

(No Model.)

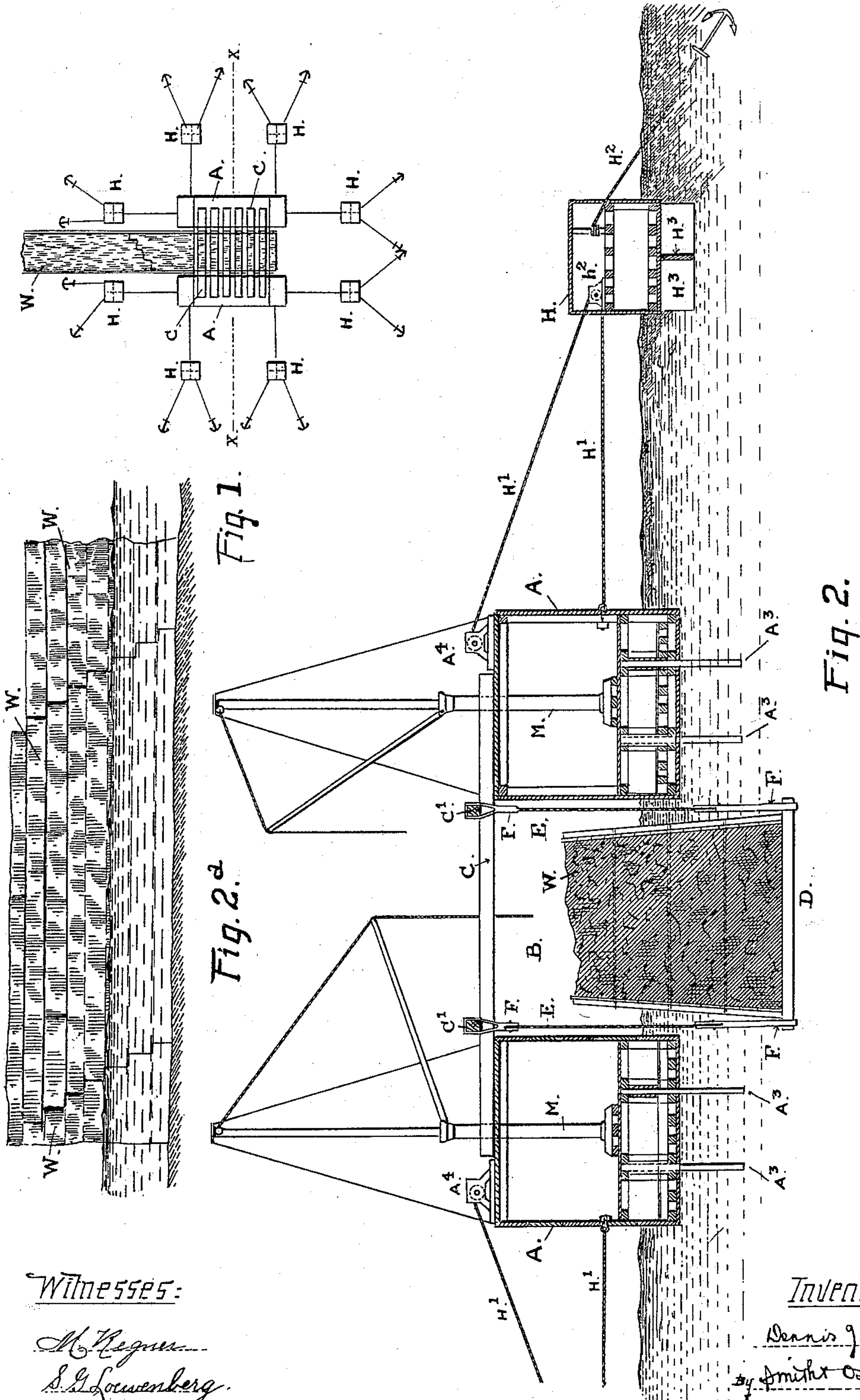
2 Sheets—Sheet 1.

D. JORDAN.

ART OF BUILDING SUBMERGED STONE AND CONCRETE STRUCTURES, &c.

No. 604,235.

Patented May 17, 1898.



