

Sept. 7, 1937.

N. F. ARBLE

2,092,385

CRIBWORK

Filed April 21, 1936

2 Sheets-Sheet 1

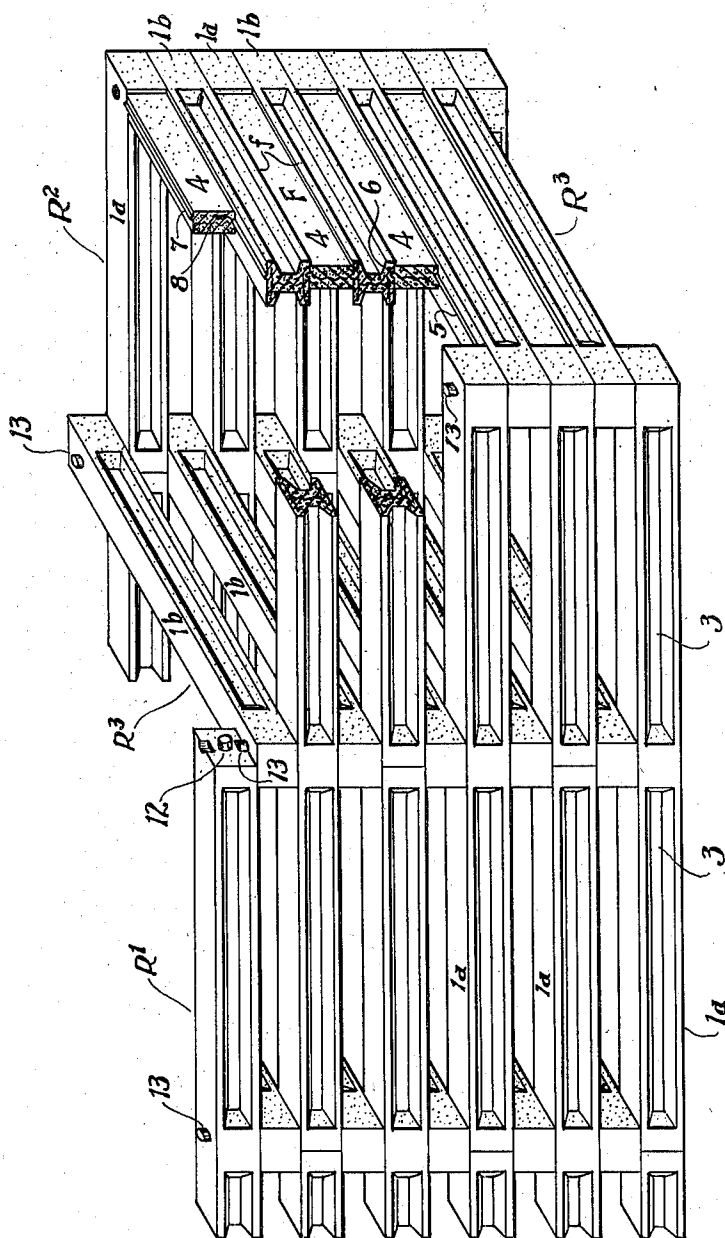


FIG. 1

INVENTOR.
Newton F. Arble
BY Christy and Wharton
ATTORNEYS.

