C. OLDER, C. M. SLAYMAKER & H. E. BILGER.

CULVERT CORE.

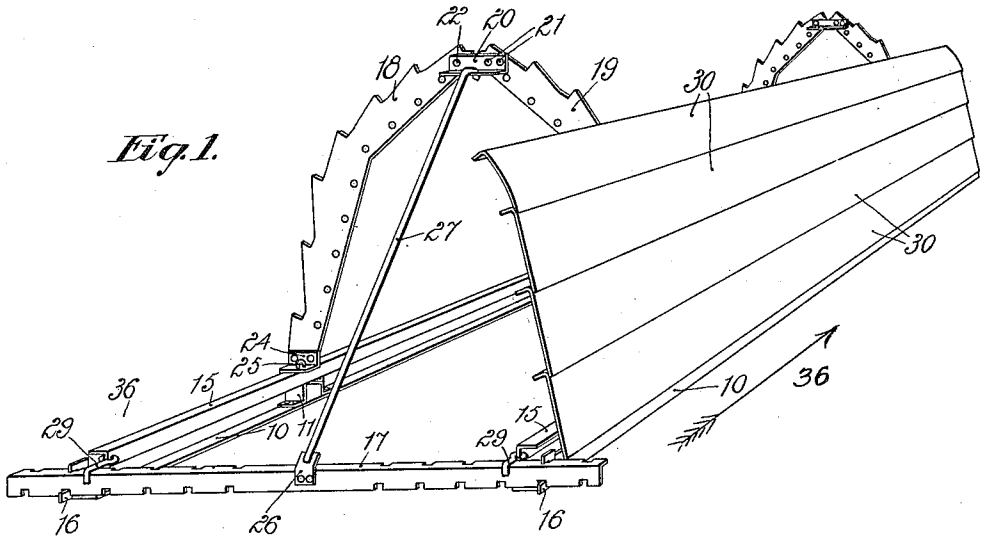
APPLICATION FILED MAY 20, 1912.

1,154,720.

Patented Sept. 28, 1915.

3 SHEETS—SHEET 1.

Fig. 1.



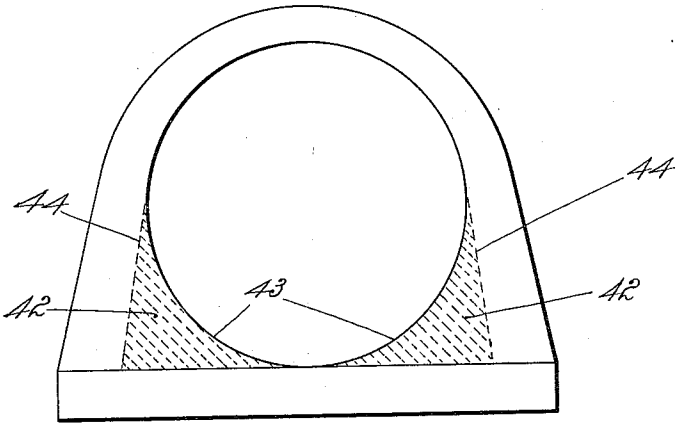


Fig. 6.

Witnesses:
Robert J. Bracke
Leslie W. Fricke

Inventors
Clifford Older
Charles M. Slaymaker
Harry E. Bilger
By Brown & Williams
Attorneys

