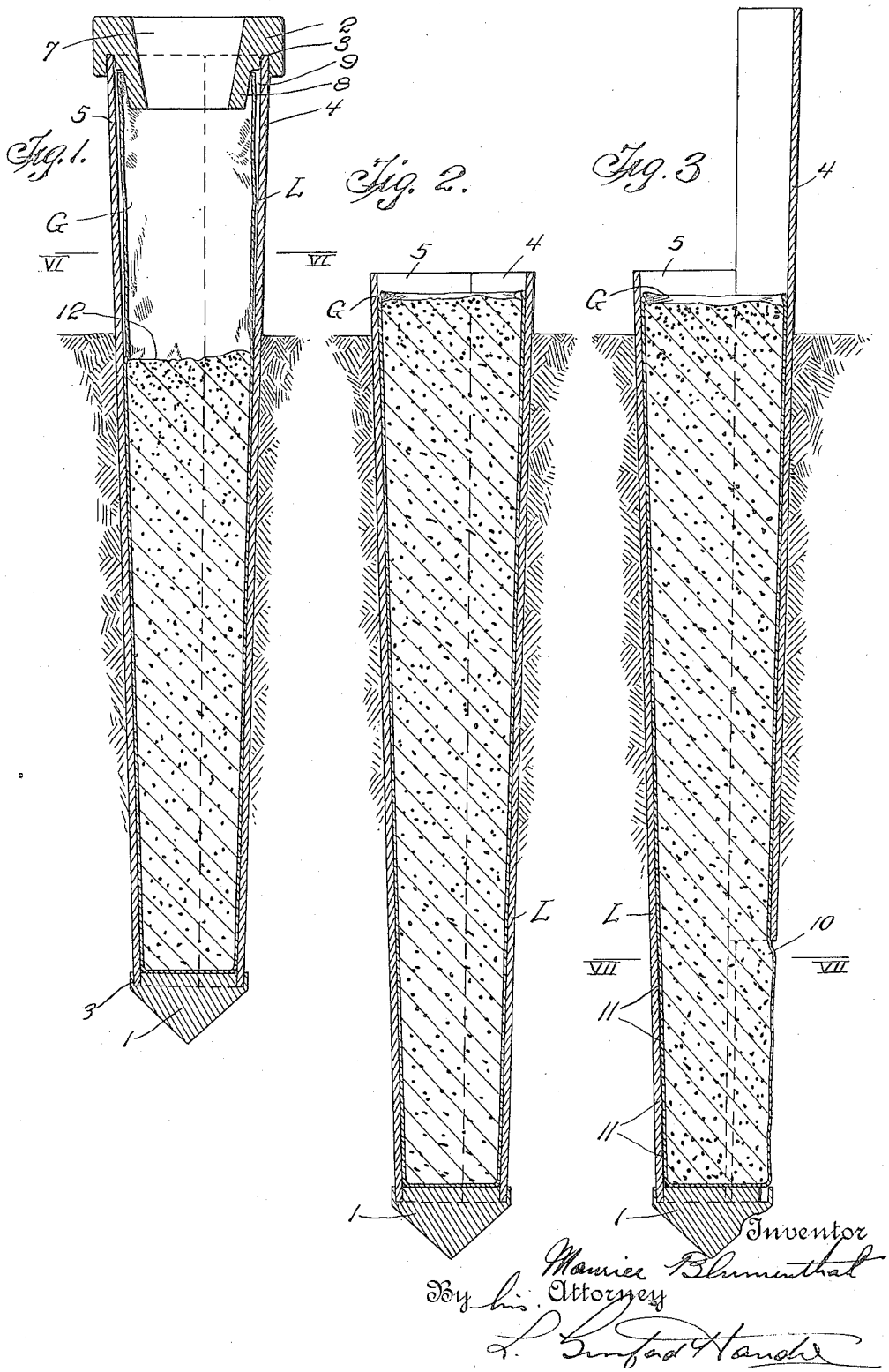
Mar. 20, 1923. 1,449,032

M. BLUMENTHAL

CONCRETE PILE AND METHOD OF FORMING SAME

Filed June 23, 1919 2 sheets-sheet 1



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Mar. 20, 1923. 1,449,032

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CONCRETE PILE AND METHOD OF FORMING SAME

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Fig. 6.