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2 Sheets-Sheet 2

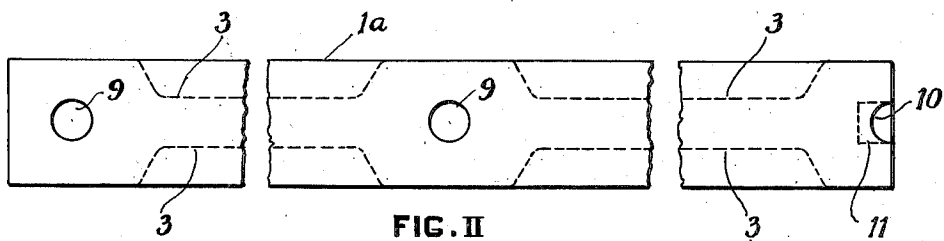


FIG. II

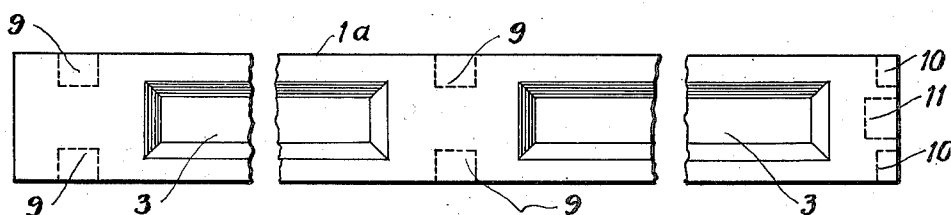


FIG. III

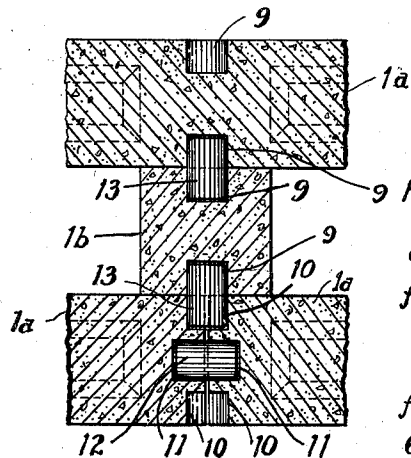


FIG. IV

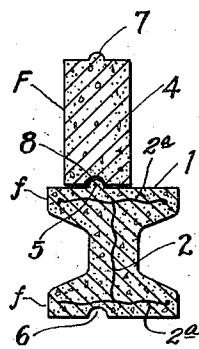


FIG. IX

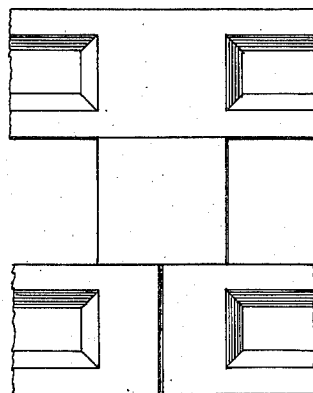


FIG. V

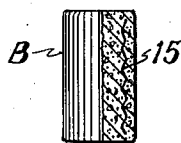


FIG. VII



FIG. VIII

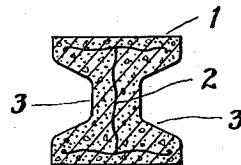


FIG. VI

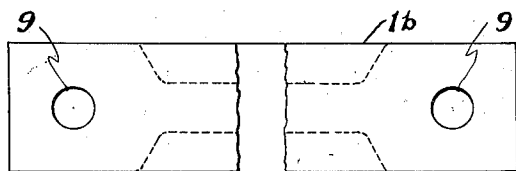


FIG. X

INVENTOR.
Newton F. Arble
 BY *Christy and Wharton*
 ATTORNEYS.

UNITED STATES PATENT OFFICE

2,092,385

CRIBWORK

Newton F. Arble, Pittsburgh, Pa.

Application April 21, 1936, Serial No. 75,571

3 Claims. (Cl. 61—47)

My invention relates to cribwork, that is, to frames constructed of sleepers, and filled with stones and earth, to provide a retaining wall (or a bridge pier, or a dock base, or the like) which is resistant to erosion.

Hitherto, timber sleepers and sleepers of reinforced concrete having been employed in the construction of cribwork, and various devices have been employed in securing the sleepers in assembly. In concrete cribwork of the usual and most widely used sorts, the ends of the sleepers are secured together in tongue-and-groove unions. The tongues of such unions are essentially made to fit the grooves snugly, and there is little or no play or flexibility between the parts, as is desirable in the construction of retaining walls that are curved in plan. Various dowel joints have been proposed, but so far as I am aware none of the proposed structures are perfect; water enters the joints and unions and stands, with the consequence and effect that in cold weather the water freezes and expands, causing the interengaged portions of the concrete members to spall and crack. Thus, the life of the cribwork structure is shortened.

