3 Sheets--Sheet 1.

J. NAPIER.

Ponton Coffer-Dams.

No. 146,775. Patented Jan. 27, 1874.

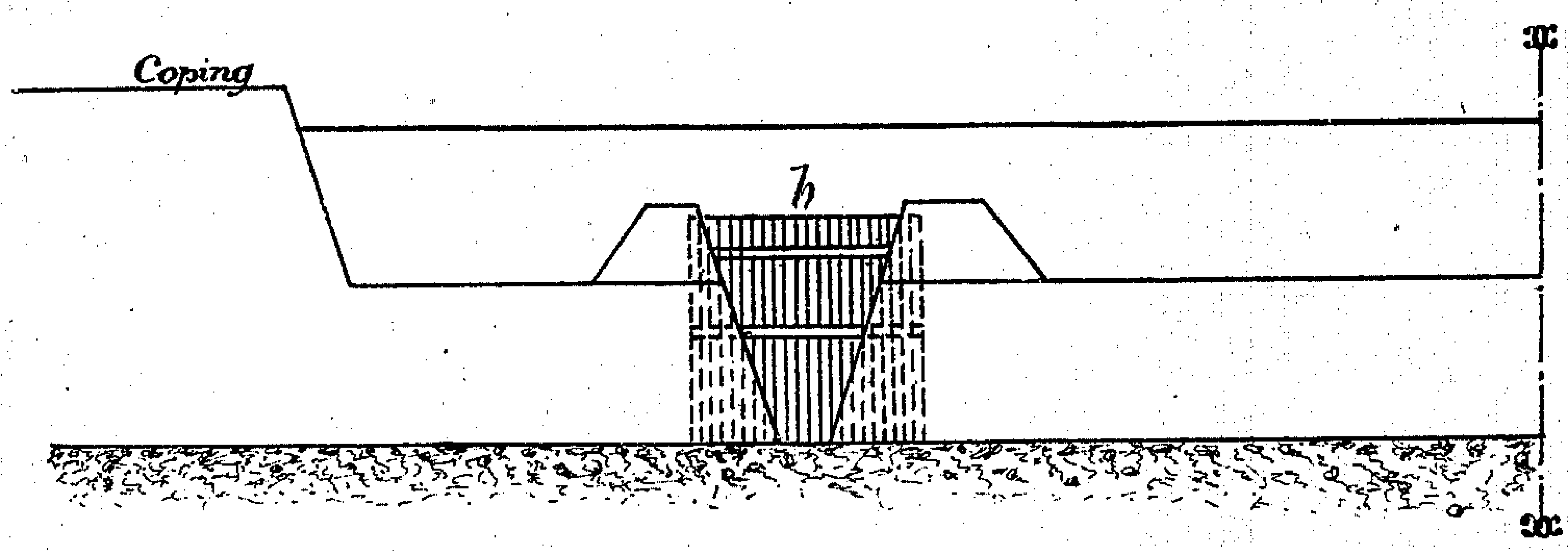