Witnesses:

M. Regan  
S. G. Lowenberg.

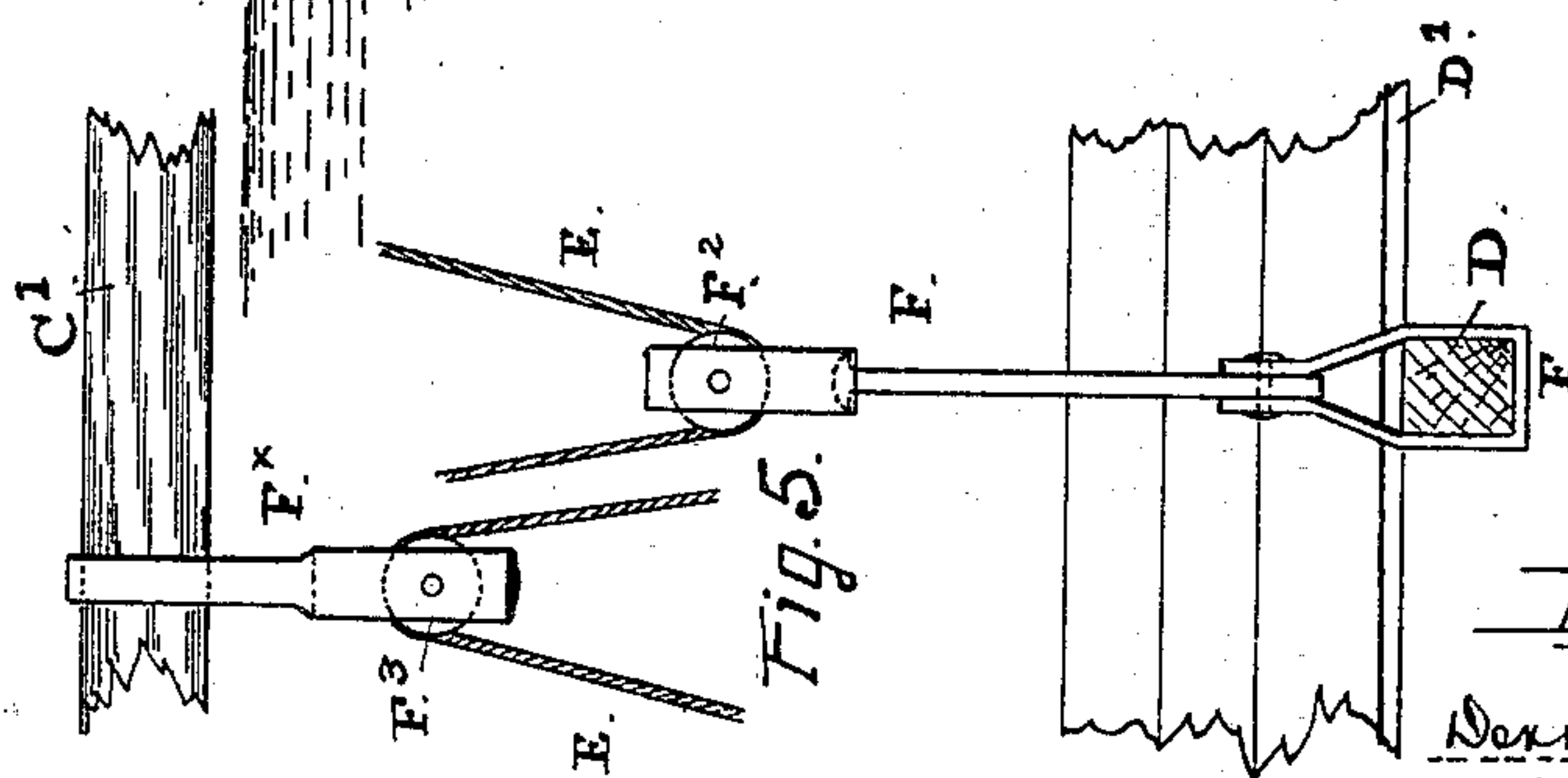