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

C. OLDER, C. M. SLAYMAKER & H. E. BILGER.

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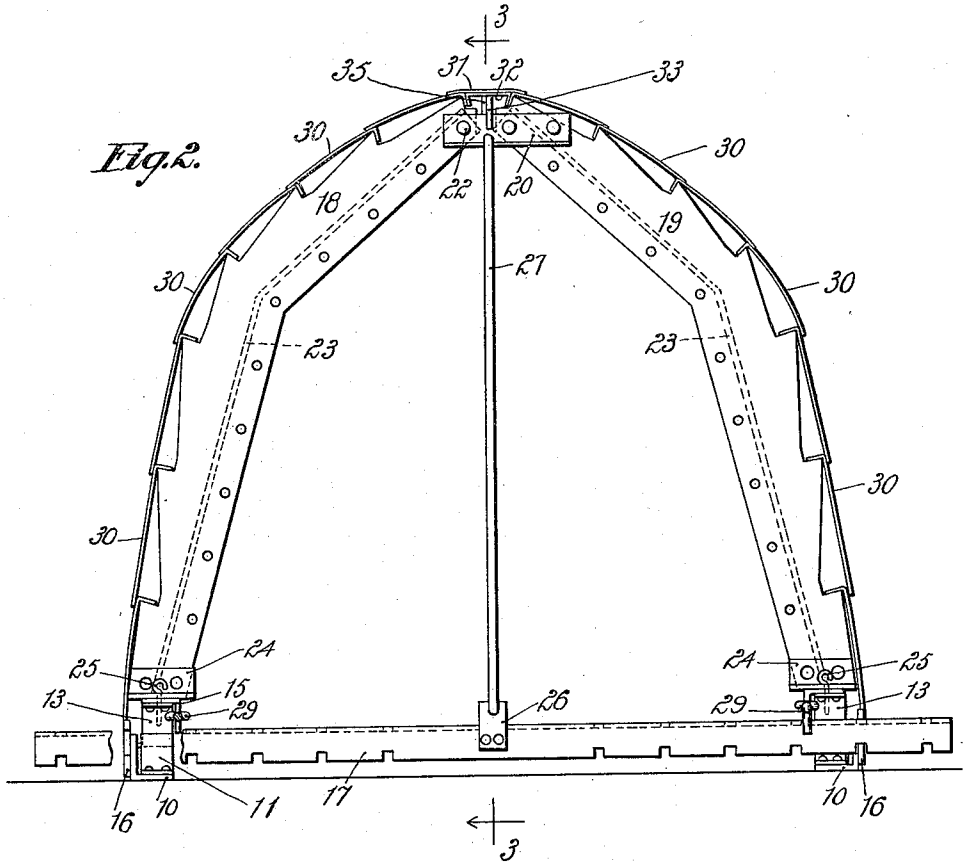
3 SHEETS—SHEET 2.

Fig. 2.



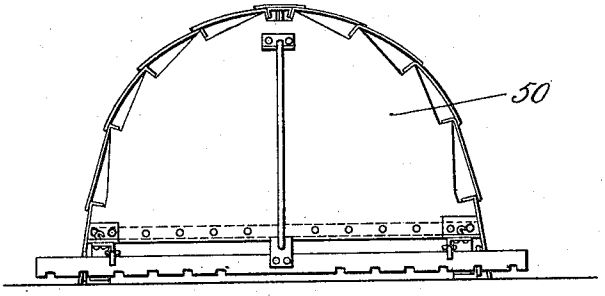


Fig. 5

Witnesses:
Robert J. Bracke.
Albin E. Ahlberg.

Inventors
Clifford Older
Charles M. Slaymaker
Harry E. Bilger
By Bowin & Williams
Attorneys

C. OLDER, C. M. SLAYMAKER & H. E. BILGER.

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3 SHEETS—SHEET 3.