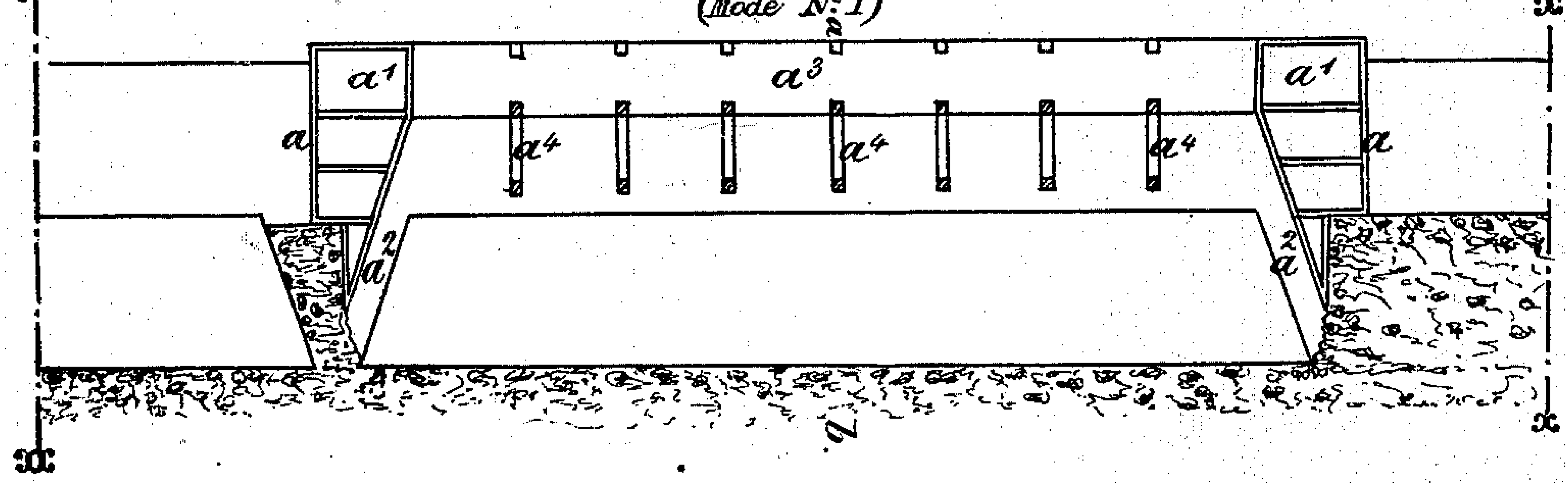
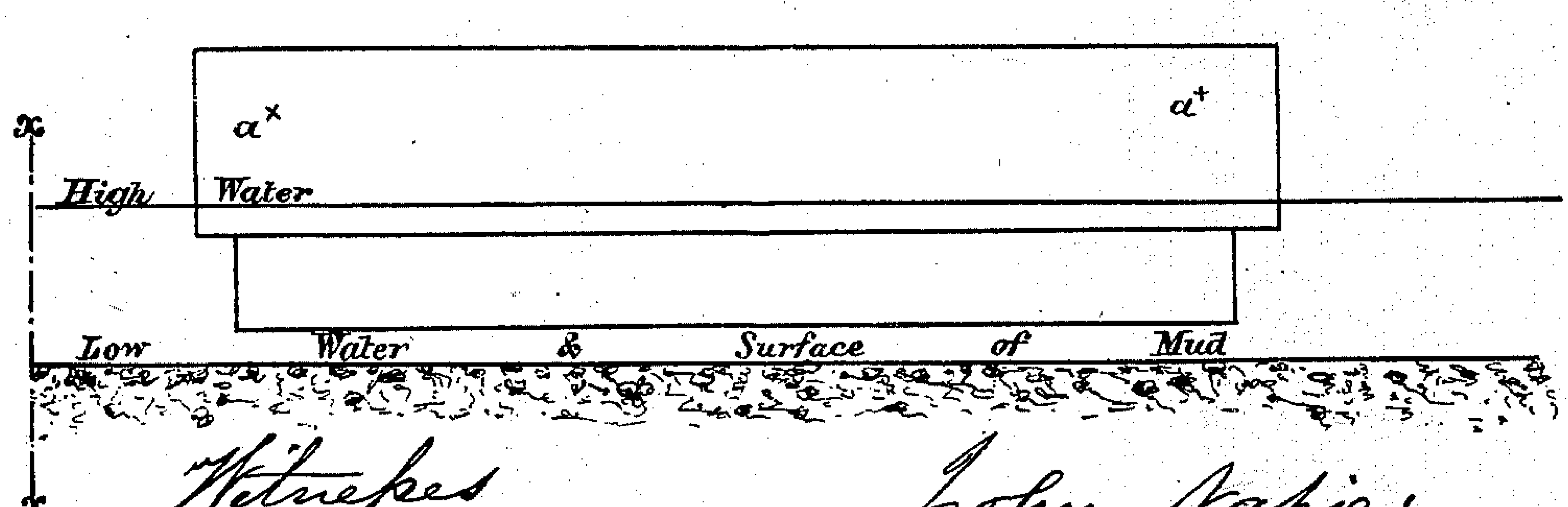


Fig: 1.