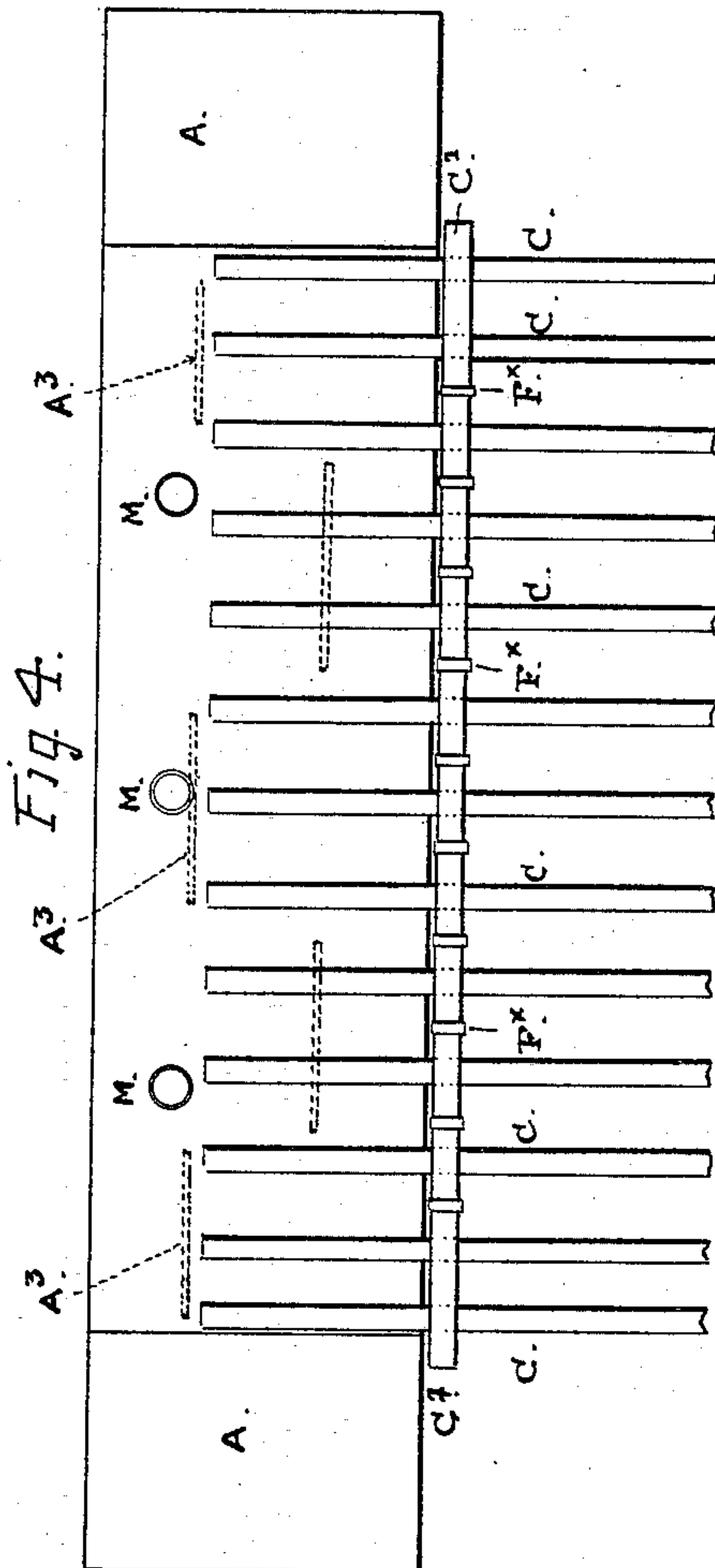
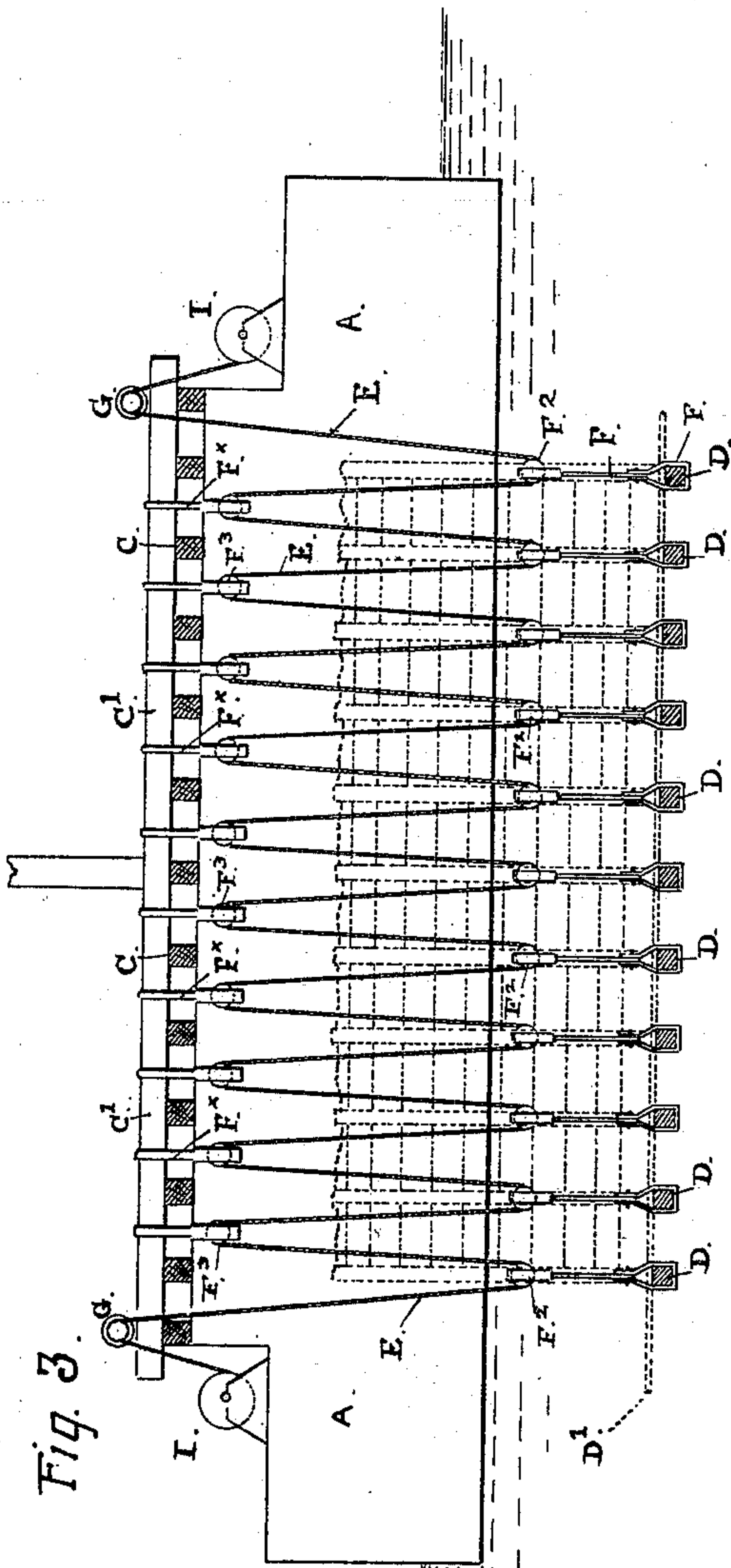
Inventor:

Dennis Jordan  
by Smith Osborn  
Atty.

(No Model.)

2 Sheets—Sheet 2

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Witnesses:

M. Regner  
S. H. Lawrenceberg

Inventor:

Dennis Jordan  
By Smith & Babcock  
Atty.



# UNITED STATES PATENT OFFICE.

DENNIS JORDAN, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO MARY L. McNAMARA, OF SAME PLACE.

ART OF BUILDING SUBMERGED STONE AND CONCRETE STRUCTURES, &c.

SPECIFICATION forming part of Letters Patent No. 604,235, dated May 17, 1898.

Application filed May 8, 1897. Serial No. 635,692. (No model.)

*To all whom it may concern:*

Be it known that I, DENNIS JORDAN, a citizen of the United States, residing in the city and county of San Francisco and State of California, have invented certain new and useful Improvements in the Art of Building Submerged Stone and Concrete Structures and in Apparatus Therefor, of which the following is a specification.

10 This invention relates to improvements made in constructing retaining-walls, breakwaters, and foundations for marine structures in deep water without the use of coffer-dams or caissons; and the improvements embrace  
15 a plan or method of building such structures in deep water and an apparatus of novel construction for carrying on said method of building submerged walls from above the surface downward to the bottom in deep water and  
20 in a continuous line, as hereinafter fully set forth, and pointed out in the claims at the end of this specification.

