

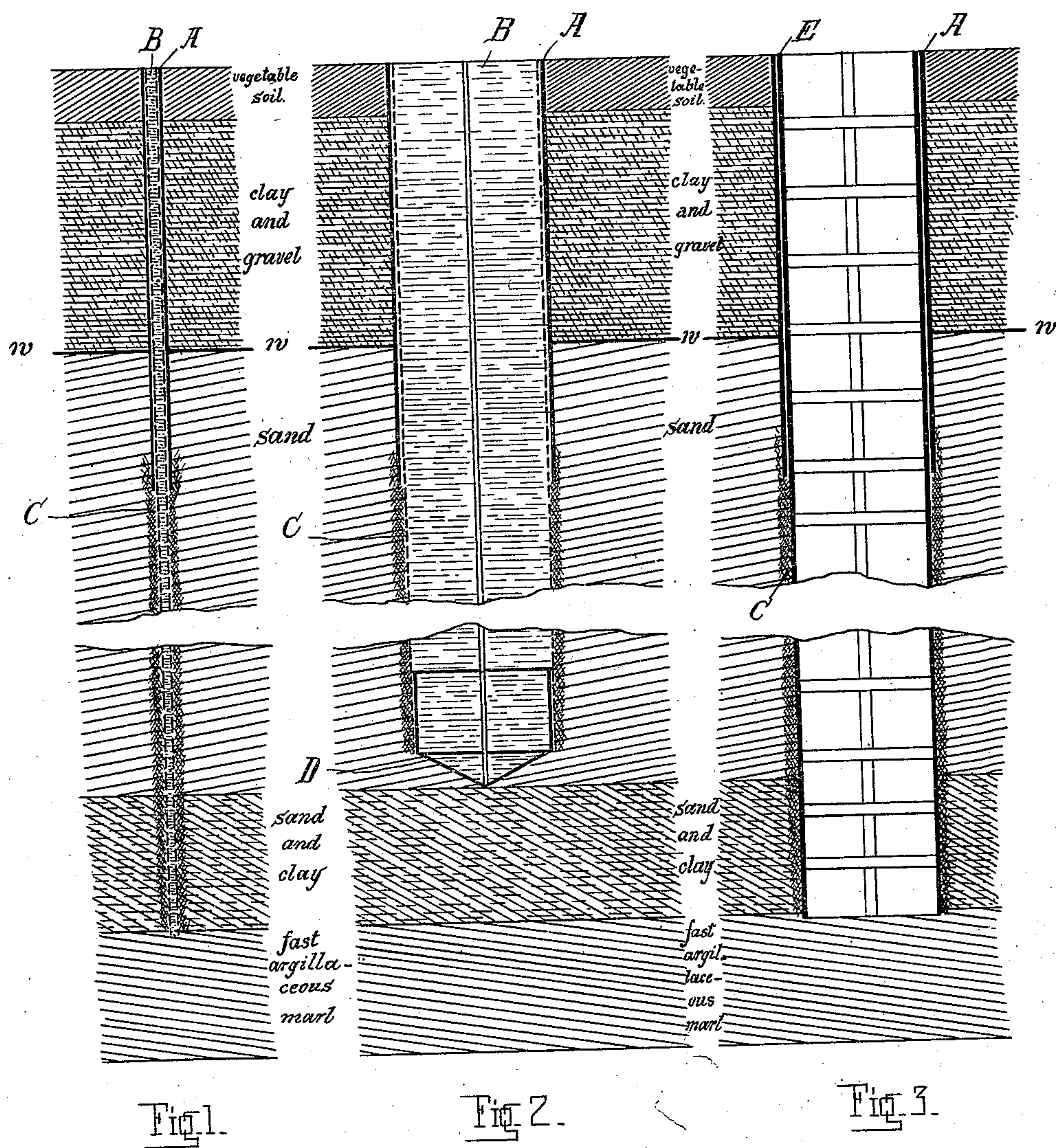
(No Model.)

F. HONIGMANN.

METHOD OF SINKING BORE HOLES AND SHAFTS IN WATER
LOGGED GROUND.

No. 542,765.

Patented July 16, 1895.



Witnesses:-

Fred Haynes
George Barry.

Inventor:-

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by his attorneys
Brown & Seward

UNITED STATES PATENT OFFICE.

FRIEDRICH HONIGMANN, OF AIX LA CHAPELLE, GERMANY.

METHOD OF SINKING BORE-HOLES AND SHAFTS IN WATER-LOGGED GROUND.

SPECIFICATION forming part of Letters Patent No. 542,765, dated July 16, 1895.

Application filed September 28, 1894. Serial No. 524,392. (No model.) Patented in Germany July 8, 1894, No. 80,113; in Belgium August 8, 1894, No. 111,336; in England August 10, 1894, No. 15,292; in France August 11, 1894, No. 240,676, and in Austria April 6, 1895, No. 45/1,194.

To all whom it may concern:

Be it known that I, FRIEDRICH HONIGMANN, mining-engineer, a subject of the German Emperor, residing at Aix la Chapelle, Germany, have invented a new and useful Improvement in the Sinking of Bore-Holes and Shafts in Water-Logged Ground or Quicksand, of which the following is a specification, and for which patents have been obtained as follows: in Germany, No. 80,113, dated July 8, 1894; in France, No. 240,676, dated August 11, 1894; in Belgium, No. 111,336, dated August 8, 1894; in England, No. 15,292, dated August 10, 1894, and in Austria, No. 45/1,194, dated April 6, 1895.