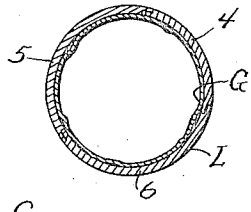


Fig. 4.

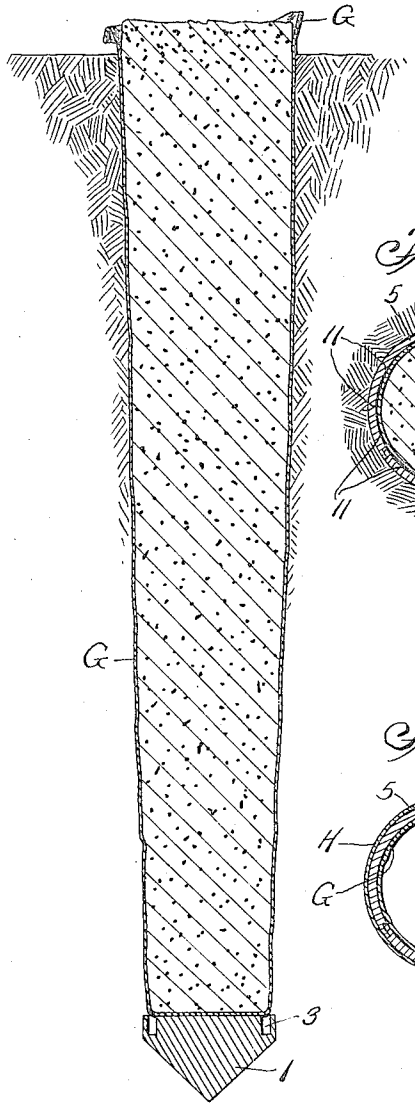


Fig. 7.

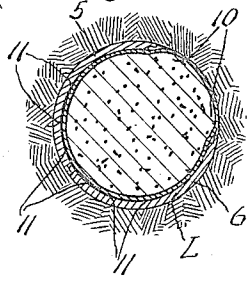


Fig. 8.

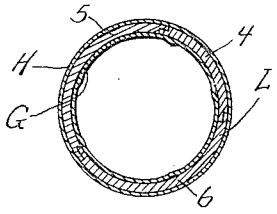
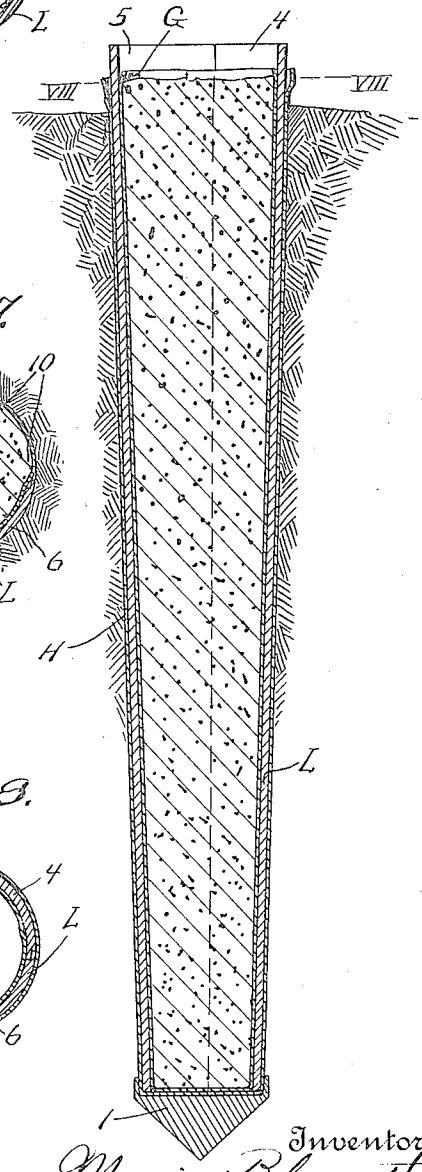


Fig. 5.



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Patented Mar. 20, 1923. 1,449,032

UNITED STATES PATENT OFFICE.

MAURICE BLUMENTHAL, OF BROOKLYN, NEW YORK.

CONCRETE PILE AND METHOD OF FORMING SAME.

Application filed June 23, 1919. Serial No. 306,134.

To all whom it may concern:

Be it known that I, MAURICE BLUMENTHAL, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Concrete Piles and Methods of Forming Same, of which the following is a specification.

This invention relates to a means for and method of producing concrete piles in the earth.