The principle on which this invention is based consists in erecting and building up a  
25 section of wall, either of natural or artificial stone blocks or of concrete, upon a suspended and vertically-movable platform carried and supported by means of a floating buoyant support over the place or location where the wall  
30 is to be sunk and laid and then lowering said platform into and below the surface at intervals and from time to time as the said section is increased in vertical height until finally the suspended supporting-platform rests on  
35 the bottom. A second section is afterward constructed, built up, and sunk, and the work proceeds by moving the floating support along the line of work into position to join the next section to the one previously formed and laid  
40 and by placing another suspended and vertically-movable platform in position in the floating support, the length of the section being governed by the length of the suspended platform provided for use, and one section  
45 after another being formed and laid until a wall or structure of required length is produced.

The apparatus produced by me for carrying on this work consists of a buoyant floating  
50 support capable of being towed or moved about from place to place, a movable plat-

form on which the wall or section of structure is built up from the bottom upward, the said platform being carried by and suspended from such support by ropes and tackle, by  
55 means of which it is lowered below the surface and into the body of water until it finally rests on the bottom, and means for lowering the said platform mounted on the buoyant floating support.

60 In combination with the aforesaid apparatus I provide movable anchoring devices or apparatus for retaining the same in position over the place where the section of wall or structure is to be laid without driving piles  
65 or connecting the floating structure with the bottom by similar means.

The following description explains at length the nature of the said improvements and the manner in which I proceed to construct, ap-  
70 ply, use, and carry out the same, reference being had to the drawings that accompany and form part of this specification.

Figure 1 of the said drawings is a diagram representing in general plan or top view my  
75 improved apparatus in position and a portion of a wall on which it is at work. Fig. 2 is a vertical cross-section, on an enlarged scale, taken through  $x x$ , Fig. 1, and through one of the anchoring portions. Fig. 2<sup>a</sup> is an ele-  
80 vation of a portion of the finished wall, showing the adjoining ends of two sections and the manner of uniting the ends. Fig. 3 is a longitudinal section taken through the center of the well or opening between the two parts or  
85 sections of the buoyant and movable support. Fig. 4 is a plan or top view of one of the sections of the same. Fig. 5 is a detail of the suspending-tackle and a portion of the movable platform on which the wall is constructed.

90 The floating and movable support to carry the suspended platform and its load consists of a scow or flat-bottom boat provided with water-tight compartments and having a well or opening extending fore and aft through  
95 the center. This opening exceeds in width the greatest thickness of the wall or section that will be formed on the work-supporting platform suspended within said opening. Suitable clear space or room between the side  
100 walls of the well and the sides of the structure is provided to afford room for the workmen



and to accommodate the temporary frames or molds in the case of concrete structures. The work-supporting platform, composed of transverse sills and planks laid upon the sills, is suspended in the well or opening in the floating movable support before mentioned, and by means of slings and ropes and blocks it is supported from said floating support and is lowered into and below the surface of the water from time to time a greater or less distance as the height of the section of wall is carried up above the surface, until in the course of such successive downward movements the platform and the wall or section of structure carried by it rest on the solid bottom of the body of water in which the work is carried on. After the platform comes to rest on the bottom in the operation of building a section of wall the tackle is unshipped from the timbers of the platform and is drawn to the surface for use with the platform that is required for the next section of wall. Each platform is thus left under the section of wall supported by it in the work of building and carrying up the section, and the floating support after being moved into a new position is fitted with another movable platform in the well or opening on which the next section or portion of the line of wall is constructed and lowered into place.

The floating support is constructed of two buoyant members of equal length, secured together by cross-timbers at the top and at suitable distances apart to afford a well or opening between them, and the two members together have the proper amount or degree of buoyancy to carry the weight of the largest or heaviest section or portion of wall that it is required to construct and carry on the movable platform suspended in the well. The two members are not united at the ends, so that the well between the two is open at the ends at and above the surface as well as below the surface of the water. This construction permits the floating structure to be moved along the line of wall or the sections already laid and standing above the water and also allows the end of one section to be joined to or united with the end of another section without difficulty, so as to construct and lay a practically continuous line of wall.

A A are two flat-bottomed boats, resembling scows, constructed with water-tight buoyant compartments rigidly united together and constituting a buoyant movable structure. B is the well or opening between them. C C are beams or timbers joining the two sections together.

D D are relatively short sills or timbers placed in suitably close order parallel with one another within and transversely across the well or opening B, but clear of the sides of the two members of the boat. D' D' are planks laid on and supported by the said timbers D to form a stage or platform.

