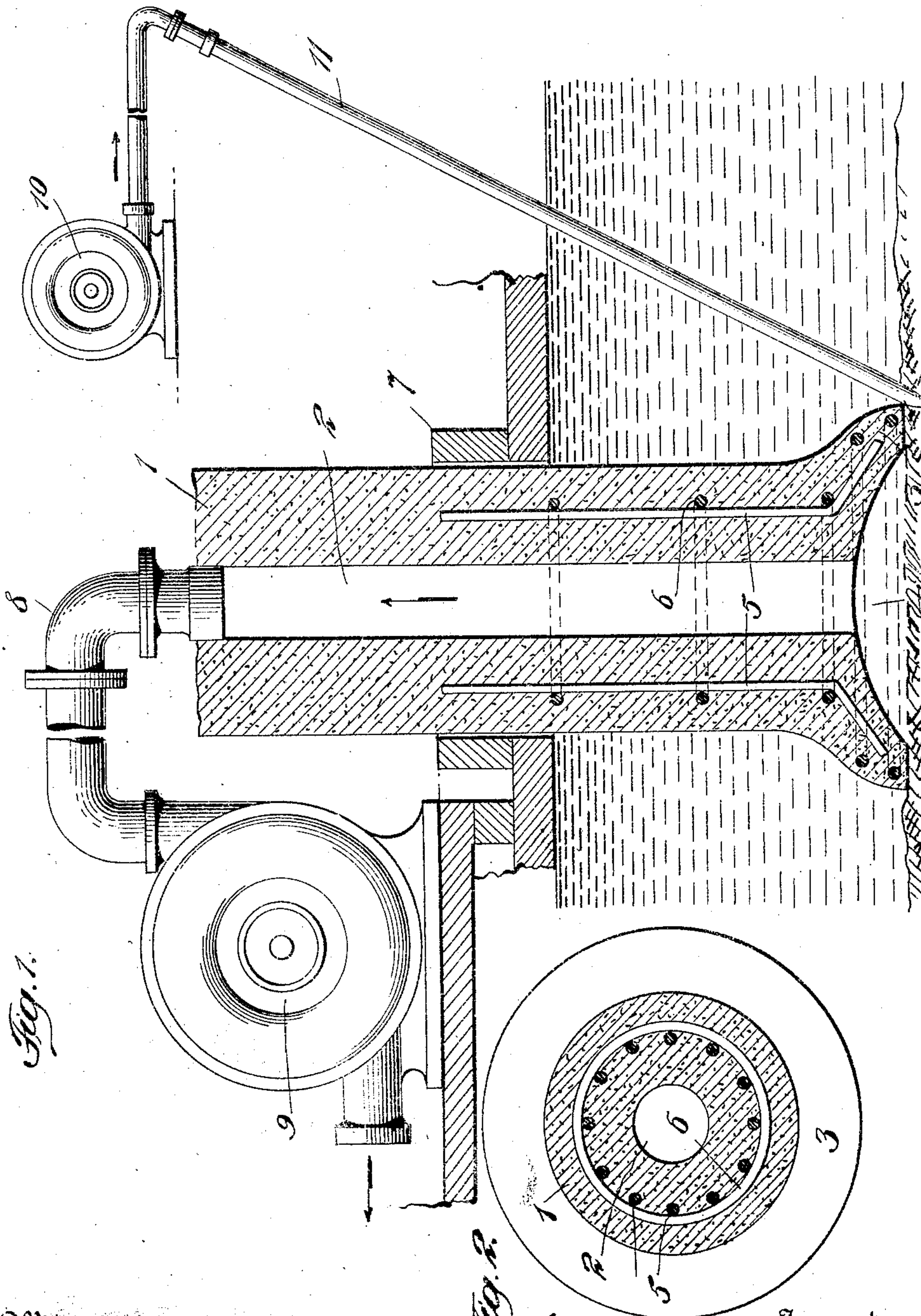


C. B. CHRISTIANSEN.
 METHOD OF SINKING CONCRETE COLUMNS, PIERS, AND THE LIKE.
 APPLICATION FILED DEC. 17, 1909.

983,808.

Patented Feb. 7, 1911.



Witnesses:
Julius F. Miller
J. Miller

Fig. 2.
 Inventor
Christian B. Christiansen
 By his Attorney
Davis & Davis

UNITED STATES PATENT OFFICE.

CHRISTIAN B. CHRISTIANSEN, OF NEW YORK, N. Y.

METHOD OF SINKING CONCRETE COLUMNS, PIERS, AND THE LIKE.

983,808.

Specification of Letters Patent.

Patented Feb. 7, 1911.

Application filed December 17, 1909. Serial No. 533,551.

To all whom it may concern:

Be it known that I, CHRISTIAN B. CHRISTIANSEN, a citizen of the United States, and resident of the borough of Brooklyn, county of Kings, city and State of New York, have invented certain new and useful Improvements in Methods of Sinking Concrete Columns, Piers, and the Like, of which the following is a complete specification, reference being had therein to the accompanying drawing, in which—

Figure 1 is a diagrammatic view showing my improved method of sinking a pier, the pier being shown in longitudinal vertical section; and Fig. 2 a horizontal sectional view of the lower end of the pier.

