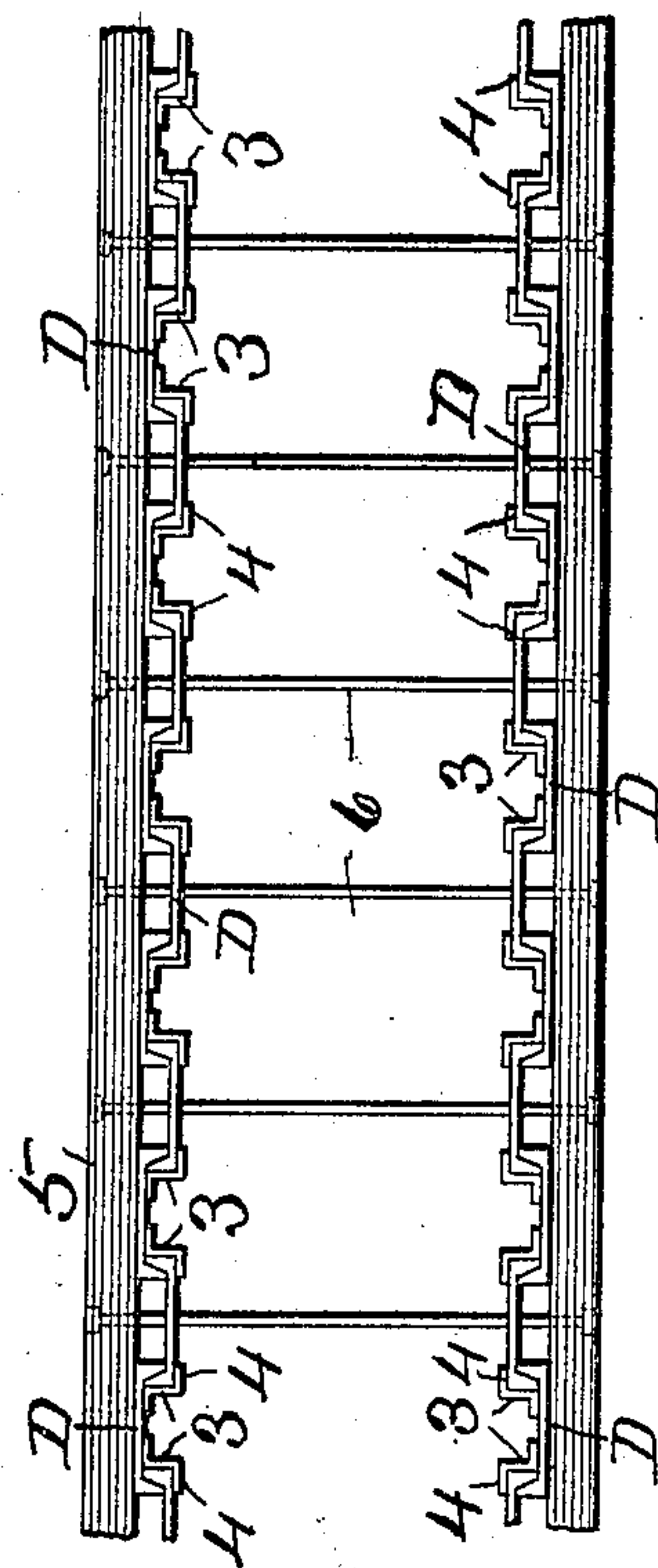