Long^l Section showing Wall carried up to above Low Water (Mode No. 1)



Elevation (a float)



Witnesses
W. L. Bennem.
W. H. Isaacs.

John Napier
by his Atty
E. S. Renwick

AM. PHOTO-LITHOGRAPHIC Co. N.Y. (OSBORNE'S PROCESS)

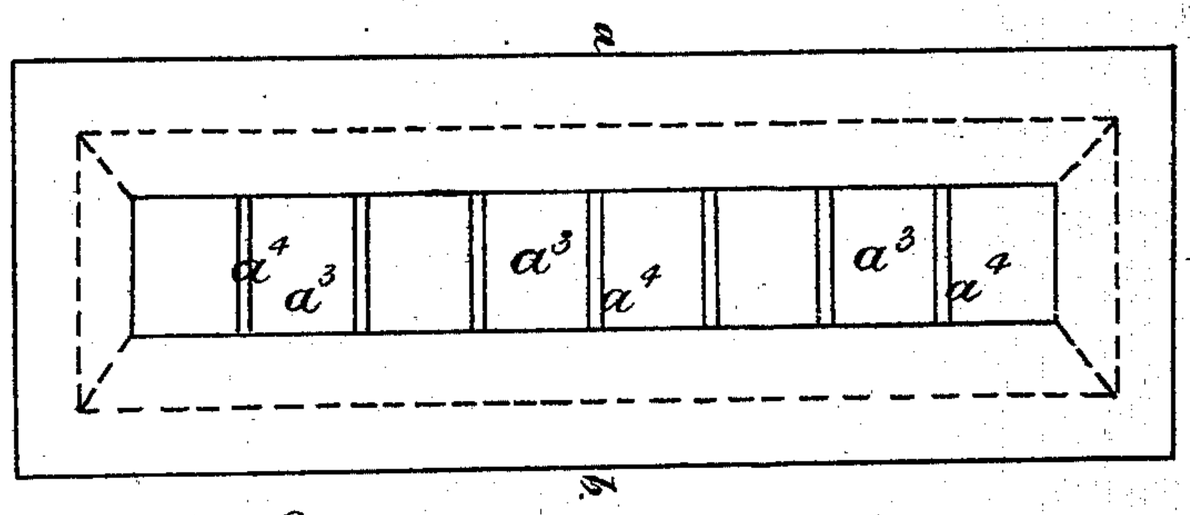
3 Sheets--Sheet 2.

J. NAPIER.

Ponton Coffer-Dams.

