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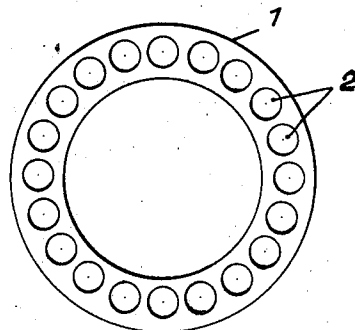
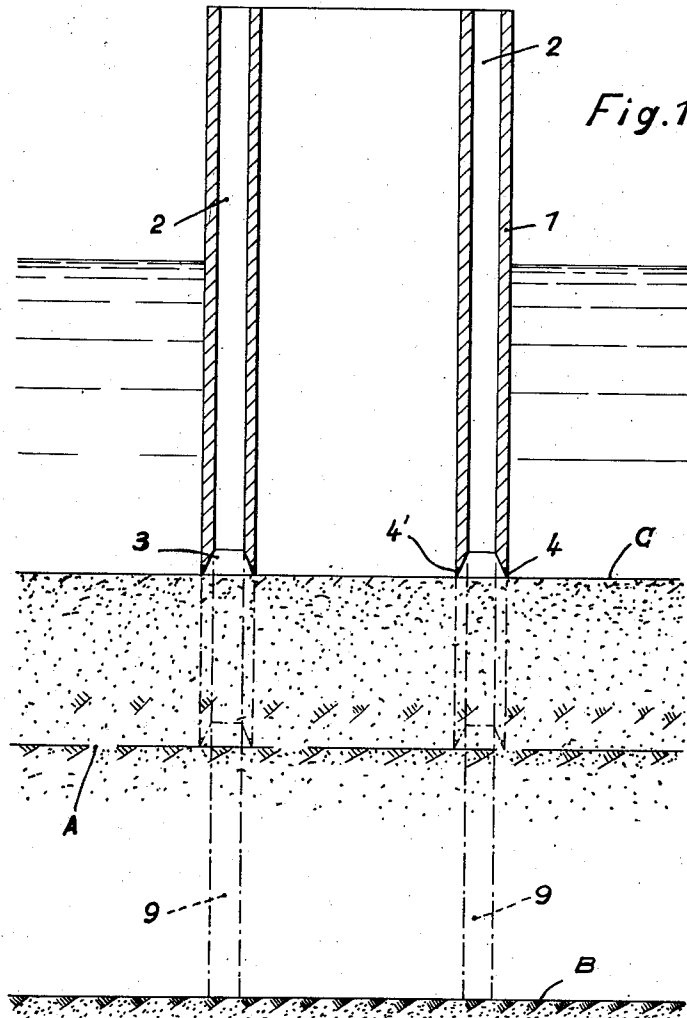
A. LARQUETOUX

2,468,265

FOUNDATION

Filed Aug. 29, 1946

3 Sheets-Sheet 1



INVENTOR
ANDRÉ LARQUETOUX,

BY

William C. Linton.