The main object of this invention is to provide an improved method of sinking concrete piers, columns and the like in soft material and more especially under water where the bottom is sandy, or of soft mud and the like. Many efforts have been made to solve this problem all of which have resulted in failure or have been so extremely costly as to cause their abandonment. The only successful method of sinking concrete piers or columns heretofore used has been by means of closed caissons fitted with the usual air locks and air chamber at its lower end, the work of excavation under the pier being done by workmen in the air chamber. This method is extremely costly and is impractical for small piers and columns. The use of small concrete piers and columns and even of concrete piles has been more or less restricted because of the difficulty and expense of sinking said devices to a sufficient depth to give them a suitable foundation. By my method the piers and the like may be sunk to any desired depth until a hard and suitable foundation is reached.

In carrying out my improved method I employ a concrete pier or column 1 formed with a vertical longitudinal aperture or channel 2 therethrough from end to end. At the lower end of this column is formed an enlarged base or foot 3 the under surface of which is concave forming a chamber 4 thereunder. The lower edges of the pier may be protected in any suitable manner, if desired. The column may also be reinforced by means of vertical rods 5 and horizontal rods 6 of metal, if desired, and this reinforcement may be located at the lower end of the column, as shown in the drawing, or it may be extended throughout any length

of the column desired. It is, of course, to be understood that the column may be guided in its vertical movement by means of any suitable form of support, such as the support 7, indicated in Fig. 1. It is also to be understood that as the column sinks it is to be extended vertically by building thereon or adding thereto by any suitable means.

Connected to the upper end of the aperture 2 of the pier is a suction pipe 8 which is connected to a suction pump 9 located at any suitable point and driven by any suitable power. This suction pump may discharge at any point desired, but will preferably discharge the exhausted material around the outer side of the pier. Located at any suitable point is a force pump 10 by means of which a jet of water under any suitable degree of pressure will be delivered through a nozzle 11 at the lower edge of the pier, said jet being directed downwardly and inwardly under the pier to loosen the material around and under the same. As many of these jets as are found desirable may be employed, all of them preferably inclining downwardly and under the pier. The purpose of the cavity 4 under the pier is to provide a chamber into which the material loosened by the jet may accumulate by reason of the pressure of the weight of the pier on the surrounding material of the bottom.

The operation of my improved method is obvious, but may be briefly described as follows: The lower end of the pier is first molded of any desired length. If it is to be used in under-water construction it is preferably of such a length as to reach above the water level while resting on the bottom. Suitable means are provided for guiding the column and holding it in a true vertical position. Proper provision is made for extending the column by molding thereon additional sections as the work progresses and the column sinks. When the suction pump is properly connected to the central aperture at the upper end of the pier water and sand and mud may be sucked up through the said central aperture from the cavity 4 under the pier. The jet 11 will loosen the material directly under the pier and drive it into the cavity 4 from which it will be exhausted by the suction pump. It will, therefore, be seen that I provide an extremely simple method of sinking piers, columns, piles and the like in

any material that may be loosened by means of jets and withdrawn from below the pier by means of a suction pump. The material drawn from under the pier may be deposited around the pier on the outer side thereof to assist in giving the pier a firm support.

It is, of course, to be understood that I do not wish to be limited in any respect as to the shape, size or construction of the pier or column, and also that I do not wish to be limited as to the means employed for exhausting the material through the pier or to any particular form of jet for loosening the material under the pier as these features of my invention may be varied within the scope of my invention.

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

1. The method of sinking piers, columns and the like consisting in loosening the material around and under the pier by means of a jet applied outside of the pier and properly directed thereunder and then sucking the loosened material away from the pier.

2. The method of sinking piers, columns and the like consisting in loosening the material under the pier by means of jets applied outside of the pier and directed under the same, and removing the loosened material upwardly through the pier.

3. The method of sinking piers, columns and the like consisting in loosening the material under the pier by means of jets applied outside of the pier and directed thereunder and then sucking the loosened material upwardly through the pier.

4. The method of sinking concrete piers consisting in first forming the pier with a cavity in its under side and a vertical channel extending therethrough from end to end and opening at its lower end into said cavity, directing a jet of water under said pier from the outer side to loosen the material thereunder and direct it into the cavity, and then sucking the loosened material from said cavity upwardly through the column or pier and extending the column by adding to its upper end as the said column sinks.

5. The method of sinking and building piers, columns and the like consisting in first forming a section of the column or pier of suitable length and having a longitudinal

aperture therein, resting the lower end of said column on the ground into which it is to be sunk, applying a jet to the ground on which the column rests to loosen the material under the column, sucking the loosened material upwardly through the column and adding to the length thereof as the column sinks.

6. The method of sinking and building concrete columns consisting in forming a section of the column of suitable length to extend from the ground to a point above water level and having a longitudinal aperture therein, then loosening the material around and under the column by means of a jet properly directed, sucking the loosened material upwardly through the column, and then adding to the length thereof as the column sinks.

7. The method of sinking and building concrete columns consisting in first forming a section of the column of suitable length and having a longitudinal aperture extending from end to end thereof, resting the lower end of the column on the ground into which it is to be sunk, loosening the material around and under the column by means of a jet applied outside of the column, then sucking the loosened material upwardly through the column, and adding to the length thereof as the column sinks.

8. The method of sinking and building monolithic concrete columns, piers and the like consisting in molding a section of the column of suitable length and having a longitudinal aperture extending from end to end thereof, placing the lower end of said molded section on the ground into which the column is to be sunk, loosening the material around and under the column by means of a jet applied outside of the column and properly directed thereunder, sucking the loosened material upwardly through the aperture in the column and molding additional sections on the upper end of the column as the column sinks.

In testimony whereof I hereunto affix my signature in the presence of two witnesses this 14th day of December 1909.

CHRISTIAN B. CHRISTIANSEN

Witnesses:

WM. R. DAVIS,
F. R. MILLER.