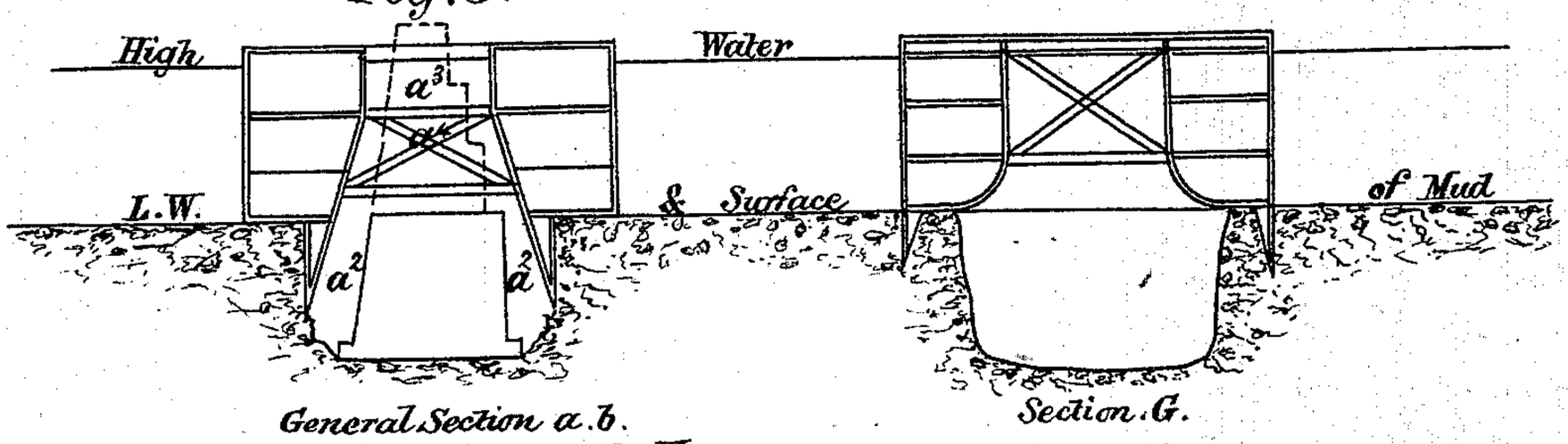
No. 146,775. Patented Jan. 27, 1874.

Fig: 2.



Plan of Dam (Mode N°1)

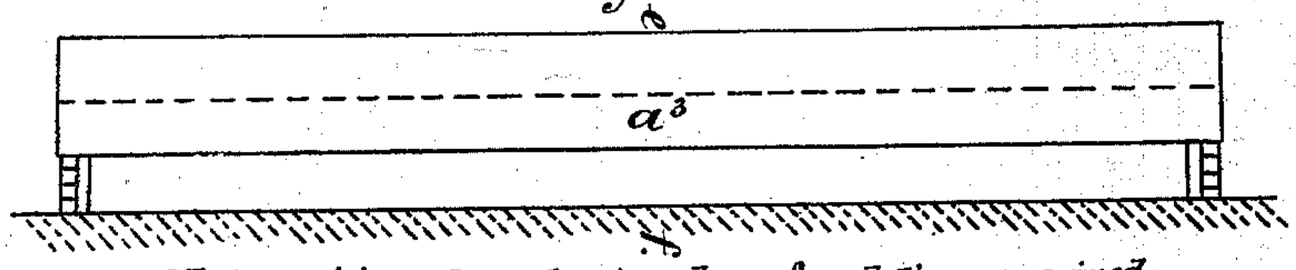
Fig: 3.



General Section a.b. with wall built to above L.W. (by Mode N°1.)

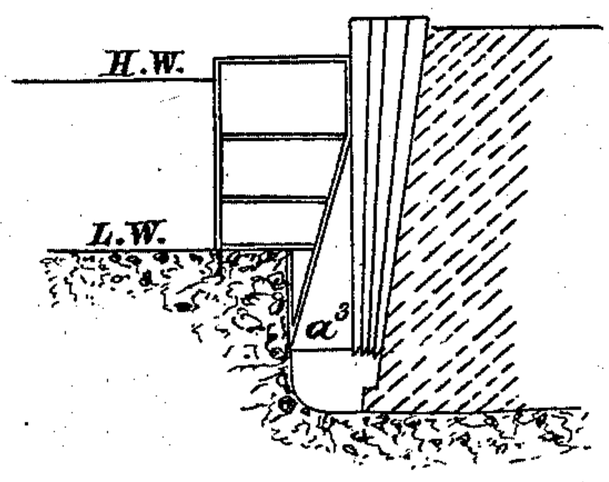
Section G. (See Spec^n)

Fig: 7. Plan.