ATTORNEY

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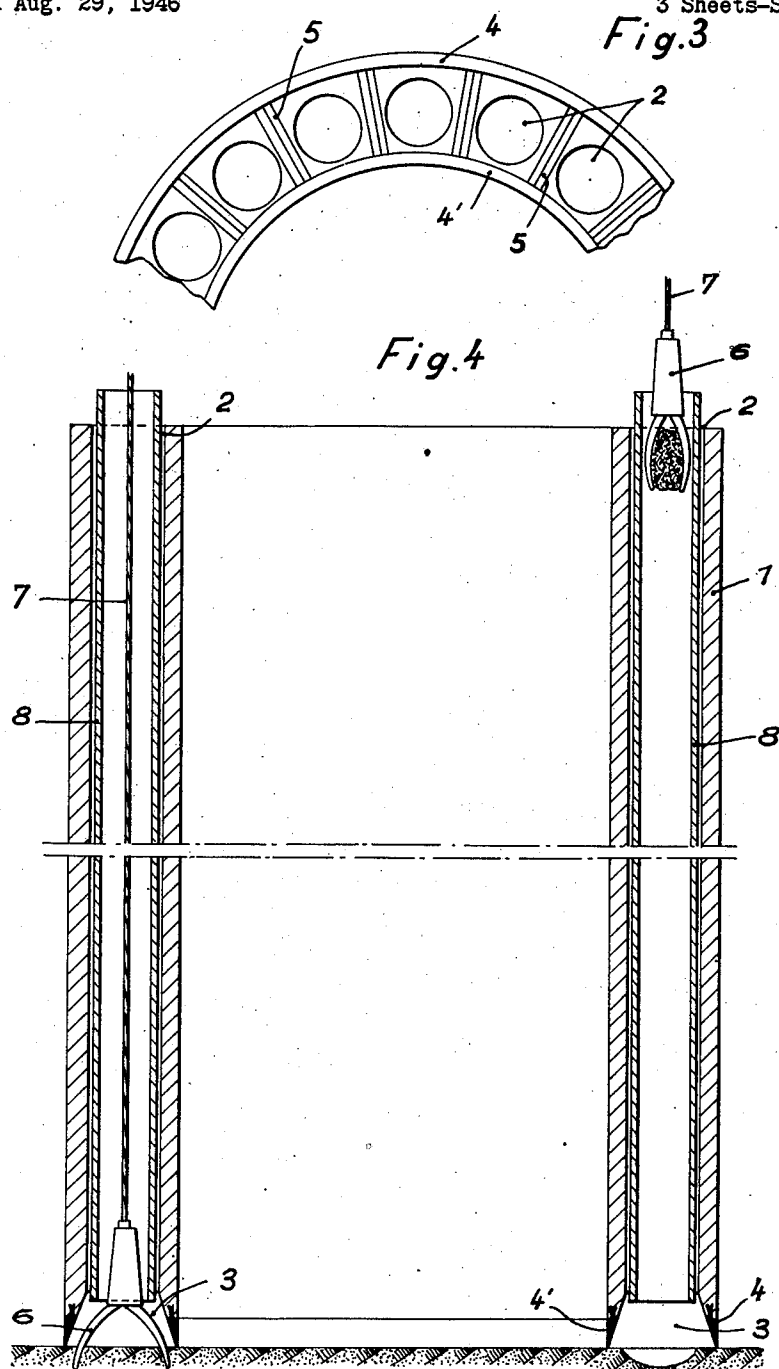
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INVENTOR
ANDRÉ LARQUETOUX,

By

William C. Linton

ATTORNEY

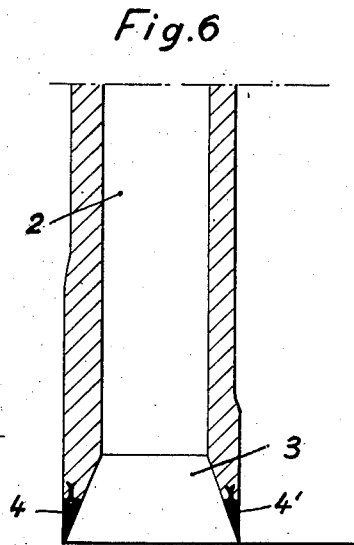
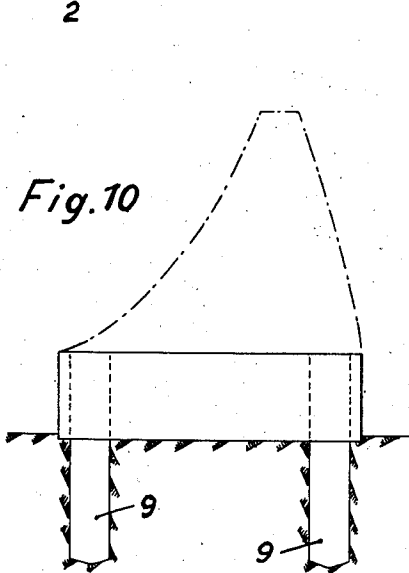
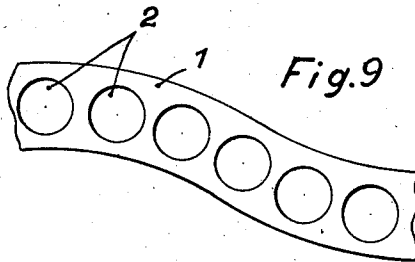
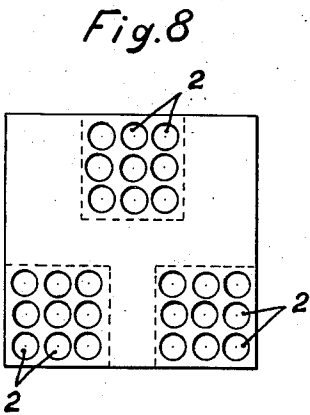
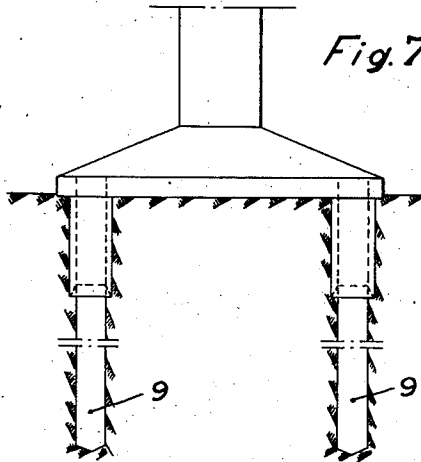
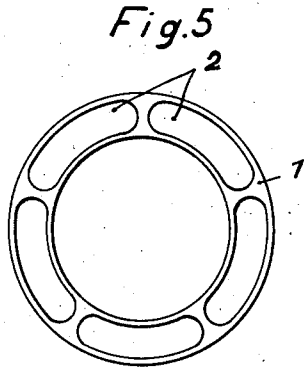
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3 Sheets-Sheet 3



