

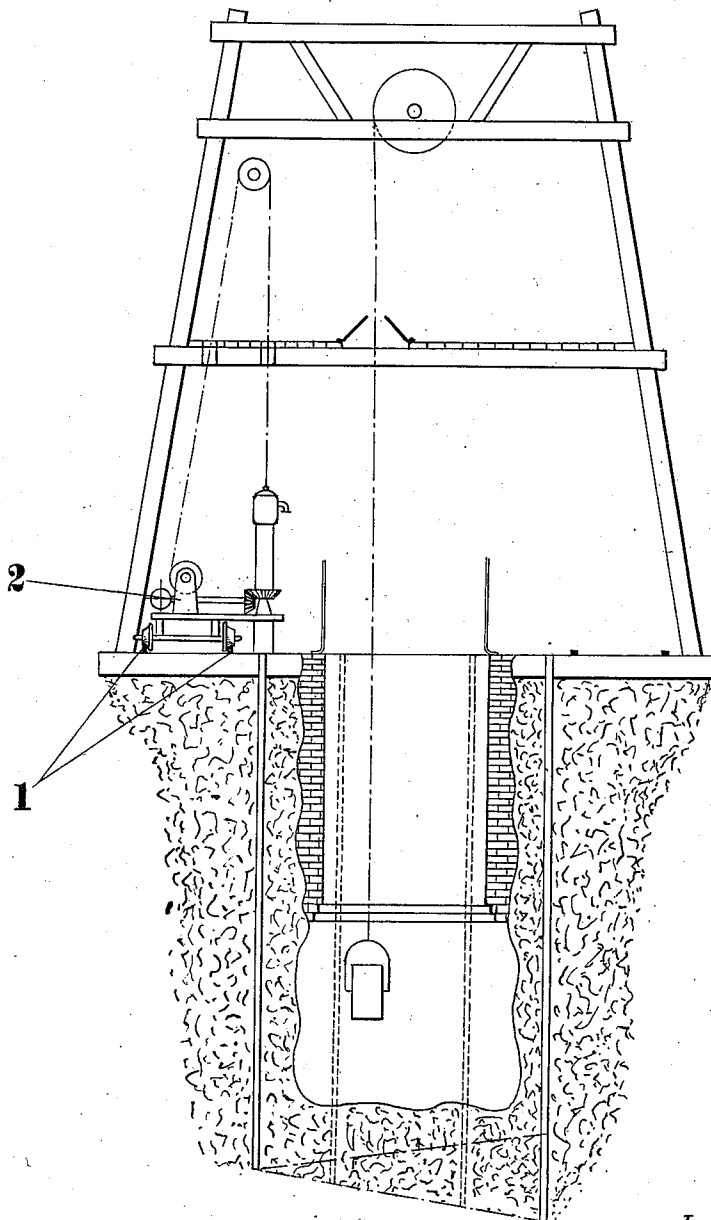
P. A. LEGRAND.
METHOD OF SINKING, LINING, AND CEMENTING SHAFTS.
APPLICATION FILED SEPT. 16, 1909.

1,014,656.

Patented Jan. 16, 1912.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses—

Henry William Blake
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Inventor

Paul Albert Legrand
by
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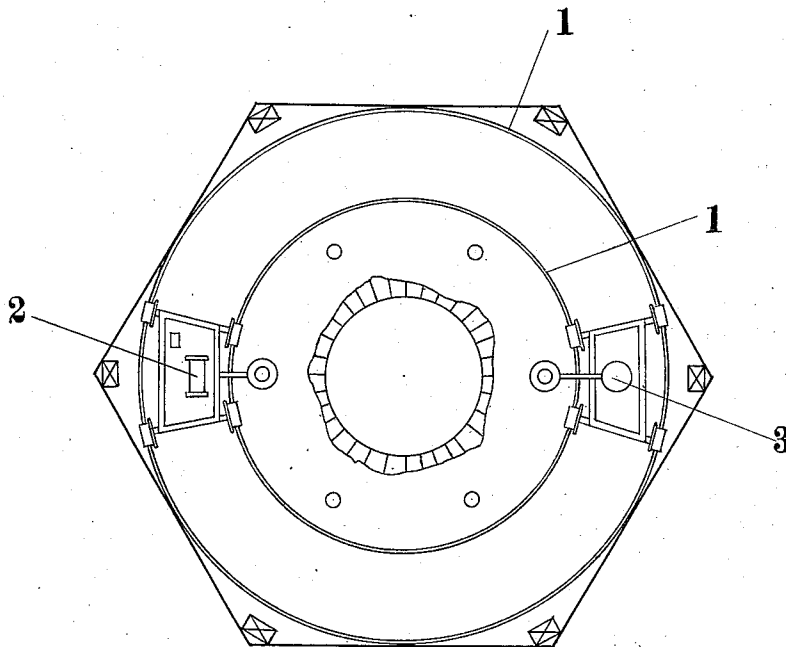
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2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

PAUL ALBERT LEGRAND, OF BRUSSELS, BELGIUM.