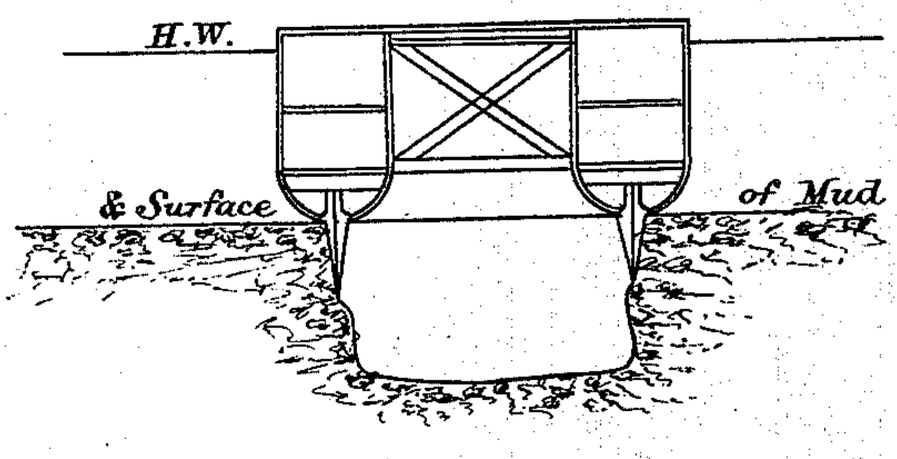


Wall requiring to be underpinned or foundation examined.

Fig: 8.



Section at e.f. Shewing mode of examining found^n of Wall



Section H. (See Spec^n)

Witnesses
W. L. Bennem
W. H. Isaack.

John Napier
by his Atty.
C. L. Kenwick

3 Sheets--Sheet 3.

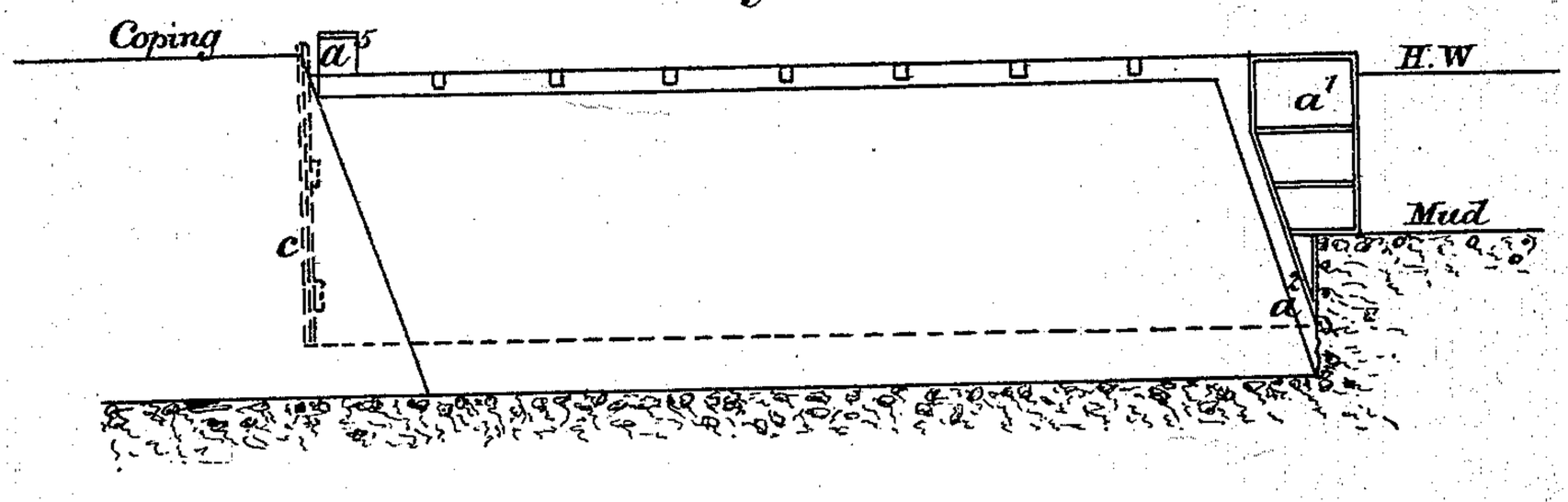
J. NAPIER.