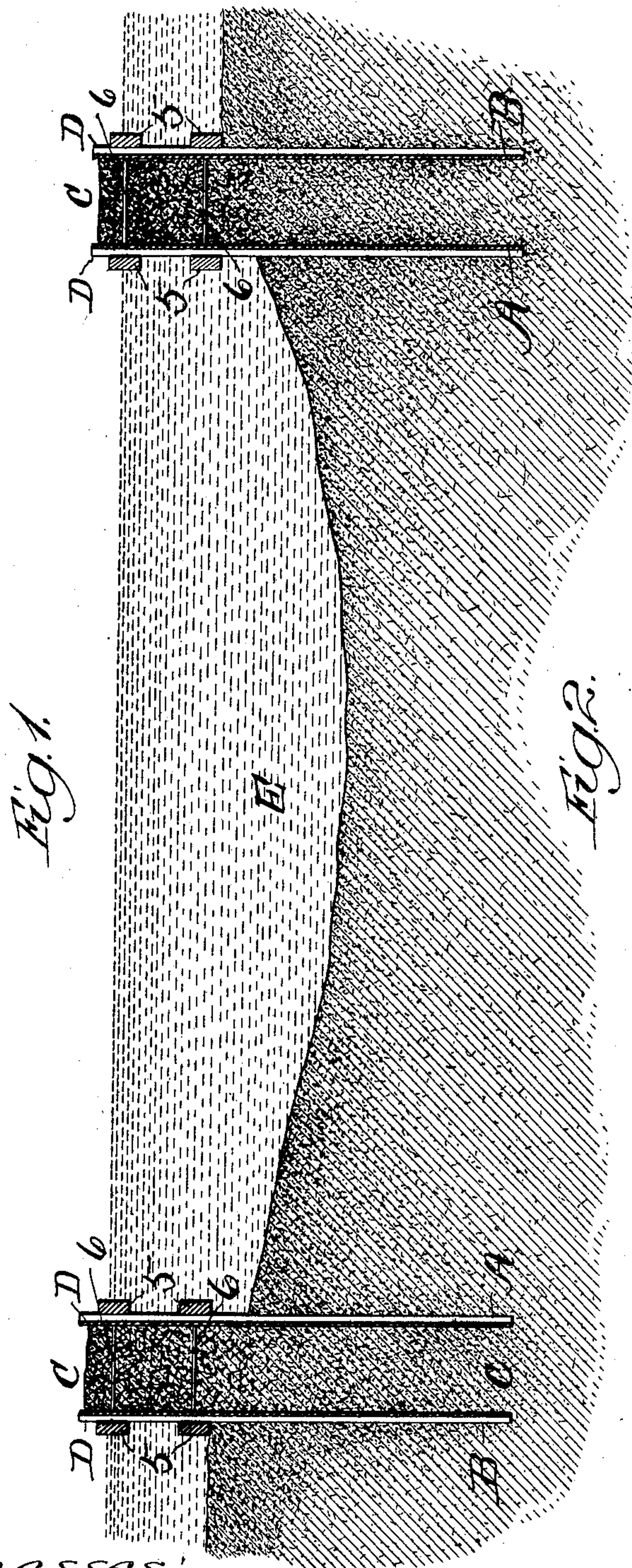


