uniform.

In assembling a structure, the blocks are successively placed in their permanent positions each block individually being rigidly anchored to the longitudinal tie rod before the next block is placed in the structure. This allows each section or block to be set permanently without the necessity of moving or adjusting an entire series after they have been placed in position, and a structure may be added to without disturbing the sections already in place.

I claim:

1. In a sectional structure blocks of plastic material arranged together in a series, tie rods extending longitudinally throughout said series against the sides of said blocks to positively aline and anchor said blocks in the structure, anchor bolts engaging said tie rods and extending transversely through the walls of each block rigidly anchoring each block independently and individually to said tie rods, substantially as described.

2. In a conduit a series of blocks of plastic material arranged end to end, each block having a uniform longitudinal channel opening and forming a cross section of the conduit, longitudinal tie rods arranged throughout said series against the inner faces of said blocks at the sides of the channel opening, anchor bolts engaging said tie rods and extending transversely through the side walls of each block rigidly anchoring each block independently and individually to said tie rods, substantially as described.

3. A culvert consisting of a series of plastic blocks arranged end to end, each block having a uniform longitudinal channel opening therethrough and each block forming a cross section of the culvert, longitudinal shoulders along the inner faces of said blocks, longitudinal tie rods arranged against said shoulders throughout the length of said culvert to positively aline the channel openings of said blocks, anchor bolts engaging said tie rods and extending transversely through the side walls of said blocks and rigidly anchoring each of said blocks independently and individually to said tie rods, substantially as described.

FREDERICK S. WENDELKEN.

Witnesses:

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WALTER P. CROSE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."