E. MORLAE.

METHOD OF LINING SHAFTS WITH CONCRETE.

APPLICATION FILED NOV. 5, 1912.

1,089,573. Patented Mar. 10, 1914.

Fig. 1.

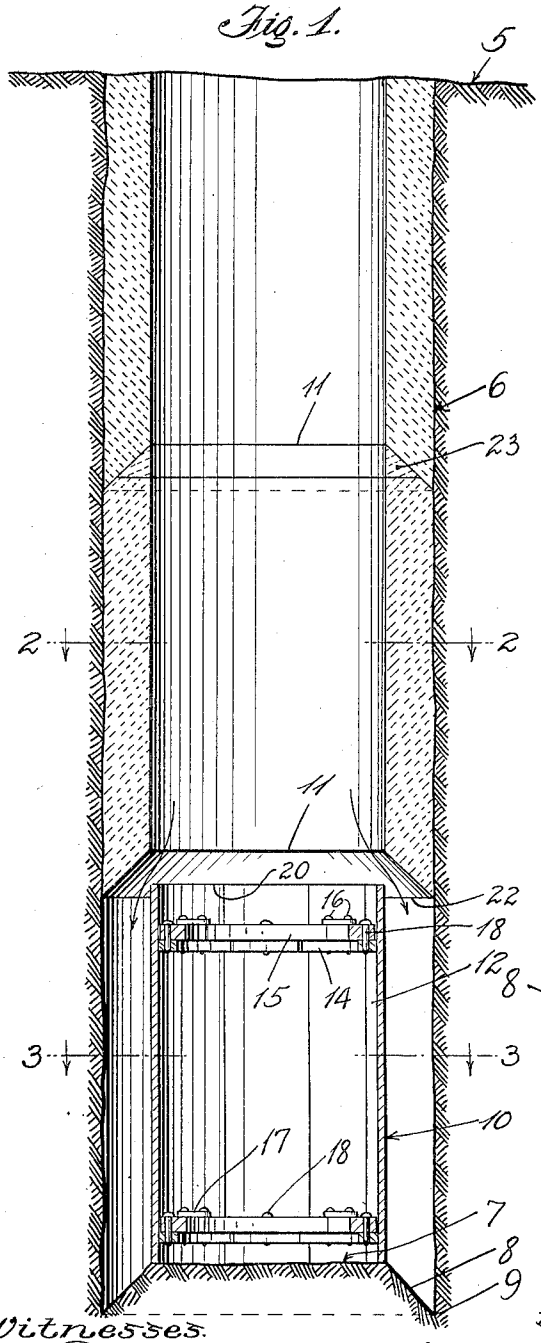


Fig. 4.

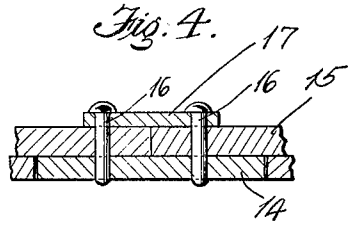


Fig. 2.

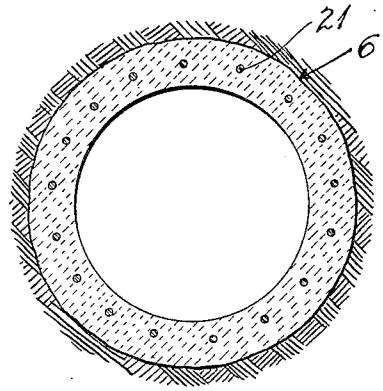
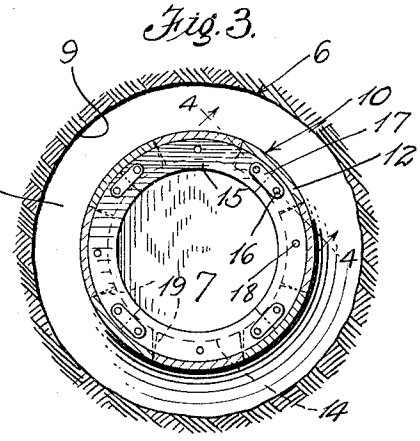


Fig. 3.



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METHOD OF LINING SHAFTS WITH CONCRETE.

1,089,573. Specification of Letters Patent. Patented Mar. 10, 1914.

Application filed November 5, 1912. Serial No. 729,557.

To all whom it may concern:

Be it known that I, EDWARD MORLAE, a citizen of the United States, residing at San Gabriel, in the county of Los Angeles and State of California, have invented a new and useful Improvement in Methods of Lining Shafts with Concrete, of which the following is a specification.

This invention relates to a method of lining shafts with concrete, and the principal object of the invention is to provide a method to eliminate the building of elaborate retaining walls in a well shaft.

