1,182,134.

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PILE AND CAISSON.
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Fig. 1.

Fig. 2.

Fig. 3.

Witnesses:

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Inventor:

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Patented May 9, 1916
To all whom it may concern:

Be it known that I, EDWARD BIGNELL, a citizen of the United States, residing at Lincoln, in the county of Lancaster and State of Nebraska, have invented certain new and useful Improvements in Piles and Caissons, and have described the same in the following specification, illustrated by the accompanying drawings.

My invention relates to that class of subsurface structures, such as piles, sheet piling and caissons, commonly formed of concrete or other cohesive or adhesive material, which are sunk by gravity in excavations made by themselves while sinking, and are utilized as foundations for wharves, piers, bridges and other superstructures to be supported thereby. I have discovered that jets of water discharged in the usual manner from the sides of such piles and caissons as aids in the sinking of the same, displace too much matter from the sides of the excavations in which such foundations are being sunk, loosen too much of surrounding earth and thereby necessitate the removal of unnecessarily large quantities of loosened earth from those excavations, as well as the use of unnecessarily large quantities of water commingled with earth, and of power for driving the water into and out of the excavation.

It is the main object of the invention to obviate these disadvantages and to facilitate the sinking of such foundations in the earth; as well as the raising of the same, when necessary, from their sunken or submerged positions; and thereby to increase the depths to which they can be driven by their own weight, as well as the vertical distances through which they can be lifted from those positions. To accomplish these objects I incorporate in a pile or caisson of the specified class a plurality of upwardly directed flaring nozzles, for discharging jets of water upward into the excavation in which that foundation simultaneously sinks.

The invention involves directing the spreading jets vertically upward in lubricating contact with the surface of the structure, and in avoiding the horizontal impingement of those jets against the surrounding earth.

In the accompanying drawings, illustrating some of the manners in which I have contemplated applying the principles of the invention, Figure 1 is a sectional view of a portion of a caisson shell, showing an aperture formed therein for the purpose of directing a fanlike or spreading jet of water under pressure flaringly upward in lubricating contact with the peripheral surface of the shell. Fig. 2 is an incomplete sectional elevation of a pile having among others two nozzles which are constructed in accordance with the same principles. Fig. 3 is a horizontal cross section on the line of Fig. 2.

In the illustrative pile which is indicated in Fig. 1, the upwardly directed aperture is formed integrally with the caisson shell by making an incision through that shell and extending outwards and upwards the flaring lower lip of the aperture, as shown.

The illustrative pile shown in Figs. 2 and 3, is of the general construction and made of operation disclosed in Letters Patent of the United States, No. 1,024,820, which were issued to me April 30, 1912, for improvements in piling construction. The body, or stem 1, of the present pile is formed of concrete or other cement, and is of uniform circular cross section. It has a longitudinal axial opening 2, which is to be supplied with water under pressure while the pile is being sunk. It is destitute of all lining of the central opening 2, and has a plurality of upwardly directed side nozzles which communicate severally with the hole 2, and are presented in several alternative forms, 8, 8', 8'', 8''' and 8''. The nozzle 8'' is narrowed at the top in the direction of a radius extending thereto from the axis of the stem 1, and is made laterally flaring upward. The nozzle 8'' is similarly flaring and has at its mouth a concavo-convex curvature, hugging the stem 1, as shown in Fig. 3.

In the operation of the invention, the lateral jets, directed as described and severally reinforcing one another, coalesce in the form of a continuous ascending sheet or film of water closely enveloping the pile and lubricating the surface thereof on all sides, preventing the adjacent earth from adhering thereto and elevating the displaced matter to the surface.

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

1. A cylindrical subsurface structure of the specified class, comprising a plurality of
upwardly directed flaring nozzles, connected
with the hollow interior of the structure,
and terminally curved to hug its convex sur-
face.

2. A cylindrical sub-surface structure pro-
vided with an excavating jet, a plurality of
lateral nozzles arranged along the sides of
the structure close enough together to carry
the excavated material upwardly along the
sides of the pile and arranged at different
levels, said nozzles being terminally curved
to conform to the convex surface of the
structure.

In witness whereof I have hereto affixed
my signature in the presence of two wit-
nesses.

EDWARD BIGNELL.

Witnesses:
Harry T. Jones,
Dorothy Jones.