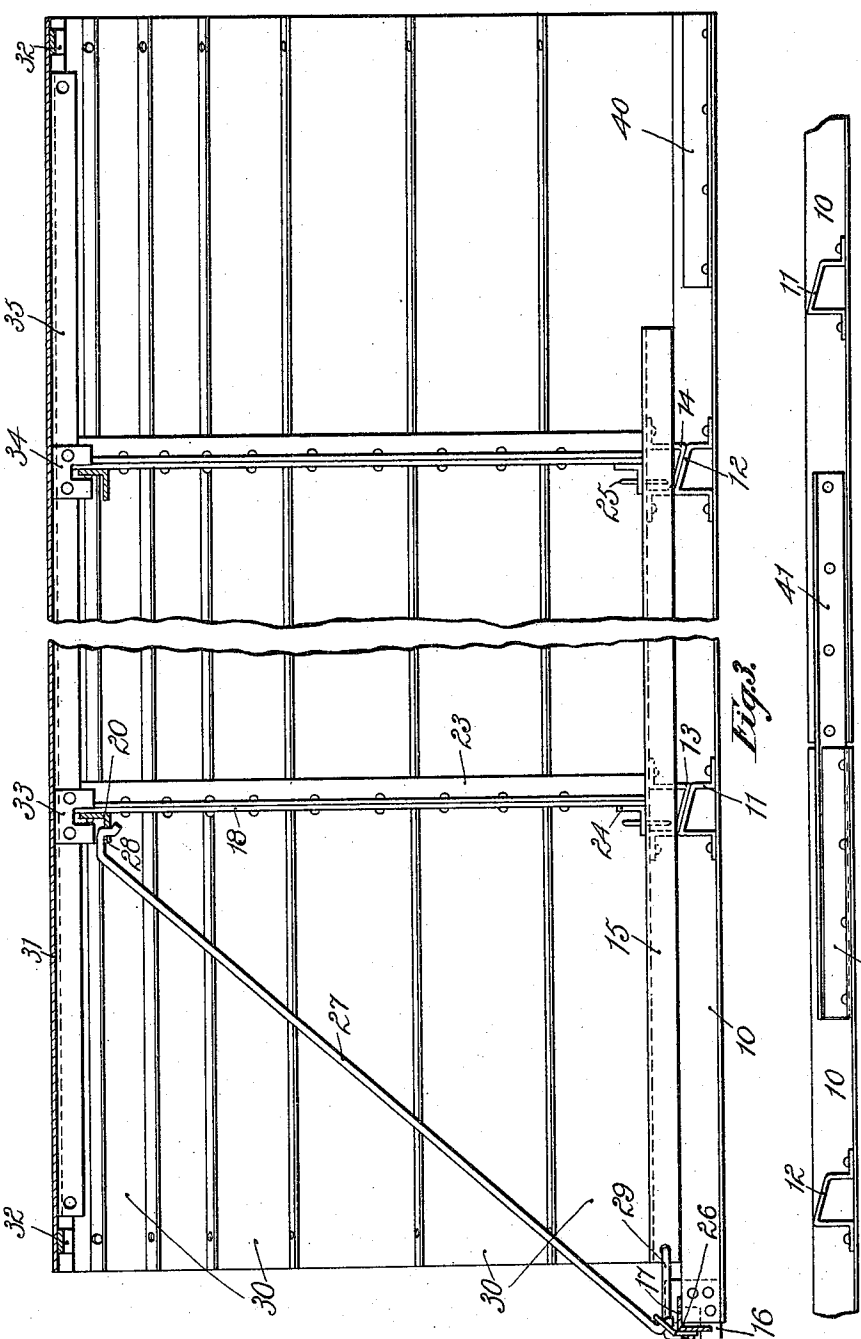

Fig. 3.

Fig. 4.

Witnesses:
Robert F. Bracke
Leslie W. Tricke

Inventors
Clifford Older
Charles M. Slaymaker
Harry E. Bilger
By Munn & Williams
Attorneys

UNITED STATES PATENT OFFICE.

CLIFFORD OLDER, OF SPRINGFIELD, CHARLES M. SLAYMAKER, OF OTTAWA, AND HARRY E. BILGER, OF SPRINGFIELD, ILLINOIS.

CULVERT-CORE.

1,154,720. Specification of Letters Patent. Patented Sept. 28, 1915.

Application filed May 20, 1912. Serial No. 698,377.

To all whom it may concern:

Be it known that we, CLIFFORD OLDER, CHARLES M. SLAYMAKER, and HARRY E. BILGER, citizens of the United States, residing, respectively, at Springfield, in the county of Sangamon and State of Illinois; Ottawa, in the county of La Salle and State of Illinois, and Springfield, in the county of Sangamon and State of Illinois, have invented a certain new and useful Improvement in Culvert-Cores, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

Our invention relates to adjustable and collapsible cores for concrete construction, particularly for use in building culverts, sewers, aqueducts, and the like. The core or form of our invention is designed for use in building arches of theoretically correct proportions and with little or no waste of concrete. The advantages of the arch form, as constructed by the use of the core of our invention, will be more clearly understood from a diagram forming a part of the accompanying drawings.