The method hereinafter described of sinking bore-holes and shafts in water-logged ground or quicksand differs mainly from the methods heretofore employed in that the lining of the bore-holes with tubes or of shafts with masonry is not done during the boring, but only after the bore-holes and shafts have been bored or carried down to the firm or solid ground which it is desired to reach. In order to enable this to be done, a resistance is offered by artificial means to the inrush of the fluid soil, whereby to prevent and render impossible the caving in or falling in of the walls or sides of the bore-hole or shaft during the progress of the boring. For the purpose of this resistance I provide within the bore-hole or shaft being sunk a head of water considerably exceeding the natural pressure of the water in the water-logged ground through which the bore-hole or shaft passes, and I employ a thick liquid within the boring, composed of a mixture of clay or similar materials, which brings the specific gravity of the liquid up to 1.2. The object of using such a semi-liquid is both to increase the excess of pressure of the internal column of liquid against the sides of the bore-hole or shaft, and also and more especially to render the sides of the boring water-tight down to a certain depth by the penetration of the clayey materials, and thus to prevent the escape of water to waste from the interior of the boring into the surrounding soil. By these means I insure that the sides of the boring remain intact and to not cave in, so that the bore-hole

or shaft will remain unobstructed without being lined, and the lining can be left until after the boring operation has been completed.

I will now explain, with reference to the accompanying drawings, how my invention is carried out in practice.

Figure 1 of the drawings is a vertical sectional view representing a bore-hole of small diameter and a tube inserted therein. Fig. 2 is a similar view of hole or shaft and tube of larger size with a bottom piece at the bottom of the hole or shaft. Fig. 3 is a similar view corresponding with Fig. 2, but showing also a complete lining which is inserted in the hole or shaft after its completion.

A, Figs. 1 and 2, designates a guiding-tube or filling-tube; B, the filled-in water.

C, Figs. 1, 2, and 3, designates the clay infiltrated into the wall of the hole by the water.

D, Fig. 2, designates the bottom piece below the tube A.

E, Fig. 3, designates the complete lining. *w w* indicate the water-level.

The operation is as follows: In the case of bore-holes of small size, such as are shown in Fig. 1, the guiding-tube A and, in the case of shafts or holes of larger size, such as are shown in Fig. 2, the similar tube A, which may be called a "filling tube," are first sunk according to the method heretofore in use for a depth of from ten to twenty meters below the water-level for the purpose of keeping out the upper strata of loose ground and gravel, and of thus obtaining a firm guidance for the boring-tools, &c., during the subsequent boring operation. When this work is completed, then the means above referred to for offering a resistance to the inrush of the fluid soil are employed before continuing to sink the bore-hole or shaft any farther. For this purpose the tubing A of the hole or the lining A of the shaft is carried up as high as possible above the natural water-level *w w* and is filled with water up to this height. The specific gravity of the liquid is brought up to about 1.2 by mixing with clay or similar material. While continually attending to these precautions, the sinking of the bore-hole or shaft is proceeded with by means of the usual

boring apparatus until the firm ground is reached, where the hole or shaft is to end. Then, but only after the boring has been completed, the lining-tubes or the shaft-lining E is inserted and carried down to the bottom of the hole, and thus the external soil is kept out.

In order to more clearly explain the action of the pressure of the internal column of liquid upon the sides of the boring, it may be stated that the excess of pressure of the internal column of liquid over the natural water-pressure in a layer of sand at a depth of fifty meters is calculated as follows: Artificial heat of water equals ten meters. Then ten plus fifty or sixty meters multiplied by 0.2 (the coefficient of the increase of specific gravity of the liquid column) equals twelve meters. Ten plus twelve equals twenty-two meters excess pressure at a depth of fifty meters. This excess of pressure in the bore over that of the surrounding soil exerts a pressure of about 2.2 kilograms per square centimeter upon the sides of the boring at this point and prevents any caving in of the sides.

Now, what I claim, and desire to secure by Letters Patent, is the following:

1. The within described improvement in the sinking of bore holes and shafts consisting in first boring the hole or shaft to a certain depth, then inserting thereinto a tube which projects above the natural water level, next continuing the boring below said tube to the depth required and at the same time keeping the hole and the said tube supplied with water to a height above said level, and finally,

after the completion of the boring, inserting a lining tube, substantially as herein set forth.

2. The within described improvement in the sinking of bore holes and shafts consisting in first boring the hole or shaft to a certain depth, then inserting thereinto a tube which projects above the natural water level, next continuing the boring below said tube to the depth required and at the same time keeping the hole and the said tube supplied with water to a height above said level, and finally, after the completion of the boring, inserting a lining tube through the first mentioned tube, substantially as herein set forth.

3. The within described improvement in the sinking of bore holes and shafts consisting in first boring the hole or shaft to a certain depth, then inserting thereinto a tube which projects above the natural water level, next continuing the boring below said tube to the depth required and at the same time keeping the hole and the said tube supplied to a height above said level with water containing clayey material for preventing ingress of water through the sides of the bore, and finally, after the completion of the boring, inserting a lining tube, substantially as herein set forth.

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

FRIEDRICH HONIGMANN.

Witnesses:

JOHN HECKMANNS,
W. C. EMMET.