E E are ropes, and F F<sup>x</sup> F<sup>2</sup> F<sup>3</sup> are slings and pulleys of a tackle by which the platform

or floor formed by the timbers D and planks D' are suspended in the aforesaid opening between the boats or sections A A. G G are rollers with grooved ends around which the ropes E are carried to winding-drums. I I indicate winding-drums for lowering the said platform into and below the surface of the water from time to time as the work increases in height.

H H are pontoons to which the boats A A are connected by cables H' for the purpose of anchoring and steadying the boats in rough water. The boat is connected by cables to a number of these pontoons, which are held by anchors H<sup>2</sup> at different points in the surrounding water.

By connecting the cables H' to windlasses on the boat it can be moved and brought into position or adjusted from time to time as the work requires.

A<sup>3</sup> are movable centerboards in the wells in the bottom of the boat to increase its stability, and H<sup>3</sup> are centerboards of a stationary character in the pontoons to secure greater steadiness.

M M are masts fixed in the boats and provided with swinging booms and hoisting tackle for handling the stone or other material used in the work.

W indicates the sections or portions of wall in course of construction.

The tackle can be arranged in several ways to support the section of wall and to lower it in and through the well during the progress of the work. In the present construction of apparatus a sling F, formed of a metal stirrup, fits over the end of each sill D and is connected with a traveling block F<sup>2</sup>, through which the rope E is run from a stationary block F<sup>3</sup> above. The blocks F<sup>3</sup> are supported from the longitudinal timbers C' by the stirrups F<sup>x</sup>, and the rope E is connected from one end to the other of the suspended platform by running it from the upper blocks to the lower blocks in regular manner, the rope being secured at both ends to the drums I I, by means of which the platform is lowered evenly and kept in the required horizontal position.

As thus constructed and arranged the work is carried on with this apparatus in the following manner: The platform in the well is lowered into a position above the water-line to support the workmen out of the water while the first courses of stone or the first layers of concrete are being laid. If concrete work is done, the planks to form the crib or mold are carried up from the platform to a convenient height and held by perpendicular timbers and horizontal tie-rods extending across the space from one side to the other of the mold. As the work is carried up and rises to the level of the decks the supporting platform is lowered into the water, and the work is carried on in this manner until finally the platform rests on the bed or bottom beneath the water. At this time the top of the



section of wall stands above the surface of the water. The tackle is then detached from the platform by slipping off the slings F from the timbers D, which is done by sending down a diver from the boat. After this the boat is moved along into a position to lay the next section of the wall in line with those already laid.

In some cases it may be found more convenient to build the section upon the suspended platform while the floating supports remain in a locality or situation that may be more or less distant from the place where the wall or structure is to be built and afterward to row the boat and its load into position over the place and lower the section into the water. Such plan of operating the apparatus will depend on the depth and smoothness of the water where the work is required to be carried on.

The several sections required to form a line of wall are joined together by leaving the horizontal courses or layers at the end of one section so as to break joints with the ends of the corresponding layers on the next section and to lap on them as the section is lowered into place, as shown in Fig. 2<sup>a</sup> of the drawings.

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

1. A buoyant, movable support having a well that is open both at the ends and at the bottom to the surrounding body of water; in combination with a suspended and movable platform in said well, and suspending ropes

and tackle for supporting the said platform and lowering it into the water consisting of slings detachable from the platform, pulley-blocks attached to said slings, pulley-blocks attached to the movable support along the sides of the well above the platform, a rope connecting the lower blocks and the upper blocks in alternate order and winding-drums on the buoyant support to which said rope is connected, as a means of lowering the platform in the well while sustaining it in horizontal position.

2. A buoyant, movable support having a well open both at the ends and at the bottom to the surrounding body of water, and a suspended vertically-movable platform in said well detachable from the buoyant support; in combination with anchored, movable pontoons, and cables and windlasses connecting said buoyant support with the pontoons.

3. A buoyant, movable support composed of two members having water-tight compartments and united at the ends to partially inclose between them a well open at the bottom and the ends; in combination with a vertically-movable and detachable platform in said well and ropes and tackle adapted to suspend and lower said platform in the well between the two members comprising the buoyant, movable support.

In testimony that I claim the foregoing I have hereunto set my hand.

DENNIS JORDAN.

Witnesses:

C. W. M. SMITH,  
CHAS. E. KELLY.