The core of our invention is adjustable to accommodate itself to the construction of arches of varying kinds or widths, as may be required to meet particular conditions. For instance, in a deep narrow ravine the height may be made equal to or greater than the width, whereas for a shallow waterway a low wide arch may be formed. The curvature and proportions under all of these adjustments will approximate the theoretically perfect arch form.

Not only is the core of our invention adjustable, but it is collapsible or partially collapsible, whereby a length of core may be used in forming one part of a culvert or aqueduct, when, after the setting of the concrete, the core may be partially collapsed and drawn forward to serve as a form for molding the next succeeding section or sections of the culvert or aqueduct. Furthermore, the core of our invention has the practical advantage that it may be handled successfully by a single workman.

These and other advantages will more fully appear upon consideration of the accompanying drawings in which—

Figure 1 is a perspective view of a partially erected core of our invention; Fig. 2 is an end elevation of the core completely assembled and ready for use; Fig. 3 is a cross-sectional view taken on line 3—3 of Fig. 2; Fig. 4 is a detail illustrating the manner in which two adjacent lengths or sections of core are alined with one another; Fig. 5 is an end elevation of a core of smaller cross-sectional area; and Fig. 6 is a diagram illustrating the form of concrete arch which may be built with the cores of our invention.

Like characters of reference are applied to corresponding parts in all of the figures.

Proceeding to a more detailed description, we provide a lower base angle 10, to which is riveted a pair of beveled supporting blocks 11 and 12. A corresponding pair of beveled supporting blocks 13 and 14 is riveted to an upper base angle 15. The several figures illustrate the relation of these base angles when the core is in condition for molding a section of culvert. It will be seen that two of the lower base angles are laid down parallel with each other and separated a distance corresponding with the width of the arch to be formed. An upper base angle rests by the supporting blocks upon each of the lower base angles. The forward end of each of the lower base angles is provided with a sheet-steel catch plate 16. These catch plates coöperate with the notched spacer bar 17 to determine the distance between the lower base angles.

Figs. 1, 2 and 3 illustrate a pair of adjustable ribs mounted upon the upper base angles. Each of the ribs comprises two sections 18 and 19, the section 19 being provided with a connecting plate 20, this plate being riveted to the rib section 19 at 21. A hole through the connecting plate 20 and the rib section 18, as indicated at 22, is adapted for the reception of a pin which forms a hinge joint between the two rib sections. Each of the rib sections is stiffened by a piece of angle-iron 23. The lower end of each rib section is provided also with a short foot 24, the foot taking the form of a short piece of angle-iron riveted to the lower end of the rib section and provided with a hole through which a connecting pin 25 may be thrust to connect the foot of the rib section with the upper base angle, the upper base angles being provided with holes for the reception of the pins 25. A brace clip 26 is riveted to the center of the spacer bar 17, whereby a brace rod 27

may be hooked through a hole 28 in the connector 20, as also through a hole in the brace clip 26 to support the upper end of the rib section. Only one of the ribs of each section is provided with this diagonal brace, the other rib of the pair being supported by means presently to be described.

The forward end of each of the upper base angles is provided with a hook 29 adapted to drop over the spacer bar 17. These hooks hold the beveled supporting blocks, one directly above the other, as illustrated in the drawings.

The frame parts having been arranged and connected together, as hereinbefore indicated, the shingles 30—30 are laid up over the notched ribs, as indicated in Fig. 1. Each shingle is provided at its upper edge with an inturned lip which hooks over the notches of the rib sections, as shown. The top strip 31 is provided at either end with a spacer 32, against which the inturned lips of the uppermost side shingles abut. It is provided also with notched spacers 33 and 34, riveted to a stiffening rib 35 of angle-iron. The spacers 33 and 34 drop over the upper ends of the ribs, as best shown in Fig. 3, thereby connecting the forward rib with the rearward rib and thus enabling the single diagonal brace-member 27 to hold both rib sections against falling forward or back, as might happen without such support.