Ponton Coffer-Dams.

Patented Jan. 27, 1874.

No. 146,775.

Fig: 5.



Long^l Section of Dam showing Wall built up to High Water (by Mode N° 2)

Fig: 4. Plan of Dam (Mode N°2)

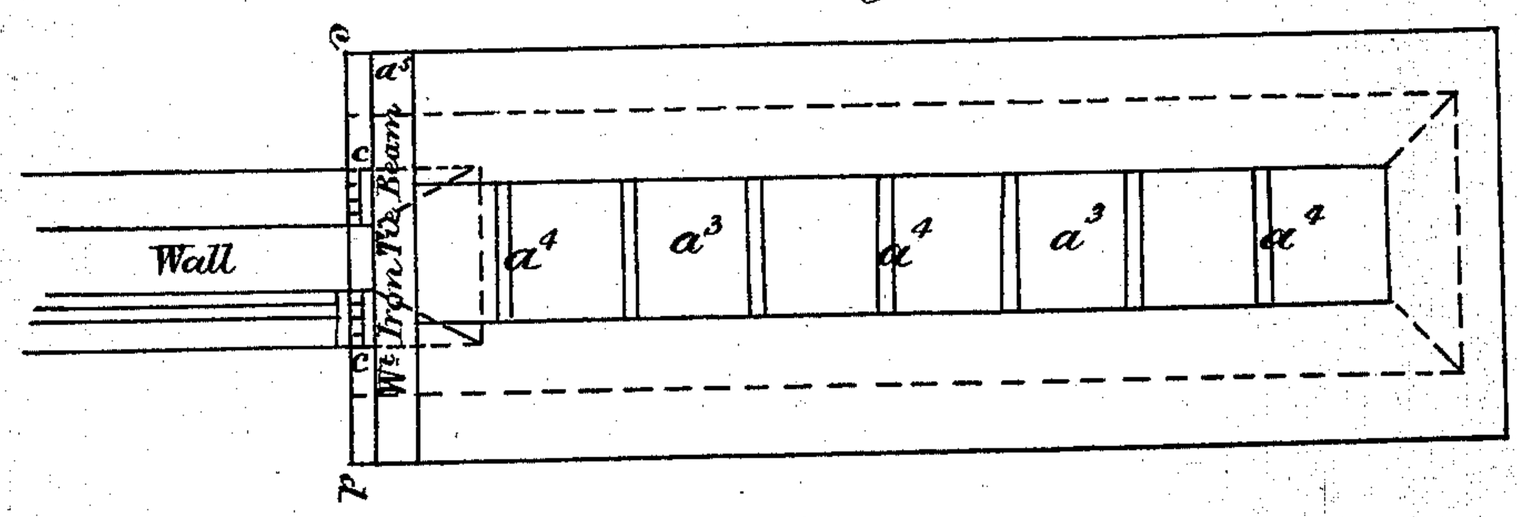
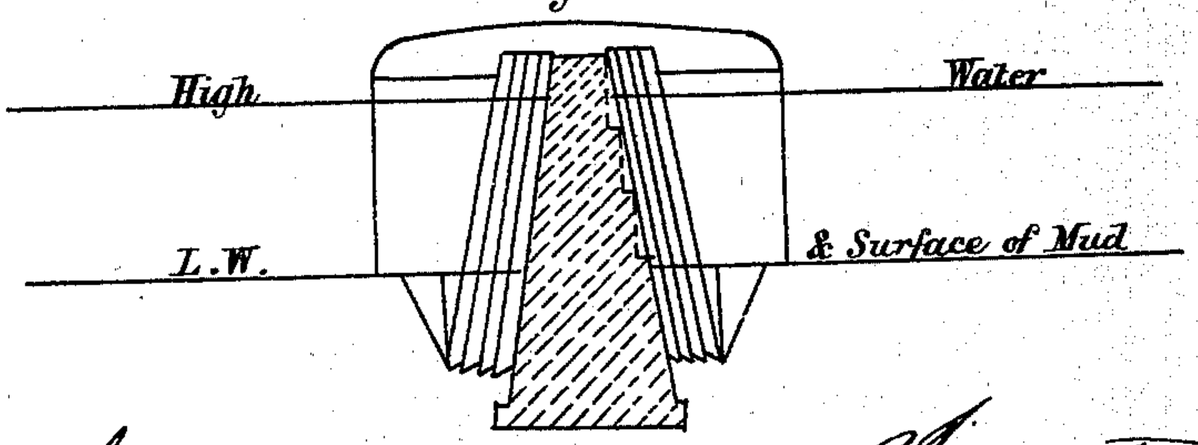