INVENTOR
ANDRÉ LARQUETOUX
William C. Linton
ATTORNEY

UNITED STATES PATENT OFFICE

2,468,265

FOUNDATION

André Larquétoux, Paris, France

Application August 29, 1946, Serial No. 693,619

In France February 18, 1946

4 Claims. (Cl. 61—50)

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In order to sink and set foundations of buildings under water in various soils up to solid bottom layers the diverse following processes have heretofore been used: by means of piles, of draining under the shelter of dikes, of dragging of the excavation and subsequent filling up, of movable or lost caissons with compressed air, of hewing and evacuation of the cuttings into the caissons.

For working up these processes use is made of lifting cars, pumps, and water or compressed air jets with pumps, crushing machines with pumps.

These various usual processes and means are applied by using as working chamber the interior of the caisson to be sunk. All of the soil which is embodied in the enclosure of the caisson must be extracted along the whole height of the excavation, the latter causing pockets, falling in of ground, and the heavily loaded caisson is caused to sink into the soil by gravity with its uprightness being no longer ensured as there often follows an unbalanced state which endangers the support of the construction.

In addition to this chief inconvenience, the workmanship is very expensive for it requires skilled labour and valuable equipment as well as a great consumption of power.

The present invention relates to a foundation pillar or caisson made of reinforced concrete which permits the application of a logical sinking process and of stabilizing means which avoid the inconveniences which are inherent to the known processes.

The pillar or caisson is characterized by the fact that it presents, in its wall structure of whatever shape and cross-section desired, funnels or channels of preferably circular cross-section which extend over the whole height of the pillar and open at the lower ends thereof, formed as independent working chambers at the lower portion of the pillar. These chambers are encircled by cutting members for penetration into the soil.

The process is characterized by the fact that the sinking operation which is always performed through the action of gravity makes use of one or more digging cars or other suitable tool, which performs the extraction of the cuttings through the funnel connected to each working chamber, by limiting that extraction to the resting surface of the caisson. Thus under the action of the cutting members a circular area is created wherein the gradual sinking of the caisson will be achieved, while the latter maintains its stability until it rests upon the bearing course at the previously chosen depth.

Another characteristic resulting from the above

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disclosed process comprises the use at the same time of the funnels of the sinking mass for prolonging, if necessary, the foundation body beyond its resting surface by means of piles which may be driven or formed of reinforced concrete into the soil. These fills may have various cross-sections and lengths sufficient for resting upon a stronger layer of ground than the previous layer and thus assuring the stability of the mass.

The invention will be more clearly understood by the following description and illustrated by the accompanying drawings, which are merely given as non limiting examples of the invention.

In the drawings:

Fig. 1 is a view in vertical cross-section of foundation pillar or caisson for being sunk for a sea coast construction. In that figure are shown the different soil levels which must be traversed by the caissons in order to perform the stability piling.

Fig. 2 is a top plan view of the pillar showing the arrangement of the channels or funnels.

Fig. 3 shows at enlarged scale a fragmentary view of the under plane illustrating the cutting members which encircle the working chambers.

Fig. 4 is a partial view in vertical cross-section at an enlarged scale of the sinking pillar, showing the working process in independent chambers and the arrangement of tubes in the funnels for the easy handling of the extracting tools and for performing the stabilizing piles.

Fig. 5 shows a modification of the shape of the channels or funnels.

Fig. 6 is a fragmentary cross-section of the pillar showing an arrangement for reducing the friction during the sinking operation.

Figs. 7 to 10 show the application of the process to different foundation units under water.

Referring to the drawings and regardless of the shape of the pillar foundation, of its size or its purpose, one reference is first made to the foundation unit 1 made of reinforced concrete with its channels or funnels 2 which extend from one end to the other and are formed at the lower portion as working chambers 3 which are limited by circular cutting members 4, 4' and other radial cutting members 5.