The framework having been laid down upon a concrete or other suitable floor, as indicated in Fig. 1, the sheet metal shingles are laid over the ribs to form the core. Concrete is then tamped in around the core. When the concrete has set, the hooks 29 are thrust back and each of the upper base angles is struck a sharp blow in the direction of the arrow 36. The backward movement of the upper base angles causes the beveled surfaces of the supporting blocks to slide over one another, thereby permitting the upper base angles to have a slightly downwad movement. Since it is the upper base angles that carry the ribs and the shingles, the latter will be partially collapsed with respect to the concrete which has been molded about them. Since, now, the core does not completely fill the opening in the concrete, the shingles can be drawn forward one by one, whereupon the framework may be more or less completely disassembled and drawn forward and out of the molded section of concrete. The core may then be set up for molding a second section of concrete, if so desired. In some cases the core can be drawn forward through the opening in the molded concrete without having been disassembled.

In some instances, it will be desired at one time to mold a concrete section of greater length than that of a single core. In such cases, two or more cores may be connected end to end. In order that adjacent sections may be brought into proper register, we rivet a short section of angle-iron 40 to the inner end of the lower base angle, as shown in Fig. 4. We also rivet another length of angle-iron 41 to the outer end of a second base section. These sections form a slip joint by means of which a second section of core may be alined with the first section.

Fig. 6 illustrates the advantages arising from the use of our culvert core, as against the usual forms of culvert core. Ordinarily, the bore is of circular cross-section. This makes it difficult to fill in the spaces which are cross-hatched at 42—42. The surfaces at 43 are very likely also to be rough, thereby impeding the flow of water through the aqueduct. By the use of our invention, the bore of the culvert follows the dotted lines at 44—44, thereby overcoming the waste of concrete at 42, overcoming also the roughness at 43 and providing a cross-section corresponding very closely with the best cross-section as theoretically determined. By adjusting the inclination of the sides and the curvature of the form, an arch of theoretically correct proportions may be built with a minimum amount of concrete. This cannot be done with a circular core or with one in which the inclination of the ribs is fixed.

The diagram of Fig. 6 illustrates the fact that with our invention greater waterway is provided in a barrel whose outside dimensions are the same, as in the case of a culvert having a circular bore.

The knock-down construction permits the substitution of interchangeable parts, as illustrated for example in Fig. 5. This shows a rib 50 of very much smaller area than is the rib section illustrated in Fig. 2. The small rib 50 may be attached to the base angles, as illustrated. A proper number of the shingles can be mounted upon the small rib sections, whereby an aqueduct of correspondingly small bore may be molded.

While we have illustrated our invention in the particular embodiments herein shown and described, we do not wish to be limited to these constructions, but desire to claim broadly any equivalent constructions which may suggest themselves to those skilled in the art.

What we claim as new and desire to secure by Letters Patent is:

1. In a device of the class described, the combination of notched supporting ribs, a plurality of sheet-metal shingles with inturned lips adapted to engage the notches of the ribs, a top shingle adapted to ride upon the tops of the supporting ribs, and means associated with the top shingle for longitudinally spacing the supporting ribs.

2. In a device of the class described, a pair of lower base members, a pair of upper

base members, beveled supporting blocks beveled from front to back attached to the upper and lower base members, corresponding blocks engaging each other, a spacing bar adapted to interlock with the ends of the base members to determine the distance between the lower base members, a plurality of interchangeable supporting ribs with notched peripheries detachably mounted upon the upper base members, a stiffening brace connecting one of the supporting ribs with the spacer bar, a top shingle adapted to ride upon the tops of the supporting ribs, means associated with the top shingle for longitudinally spacing the supporting ribs, and a plurality of overlapping sheet-metal shingles of curved contour, each shingle being provided with an inturned lip adapted to engage the notches on the peripheries of the supporting ribs.

In witness whereof, we hereunto subscribe our names, in the presence of two witnesses.

CLIFFORD OLDER.
CHARLES M. SLAYMAKER.
HARRY E. BILGER.

Witnesses to the signatures of Clifford Older and Harry E. Bilger:

L. F. DUVALL,
O. L. ADDLEMAN.

Witnesses to the signature of Charles M Slaymaker:

CHRISTIAN SCHLUSSER,
ANDREW REINERSON.