METHOD OF SINKING, LINING, AND CEMENTING SHAFTS.

1,014,656.

Specification of Letters Patent.

Patented Jan. 16, 1912.

Application filed September 16, 1909. Serial No. 518,034.

To all whom it may concern:

Be it known that I, PAUL ALBERT LEGRAND, a subject of the King of Belgium, residing at 5 Rue Dessez, Brussels, Belgium, have invented certain new and useful Improvements Relating to the Methods of Sinking, Lining, and Cementing Shafts, of which the following is a specification.

Hitherto several methods have been employed for cementing or lining mine-shafts sunk in watery soil in order to facilitate the sinking operation. Thus bore holes have been made in the section of the shaft or on the exterior of the latter, and, according to one method of procedure, the holes are bored to their full depth and cement injected into the surrounding watery soil through the finished holes, while according to another method, the holes are bored in sections of convenient depths, depending on the strata, and cement injected after the completion of each section. According to a third method the cementing operation is carried out simultaneously with the boring operation. The work of deepening the shaft, however, has always been commenced after the completion of the cementing operation, and after the mouth of the shaft has been completely cleared of the apparatus for boring and cementing. The whole of the time employed in making the bore holes and in cementing, together with the other necessary operations, is therefore lost as regards the deepening of the shaft. These operations, however, of boring and cementing may take considerable time, especially when a deep shaft is to be sunk.

The present invention has for its object to avoid this loss of time, by deepening the shaft simultaneously with the formation of the circle of bore holes, and the injection of cement into the soil by means of the latter.

The invention is illustrated in the accompanying drawings in which—

Figure 1 shows a section of the shaft, and the apparatus in elevation. Fig. 2 is a plan view.

- 1 are the rails.
- 2 is the boring engine.
- 3 is the cementing apparatus.

All the bore holes are formed on the exterior of the shaft itself. The boring apparatus is or are also provided around the edge

of the shaft itself, so as to leave the mouth free for the work of deepening the shaft.

The cementing of the soil around the shaft is effected spirally downward in the manner that the first hole is bored a certain distance downward, the second hole a little deeper than the first, the third a little deeper than the second and so on. In order that the work of deepening the shaft may always be effected in soil that is surrounded by well cemented soil, capable of preventing the passage of water from the surrounding watery soil into the shaft as it is deepened the work of boring and cementing is carried out in advance of the work of deepening the shaft, to an extent depending upon the particular conditions under which the work is carried out. For this purpose the drill or drills pass from one bore hole to the next, and they are therefore mounted on wheels and run on circular rails around the mouth of the shaft. Any usual type of boring apparatus can in this way be mounted on wheels if made light and of small size, but for cementing purposes I prefer rotary drills to the hammer type of borer, since rotary drills are less liable to deposit slime, and cause less agitation in the water current than the hammer type of borer which is liable to fill with slime the cracks or crevices in the soil, which should be filled with cement. Further any type of cement reservoir may be mounted on the rails and moved successively to the different bore holes.

In order that the men engaged upon the boring, cementing, winding and other work shall not inconvenience one another some of the operations can be carried out at different levels as shown in Fig. 1 where the winding gear is disposed at a higher level than the gear for the other work.

What I claim as my invention and desire to secure by Letters Patent is:—

1. The method of sinking shafts in watery soil consisting in sinking the shaft and simultaneously cementing the soil around the same.

2. The method of sinking shafts in watery soil consisting in sinking the shaft and simultaneously boring holes around the same, the holes being made gradually deeper around the shaft, and cementing the soil in a spiral direction around the shaft by intro-

ducing the cementing material through the bore holes.

3. The method of sinking shafts in watery soil consisting in boring the holes and in
5 cementing the soil in a spiral direction around the shaft simultaneously with the sinking of the shaft.

In testimony whereof I have hereunto signed my name to this specification in the presence of two subscribing witnesses.

PAUL ALBERT LEGRAND.

Witnesses:

GREGORY PHELAN,
JAMES M. G. FAY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."