The channels 2, of suitable diameter, as 0.45 m. for instance, in accordance with the importance of the construction are arranged in order to allow the lowering of the suitable tools. The latter consist in a digging car 6 or the like depended at a cable 7 which is operated in the known manner. Before performing the extraction of the cuttings through the funnels, metal tubes 8 are or may

be placed into the said funnels and are of a sufficient length or may be joined together in order to extend beyond the setting level chosen A, for constituting, if necessary, a stability piling upon the hard soil B. The same piling can be formed with driven piles, or better, with reinforced concrete piles moulded into the ground.

According to the invention, the operation is achieved in the following way:

The pillar or caisson being brought at the working place, resting upon a prepared soil level C, and the tubes 8 being arranged into the interior of the funnels, the extracting tools 6 are successively lowered through the said funnels according to an alternate and diametral symmetric operation for maintaining the pillar stability. In proportion as the cuttings are removed for the totality of the working chambers, the sinking operation is achieved in the plane of the bearing surface of the pillar and the latter sinks gradually in the circular or otherwise formed groove.

The lateral abutments are thus maintained and the central bench of the soil penetrates into the interior of the caisson.

In the case of any hinderance opposed to the extraction work (say the case of rocks), one would have recourse, as it is made at the present time, to the boring of the rock followed, if necessary, by a breaking out with explosive means.

The sinking operation is thus led up to the resisting ground. It may also be stopped upon a soil of insufficient strength; in that case, the foundation block will be stabilized by means of piles 9, the construction or setting in place of which being made through or in prolongation of the channels or funnels.

Figs. 7 to 10 show various shapes of the foundation lump to be sunk in accordance with the procedure described above.

Fig. 7 shows for instance a foundation for a pole; Fig. 8 is a rectangular foundation; Fig. 9 a foundation of sinuous shape; Fig. 10, a pillar for the erection of a dam, etc.

In such a case where the pillar has no reason to be prolonged by a piling, because the resting soil surface is of sufficient strength, the working chambers may be merely filled with concrete in order to make up foundation slabs.

Further the channels or funnels may be also filled, partially or entirely, with concrete or any other filling materials.

It will be still noted that in the case of thick ground layers to be traversed and for limiting the friction resistance upon the caisson, this latter comprises at its lower part lateral extensions, of various shape and importance at either side of the working chambers as shown in Fig. 6 or only at one side of said working chambers.

The whole security is ensured by the possibility of knowledge of the various ground layers encountered for each foundation unit of the construction and of the penetration through said layers while the neighbouring zones are left unshaken, which allows to obtain the lateral needed abutment, and, in vertical direction, the requisite strength, with or without the use of piles.

Due to various shapes which may be given the foundation, according to the requirements of the superstructure, one may obtain constructions,

such as wharves, dams, poles, etc. which permit the logical use of materials, the saving of which becomes in addition of the saving achieved in the setting of the foundation proper.

The latter needs indeed for its working out no important nor skilled workmanship, and only a reduced equipment and a low consumption of power.

It wants particularly no skilled labour for operation under water, no powerful lifting and handling apparatus, no important preliminary installation, no provisional installation, no water exhaust.

This now simple but reliable process results in a great rapidity of achievement and a very low cost as compared with the processes in use at the present time.

Having thus disclosed my invention with examples of carrying out the same which are able of various modifications without departure of the scope of the invention, I claim:

1. A foundation comprising a caisson having an elongated tubular wall, said wall having a plurality of inverted funnel-shaped passageways formed and extending longitudinally therethrough, the lower end of each of said passageways forming a working chamber in the bottom of said wall from which to remove material beneath said wall and cutters formed around each of said chambers and extending from the bottom of said wall.

2. A foundation comprising in combination a caisson having elongated tubular wall, said wall having a plurality of inverted funnel-shaped passageways formed and extending longitudinally therethrough and means for stabilizing said caisson formed by piles extending from the lower end of said passageways.

3. A foundation comprising in combination a caisson having elongated tubular wall, said wall having a plurality of inverted funnel-shaped passageways formed and extending longitudinally therethrough, the lower end of each of said passageways forming a working chamber in the bottom of said wall, cutters formed around each of said chambers and extending from the bottom of said wall and means for stabilizing said caisson formed by a plurality of piles each introduced through and extending from one of said chambers into the surrounding earth.

4. A foundation comprising in combination a caisson having an elongated tubular wall, said wall having a plurality of inverted funnel-shaped passageways formed and extending longitudinally therethrough, and a plurality of tubular members each slideably mounted in and extending from one of said chambers into the surrounding earth to form stabilizing members for said wall.

ANDRÉ LARQUETOUX.

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