No. 832,371.

PATENTED OCT. 2, 1906.

L. P. FRIESTEDT.  
SHIP CHANNEL OR CANAL.  
APPLICATION FILED FEB. 3, 1904.



Witnesses:  
E. C. Gaylord.  
John Enders.

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Atty.



# UNITED STATES PATENT OFFICE.

LUTHER P. FRIESTEDT, OF CHICAGO, ILLINOIS.

## SHIP CHANNEL OR CANAL.

No. 832,371.

Specification of Letters Patent.

Patented Oct. 2, 1906.

Application filed February 3, 1904. Serial No. 191,837.

*To all whom it may concern:*

Be it known that I, LUTHER P. FRIESTEDT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Ship Channels or Canals, of which the following is a specification.

This invention relates to a system of engineering in the construction and maintaining of a navigable ship channel or canal, and especially through a body of water offering unusual obstructions to navigation.

The object of this invention is to provide a system for use in the construction of pier-walls on each side of a navigable channel and prevent silt and other earthy deposits from seeping through into the channel and obstructing navigation. This system or plan has more especial reference to the improvement of what is known as the "St. Clair flats," a shallow marshy body of water between the St. Clair river and lake St. Clair above Detroit, in the State of Michigan. This particular location has become notoriously a part of the history of the Great Lakes and the merchant marine on account of its continuous and dangerous obstructions against navigation and the impossibility of maintaining an open navigable channel. The government has expended millions of dollars in the past fifty years and nothing like permanent works have yet been constructed by the engineers. The open channel to be maintained is a number of miles in length, the bottom being of a fine peculiar deposit of considerable depth which seeps through the wooden piling into the channel and requires constant dredging to prevent filling up and interfering with navigation. Wood piling being ordinarily used, the operation of dredging has the effect of loosening up the same, which then have a tendency to topple over and become another obstruction in the channel and must be removed at considerable expense and annoyance, as they become an impediment to navigation. The ship-channel through the St. Clair flats for a portion of its way has an open body of water on each side thereof, as fairly illustrated in the drawings. The frost and ice is another serious factor to be considered, as during the closed period of navigation the ice gorges in and often displaces or destroys the means employed in protecting the channel. It will be readily understood from these conditions and surroundings that it is a very difficult matter to guard the channel and keep it from filling.

The engineering method or system presented in this application is intended to overcome many of the difficulties encountered and greatly reduce the cost and labor of maintaining an open channel.

In the accompanying drawings, Figure 1 is a cross-section of the channel and pier-walls, and Fig. 2 is a plan view of the pier-walls.

With this end in view a wall or embankment is constructed along each side of the channel which extends down to bed-rock or "hard-pan."

The structure is in the form of a double wall, comprising an inner single wall A and an outer single wall B, with an intervening space C, as shown. The walls are composed of metal sheet-piling sections D, which are assembled in an interlocked position and driven into the earth to the required depth in securing a solid and substantial foundation. Any form of interlocking metal-piling sections may be used that is suitable for this class of work. For this particular use the standard channel-beam is preferred on account of that form being best adapted for the purpose.

The piling-sections are positioned alternately with reference to each other when assembled in a wall—that is, the flanges of one beam or section point in one direction and the flanges of the next joining beam-section pointing oppositely thereto and interlocking edgewise, as shown in Figure 2 and fully set forth in former patents issued to me.

Each alternate beam-section is provided with companion Z-irons 3, which are rigidly secured thereto. The free flanges 4 of the Z-irons overlap the corner edges of the joining sections and prevent lateral displacement as the same are assembled and driven into place.

The two single walls A and B, forming the wall structure, may be spaced any required distance apart in accordance with the nature of the location and the amount of resistance to be met. Under the present arrangement the space C between the single walls may be of any width—say, from ten feet to forty—in accordance with the strength and durability required. The space or chamber between the single walls may then be partially filled with the matter excavated in deepening the channel or any other material suitable for the purpose, and if necessary topped off with a solid body of cement.

The piling-sections interlock loosely; but the interstices are soon closed with the sur-



rounding matter and forms a perfectly-tight joint and prevents silt or mud no matter how fine from seeping through and filling up the channel E between the embankment-walls.

5 The upper part of the walls will be stiffened and strengthened by a number of wales 5, located on the outer sides of the single walls and connected by a series of tie-rods 6, extending through the metal sheeting, as best  
15 shown in Fig. 2.

By this plan it is possible to construct a wall or embankment that will not be seriously affected by atmospheric changes and able to successfully resist the severest shocks  
15 to which it may be subjected.

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

1. A solid-wall embankment for maintain-

ing open navigable channels, which consists 20 of a double-wall structure located on each side of the channel and composed of beam-sections interlocked edgewise in continuous order and driven down to bed-rock.

2. A double wall located on each side of a 25 navigable channel, each double wall consisting of two single walls spaced apart with a solid filling in between, said walls being composed of metal-beam sections interlocked edgewise and driven down to bed-rock. 30

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LUTHER P. FRIESTEDT.

Witnesses:

L. B. COUPLAND,  
G. E. CHURCH.