More particularly my invention is directed to concrete cribwork, and consists in a specifically improved joint or union for securing the individual concrete members in assembly.

In the accompanying drawings Fig. I is a fragmentary view in perspective of cribwork embodying the invention; Fig. II is a fragmentary view in plan and to larger scale of one of the individual concrete sleepers of the cribwork; Fig. III is a similar view of the same in side elevation; Fig. IV is a fragmentary view, showing in vertical section two courses of longitudinal sleepers with the end of a cross sleeper secured between; Fig. V is a view in front elevation of the structure shown in Fig. IV; Fig. VI is a view in cross-section of my concrete sleeper; Fig. VII is a view, partly in side elevation and partly in vertical section, of a particular fastening element used in my cribwork; Fig. VIII is a view in plan of such element; Fig. IX is a view in cross-section of my sleeper, showing an elaboration in structure for cooperation with filler blocks, and showing one of such blocks assembled therewith; and Fig. X is a view in plan of a sleeper of modified structure for use in the cribwork.

Referring to the drawings, my cribwork is constructed of concrete sleepers *1a* and *1b* of the general rectangular form illustrated in Figs. III, IV, and X, and each sleeper embodies an expanded metal reinforcement *2*. The reinforcement is

of I section, as shown in Figs. VI and IX, comprising two horizontal sheets *2a* of expanded metal secured, say by spot-welding to the opposite edges of an interposed vertical sheet (*2*) of expanded metal. In order to conserve material and to enhance artistic appearance, I include in the body of each sleeper two or more rectangular recesses *3*.

In accordance with usual practice any desired form of cribwork may be constructed of my sleepers, and, in exemplary way in Fig. I, I show a cribbing wall in course of construction. The sleepers are assembled in such manner as to form two parallel, vertically extending reaches *R¹* and *R²*, interconnected and integrated at uniform intervals by means of vertical transverse reaches *R³*. The sleepers *1a* (Fig. I) used in the construction of the front and rear walls or reaches *R¹* and *R²* are known in the art as stretchers, and the sleepers *1b* used in the transverse walls or reaches *R³* are known as headers.

The bottom courses of the inner and outer walls or reaches *R¹* and *R²* rest upon a suitable footing—ordinarily a concrete base (not shown) is provided, and in accordance with usual practice the upper face of such footing or base lies in a horizontal plane, or in an inclined plane lying normal to the slope or batter desired in the finished structure.

The ends of the headers (*1b*) lie between the horizontal courses of the stretchers (*1a*), whereby the several courses of stretchers are vertically spaced from one another and extend in parallelism. The sleepers *1a* may, and ordinarily will, be constructed of greater length than the sleepers *1b*. In completed form the cribwork is filled and packed with riprap, earth, or other suitable filling material, and as thus constituted (and by virtue of the features of my invention presently to be described) provides a structure which is both efficient and durable in service.

Usually portions of the cribwork remain exposed to view in the finished installation, and desirably the open spaces between the stretchers and headers in such exposed portions are closed, to provide better confinement of the filling material and to lend neater appearance to the whole. To this end I provide concrete slabs *4* for closing such spaces, and in Fig. I the slabs *4* are shown to be installed between the headers *1b* of the right-hand wall *R³*, but it will be understood that identical organization of such slabs may be made with the stretchers. On the upper face of each sleeper to be used in the exposed walls of the cribwork, I provide a longitudinally extending rib *5* and on