It is also an object to provide a method by which the concrete may be inserted in sections progressively from the top or ground level downward.

In the drawings accompanying this specification Figure 1 is a central longitudinal section of a shaft showing two of the sections of concrete introduced, and the form in position ready to place the next succeeding section of the lining. Fig. 2 is a cross section on the line 2—2 of Fig. 1, viewed in the direction indicated by the arrows. Fig. 3 is a cross section of the shaft on the line 3—3 of Fig. 1, viewed in the direction indicated by the arrows. Fig. 4 is a detail section on the line 4—4 of Fig. 3, viewed in the direction indicated by the arrows.

Heretofore in the lining of shafts with concrete, as far as known to me, the shaft has first been sunk or dug the required depth, requiring a temporary lining to retain the walls of the shaft intact and prevent caving in upon the operators. Then this supporting lining either has to be removed or becomes a loss by being left in the shaft while the forms are inserted and the lining introduced from the bottom upward, the entrance of water in the lower end of the shaft or intermediate positions complicating this process.

This invention overcomes the above difficulties by providing a method by which the shaft is inclosed with the permanent lining as the work progresses downward without great delay, and materially reducing the cost, and increasing the efficiency of the structure.

In the drawings numerals are used to designate the same parts in the different views, 5 designating the surface of the ground, and 6 the shaft vertically dug therein by any suitable means or apparatus, the method preferably used being to dig the shaft a depth equal to the hight of the collapsible form preferably used. In practice this form is about six feet in length, depending on the character of the soil through which the shaft is being sunk. The section dug is preferably as indicated, in the lower portion of Fig. 1, so as to provide the platform 7 of a diameter equal to the diameter of the finished shaft, from this point downwardly and outwardly, being excavated to leave the inclined face 8 until the concentric periphery of the major diameter of the shaft is met at the point 9. On this platform 7 the collapsible form 10 is erected, the upper edge of which falls slightly below the inner edge 11 of a previously formed section. The form 10 is preferably formed of a plurality of vertical sections 12 each of which is provided with a flange 14 secured thereto at suitable distances, the flanges, when various sections are placed adjacent one another abutting to form the circular configuration or cylinder, upon which flanges are supported the four sections of the rim 15 which are held together by suitable means. as pins 16 passed through the locking plate 17 together with the pins 18 which pass through the flanges 14 and the rim 15 intermediate of the locking plates 17. One of these sections is necessarily cut away as indicated in dotted lines at 19 so that this section may be removed to allow the collapse of the form after the concrete has been inserted.

As before stated, the concrete is introduced between the upper edge 20 of the form and the lower inner edge 11 of the previously formed section of the concrete lining which is preferably reinforced by the vertical rods 21 supported in any well known manner. This upper edge 20 preferably extends a slight distance above the lower edge 22 of the last section of the concrete lining.

The shaft is preferably dug during the day the required depth, then the process of tamping the concrete lining in place is performed, and the concrete left to cure over night, while the digger is otherwise occupied. The concrete sufficiently sets to permit the removal of the forms the next morning, and the shaft is sunk the corresponding distance only limited by the length of the form used. The triangular space 23 is filled either before the removal of the form and troweled in position, or inserted afterward, as may be found preferable.

In an excavation having a lining of this character, the cost over usual constructions has been reduced approximately one-half, together with the material increase in speed of construction, and with greater assurances of safety, the irregular portions of the shaft walls firmly grasping the concrete sections, and preventing sliding as well as the connection to one another by adhesion, or suitable connections between the reinforcing rods.

What I claim is:

1. A method of lining shafts with concrete, consisting in sinking a shaft approximately equal to the depth of the form used, an annular channel being formed below a flat base for the form, inserting the form to rest on the base, and filling in cement, then removing the form and sinking the shaft another section and placing the form to fill in below the last formed section.

2. A method of lining shafts with concrete, consisting in sinking a shaft equal to the depth of a form, inserting the form, and filling in cement, then removing the form and sinking the shaft another section and placing the form to fill in below the last formed section, then facing the inside of the casing intermediate of the flat top of the new section and the inclined edge of the section next above.

3. A method of lining shafts, which consists in first excavating a portion of the shaft approximately equal to the height of the form employed, the bottom of the shaft being formed as a truncated cone, the truncation forming a base for the form, then inserting the form of smaller diameter and filling the void between the wall of the shaft and the form with concrete and allowing the same to set, then removing the form and excavating additional sections of approximately the same depth one at a time below said first named section and proceeding with substantially the same steps as set forth for the first section, whereby the shaft will be lined in sections from the top to the bottom thereof.

In witness that I claim the foregoing I have hereunto subscribed my name this 25th day of October 1912.

E. MORLAE.

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