Fig: 6.



Section at c.d.

Witnesses
W. L. Beinemn
W. H. Isaack.

Inventor
John Napier
by his atty
E. S. Renwick

UNITED STATES PATENT OFFICE.

JOHN NAPIER, OF LONDON, ENGLAND.

IMPROVEMENT IN PONTON COFFER-DAMS.

Specification forming part of Letters Patent No. **146,775**, dated January 27, 1874; application filed October 22, 1873.

To all whom it may concern:

Be it known that I, JOHN NAPIER, of 18 Finsbury Circus, in the city of London, England, a subject of the Queen of Great Britain, have invented or discovered new and useful Improvements in Apparatus to be used in lieu of a Coffer-Dam for making excavations under water, and for excluding water for other purposes; and I, the said JOHN NAPIER, do hereby declare the nature of the said invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof—that is to say:

This invention has for its object improvements in apparatus to be used in lieu of a coffer-dam for making excavations under water, and for excluding water for other purposes. The apparatus consists of a ponton with an opening in the center, surrounded by water-tight compartments, which, when empty, give sufficient buoyancy to the apparatus to enable it to be floated to the place where it is to be used and to be removed after use. Around the bottom of the ponton a keel-like ridge is formed, which is sharp at its lower edge. The ponton, having been floated to the place where it is required for use, is allowed to settle down until it rests on the bottom, and the sharp keel then penetrates to a sufficient depth to cut off all communication between the exterior water and the space inclosed by the ponton. In order to cause the keel to penetrate to a sufficient depth, the compartments around the central opening are filled with water. Pumps are provided to pump out the water from the space inclosed by the ponton, and the same pumps may be employed, if necessary, in filling and emptying the compartments of the ponton. Where there is sufficient tide, the water can be run out and will not require pumping. In some cases I make the ponton three-sided, so that when a portion of a wall has been built up within it it may be floated off to sufficient distance to enable the work to be continued, whereas otherwise—that is to say, when the ponton is four-sided—the work must not be carried so high as to prevent the ponton being floated away over the top of the work. The sides of the ponton are firmly braced together by girders, which, if desired, may be movable.

In order that my said invention may be most fully understood and readily carried into effect, I will proceed to describe the drawings hereunto annexed.

Figure 1 shows a four-sided ponton-dam constructed according to my invention, and illustrates the way in which it is employed to construct a wall in tidal water. *a a* show the ponton-dam in section; it is also shown in outline elevation at $a^{\times}$ $a^{\times}$. Fig. 2 is a plan of same, and Fig. 3 shows a transverse section of the arrangement.