the opposite face a groove 6. Advantageously, the concrete slabs or blocks 4, reinforced if desired, are formed each with a rib 7 on one of its longitudinal edges and a groove 8 in its other, note Fig. IX. The slabs 4 are securely assembled in the cribwork with their grooves and ribs 7 and 8 in engagement above and below, respectively, with the ribs and grooves 5 and 6 of the headers (or stretchers), and such slabs are so proportioned that the openings normally exposed between the headers (or stretchers) are neatly closed. It will be understood that on each sleeper the rib 5 and groove 6 extend in parallelism, and lie an interval from the medial, vertical plane of the sleeper (note Fig. IX), while the complementary groove 7 and rib 8 of the slab 4 lie in the vertical mid-plane of such slab. Thus it is that the body of the slab 4 may be constructed of substantially less thickness or breadth than the sleeper, while permitting the exposed face F of the slab to extend in the desired close proximity to the exposed faces f of the sleepers between which the slab is assembled. If in the completed cribwork the exposed wall lies to the right of the finished structure, as shown in Fig. I, the sleepers are laid with their ribs and grooves 5 and 6 lying to the right of their vertical mid-planes, whereby the exposed faces F of the interposed slabs lie immediately within the exposed faces f of the sleepers. And if, on the other hand, the wall of the cribwork be exposed from the left, the sleepers are reversed, and laid with their ribs and grooves 5 and 6 lying to the left of their vertical mid-planes, note Fig. IX, whereby the exposed faces F of the slabs 4 lie adjacent the left-hand faces f of the sleepers. By virtue of this particular arrangement of ribs and grooves in the sleepers and slabs, the parts are interchangeable, for use in walls exposed to view either from the left or the right.

It may be remarked of the tongue-and-groove union of the slabs 4 with the sleepers that it is such that water can not collect therein and produce the objections alluded to in the forepart of this specification.

Turning to a consideration of the means for integrating the elements 1a, 1b of the cribwork, I may first remark that such means comprise dowel-pins extending between and into the adjacent bodies of the cribbing members to be secured in union. Of course dowel-pins have been used hitherto as fastening means in many various types of construction, but it will be understood that I have developed a specifically new dowel-pin fastening which is particularly adapted for use in concrete cribwork.

As shown in Figs. II and III, each sleeper includes two sockets 9 molded in its body adjacent one end; two half-sockets 10 are molded in the body at its opposite end; and two molded sockets 9 are provided in the intermediate body portion of the sleeper. The two end sockets 9 are axially aligned and extend inward from the top and bottom faces of the sleeper, and it is important to note that the sockets extend inward only part-way through the body of the sleeper. The same will be noted of the two intermediate sockets 9 and the two half-sockets 10. In this case the sleepers 1a shown in Figs. II and III provide the long stretchers in the cribwork, and the sleepers 1b shown in Fig. X provide the headers, it being noted that the sleepers 1b are substantially one-half the length of the sleepers 1a. And it will be noted that the sleepers 1b have two complete sockets 9, 9 at each of their opposite ends. Re-

ferring again to Figs. II and III, it will be perceived that each of the sleepers 1a includes a socket 11, opening between the two half-sockets 10, 10 and extending axially of the sleeper.

In erection of the cribwork the stretchers 1a (the sleepers of Figs. II and III) are laid end to end in horizontal courses, with the ends of the transversely extending headers (the sleepers of Fig. X) lying between the courses. The horizontally extending stretchers in the several courses are arranged in vertically staggered relation, as indicated in Figs. I, IV, and V, and in each course the stretchers are so arranged that, meeting end to end, the socket 11 of one pair with the socket 11 of another, providing a closed, horizontally extending pocket (11, 11), as shown in Fig. IV. In this pocket a dowel 12 is secured, and such dowel serves to hold the two abutting stretchers in substantial alignment. It will be further noted that the two half-sockets 10, 10 of one stretcher are paired with the half-sockets of the other, forming in the abutting ends of the two stretchers upper and lower sockets (note Fig. IV), axially aligned and respectively extending vertically upward and downward from the horizontally extending pocket 11, 11 located between. The sockets 9, 9 are so located in the ends of the headers 1b (Fig. X) that in the assembly the lower socket 9 of the header is paired in accurate alignment with the socket formed by the two upper half-sockets 10 in the meeting ends of the stretchers 1a below, while the upper socket 9 in the end of the header 1b is paired with the intermediate socket 9 of the stretcher 1a above. Thus, two vertical, closed pockets are provided, and in these pockets two dowels 13 are severally installed, the dowels being introduced, of course, during the assembly of the particular stretcher and header members. In such manner the ends of the stretchers of the several horizontal courses are secured in alignment, and the ends of the headers are securely fixed to and between the courses of stretchers in the cribwork structure.

It is further characteristic of my invention that the dowels are made of concrete including a metallic reinforcement. In Figs. VII and VIII a typical dowel is shown. It comprises a cylindrical body B of concrete, including a tube 15 of expanded metal, extending concentrically and axially of the body B, and providing an effective reinforcement of the body against shearing stresses. In this case the tubular reinforcement is of circular cross section, but tubes of other cross sections may be employed.

The sockets 9, 10—10, and 11 are of slightly larger cross-section than the dowels which they receive in the assembly. This slight clearance, together with the cylindrical form of the dowels, permits during erection slight adjustment of the relative positions of the sleepers, whereby the meeting faces of the sleepers may be fitted together in the desired snug surface-to-surface contact, and the inner and outer walls R¹ and R² of the cribwork may readily be built to desired curvature (visualize a retaining wall for a bank of earth at a curve in a railway). Advantageously, a trowel-full of fine aggregate concrete (or mortar) is introduced to the sockets immediately before the dowels are introduced; the assembly and adjustment of the sleepers and dowels are readily effected before such concrete sets; and, manifestly, after the concrete hardens, there is provided an absolutely rigid integration of the parts.

In my cribwork there are no recesses or ex-

posed pockets in which water may collect. The structure is both secure and durable against the combined effect of rain, cold and heat. And it may be remarked that such of the pockets 9, 10, and 11 as remain exposed in the outer faces of the completed cribwork may be readily filled with concrete and smoothed over.

As organized, my specialized arrangement is useful even though material other than concrete be utilized in making up the cribwork. The form and arrangement of elements will be found useful in a cribwork assembly, certain or all of the elements of which are made of wood, steel, or other suitable material.

I claim as my invention:

1. A cribwork structure comprising a plurality of courses of stretchers in end-to-end relation, and transverse headers arranged above and below the stretchers at the joints between the latter, the said headers and stretchers having sockets in their end portions arranged to register to form completely closed pockets when the headers and stretchers are in assembled relation, reinforced concrete dowel pins of dimensions smaller than said closed pockets, and bodies of slow-hardening plastic material surrounding the pockets, to permit adjustment of the headers and stretchers after assembly and before hardening, and after hardening to be reinforced by the concrete dowels and to rigidly fix the position of the headers and stretchers.

2. A cribwork structure comprising a plurality of courses of stretchers in end-to-end relation, and transverse headers arranged above and below the stretchers at the joints between the lat-

ter, the stretchers having axially extending half sockets in their ends registering to form completely enclosed pockets, and quarter sockets at top and bottom in their ends extending vertically partway through them and registering to form half-sockets, the headers having vertically extending half-sockets in their upper and lower portions registering with the half sockets formed by the quarter sockets in the ends of the stretchers to form completely enclosed vertical pockets, dowel pins enclosed in the pockets, the said pins being of dimensions smaller than the pockets, and a body of slow-hardening plastic material surrounding the dowel pin in each completely enclosed pocket and engaging the pin and the walls of the pocket.

3. A cribwork structure comprising a plurality of courses of stretchers in end-to-end relation, and transverse headers arranged above and below the stretchers at the joints between the latter, the stretchers having axially extending half-sockets in their ends registering to form completely enclosed pockets, and quarter sockets at top and bottom in their ends extending vertically partway through them and registering to form half sockets, the headers having vertically extending half-sockets in their upper and lower portions registering with the half-sockets formed by the quarter sockets in the ends of the stretchers to form completely enclosed vertical pockets, and dowel pins enclosed in the pockets to secure the stretchers and headers against relative movement in the assembly.

NEWTON F. ARBLE. 35