The ponton-dam is constructed with a strong frame of angle or T iron, which is plated over in the way in which an iron ship is constructed. The internal capacity a^1 of the ponton-dam is divided into several water-tight compartments, into which, by suitable valves worked from the deck, water can be admitted, and it can also be pumped out or allowed to escape from these compartments. When the ponton-dam is to be conveyed to the place where it is required for use, it is floated and towed to its place; then water is admitted to the compartments, and it settles down onto the bottom, which, if of mud or clay, will prove the most suitable ground for the apparatus to work in; but such a bottom is by no means absolutely necessary, as by excavating round the inside edge of the keel it can in other materials be made to sink to any depth required. The weight of the structure causes the sharp, keel-like ridge a^2, which is formed all around the bottom, to penetrate the soil and cut off communication between the water in the space a^3, which the ponton-dam incloses, and the water outside, except by pipes or passages provided for the purpose, which can at pleasure be closed by valves. As the tide falls, the water is allowed to run out of the space a^3 by these pipes or passages, which are then closed; or, when necessary, the water is pumped out. The excavation for the foundations is then made, and afterward the wall is built up until it is above the low-water level. The compartments a^1 of the dam are now emptied, and the water is

excluded from them, while it is allowed to flow freely into the space a^3. Thus the structure is caused to float with the rising tide until it has risen over the top of the wall, when it is hauled away, and can at once be adjusted to a new position to construct another length of the wall. a^4 a^4 are movable beams, connecting the two sides of the ponton-dam so as to give it a rigidity and stiffness. The cutting keel or ridge a^2 is very strongly framed, so that it may not be liable to be distorted by any obstacles with which it may meet. The portions of wall thus constructed may be connected without difficulty by piling the spaces between them on either side, as is shown at *b*, so as to form a small dam, within which the masonry is laid. Usually a single tide will suffice to complete, in this manner, the connection between two lengths of walls built by means of the ponton-dam, as already described. The sectional form of a ponton-dam may be varied thus: Sections G and H are forms which are suitable where a wide excavation is required, as in dredging operations. As represented in these figures, the cutting-keel is constructed of strong plates supported by angle-pieces at intervals.

In some cases I form the ponton-dam with three sides only. Fig. 4 is a plan illustrating this arrangement. Fig. 5 is an elevation, partly in section; and Fig. 6 is a section taken on the line *c d* in Fig. 4. In this case a tie-beam, a^5, is used to connect and support the two free extremities of the structure. This tie-beam, as well as the smaller ties a^4 a^4, is placed at such a height as not to interfere with the work to be carried on within the space a^3. When using a ponton-dam of this construction, the wall can be carried up farther than when the ponton-dam is so constructed as completely to inclose the space a^3. When one section of the wall has been completed, the three-sided ponton-dam is floated and adjusted to the end of the wall so as just to overlap it, in the manner shown by the drawings. The ponton-dam, when so adjusted, is caused to settle down onto the bottom, in the manner already described, and piling, as shown at *c c*, is then driven between the wall and the extremities of the ponton-dam, so as to complete the inclosure of the space a^3.

These ponton-dams may, for convenience of transport, be constructed in parts capable of being bolted together when required for use. This arrangement will also admit of the use of the pontons, in the manner illustrated by Figs. 7 and 8, in examining the foundations of walls. Fig. 7 is a plan, and Fig. 8 is a transverse section taken on the line *e f* in Fig. 7.

Piling is employed between the wall and the ponton-dam, as already described in respect to Figs. 4, 5, and 6, and in this manner the space a^3 is inclosed at each end.

Having thus described the nature of my said invention, and the manner of performing the same, I would have it understood that I claim—

The apparatus for making excavations under water, and for excluding water for other purposes, such apparatus consisting of a ponton-dam with a sharp, keel-like ridge, adapted to penetrate the bottom on which it is allowed to rest, and with compartments, which may be emptied or filled to float or sink the apparatus, substantially as described.

JOHN NAPIER.

Witnesses:
G. F. WARREN,
WILMER M. HARRIS,
Both of No. 17 *Gracechurch Street, London.*