While the means herein illustrated may be employed for the making of concrete piles within the earth of various classes and consistency, it, however, is particularly adapted for the making of concrete piles in earth which is soft and watery. The device of this invention may be used with especial efficiency in sinking piles to a solid bed thru water bearing strata, or even thru the clear water itself of streams, or along the shores of rivers and the like, for supporting piers and such structures.

A particular object of this invention, therefore, is to provide a device, and a method of using the same, whereby the soft earth or the water may be positively excluded from contact with the unset concrete employed for the building of the pile.

A further object is to provide a suitable hollow shell adapted to be driven into the earth to receive the concrete for comprising the pile, to provide means whereby the shell may be removed, and to provide an auxiliary container for the concrete of a character to prevent contamination of the concrete with the surrounding water, and to continue holding the concrete in pile shape after the shell has been removed.

A further object is to provide an auxiliary container having a suitable degree of elasticity whereby to permit the material of the pile to flow, or expand, into the space left in the earth by the removal of the shell.

While the objects above referred to may be readily attained with either a sectional or a non-sectional shell, yet a sectional shell is preferable, and, therefore, a further object of this invention is to provide an auxiliary container having such cooperative relation with the shell as to enable easy removal of the shell sections.

A further object is to provide a new and improved type of auxiliary container or liner for concrete piles.

A further object is to provide an improved method for sinking and completing piles of the class indicated.

Other objects and aims of this invention, more or less specific than those referred to above, will be in part obvious and in part pointed out in the course of the following description of the elements, combinations, arrangements of parts and applications of principles, constituting the invention, and the scope of protection contemplated will be indicated in the appended claims.

In the accompanying drawings which are to be taken as a part of this specification, and in which I have shown merely a preferred form of embodiment of the invention:—

Figure 1 is a longitudinal sectional view illustrating a pile in the course of construction in accordance with this invention.

Figure 2 is a similar view showing the parts of Fig. 1 fully driven into the earth preparatory to the removal of the shell.

Figure 3 is a view similar to Fig. 2 but illustrating one of the sections of the shell in the course of being removed.

Figure 4 is a longitudinal sectional view of a completed pile.

Figure 5 is a view similar to that shown in Fig. 2 but illustrating a modification in which two auxiliary containers are employed, one within and the other without the shell.

Figure 6 is a transverse sectional view taken substantially upon the plane of line VI of Fig. 1.

Figure 7 is a similar sectional view taken substantially upon the plane of line VII of Fig. 3, and

Figure 8 is a transverse sectional view taken upon the plane of line VIII of Fig. 5.

Referring to the drawings for describing in detail the structure and features therein illustrated, the reference character L indicates the shell, or former, which is provided at its lower end with a nose piece 1 and at its upper end with a cap piece 2, the end edges of the shell being received in suitable recesses 3 in said nose piece and cap piece so as to retain the sections 4, 5 and 6 of the shell in proper assembly while the whole is being driven into the earth by blows dealt upon the upper surface of the cap piece, in the usual manner.

Within the shell is arranged the auxiliary container G. This container is in the form of a bag closed on all its sides and at its

bottom, and being open only at its top end for receiving concrete emptied thereinto, for instance, thru the opening 7 of the cap piece. Preferably the cap piece is formed with a pendent flange 8 providing a recess 9 between itself and the adjacent portions of the shell for receiving the upper annular edge portions of the auxiliary container and thereby properly holding said portions of the container spread for receiving the concrete.

The container G may be of any appropriate material but I have discovered that for the purposes of this invention said container is most admirably adapted to its purposes if made of paper, the paper being suitably reinforced and being of water-proof character thruout. I have discovered that a paper bag, or container, employed in the relation as set forth, has numerous very important advantages over containers of other materials. The paper container is very easily handled at all times. Before being placed within the shell it may be conveniently folded or wrapped. It can be readily inserted within the shell. And after the concrete is introduced the space occupied by the paper is almost negligible. The paper also will readily accommodate itself to any and all irregularities which may occur upon the inner surface of the shell. After the shell is removed the paper also will suitably accommodate itself to the various irregularities of surface of the surrounding earth, thus enabling the pile to attain a firm and more efficient grip upon the earth while at the same time preventing undesirable spreading or migration of the material of the pile into voids in the earth.

Furthermore, the use of paper for the auxiliary container gives to the container a certain degree of elasticity which will enable the container to spread under the weight of the unset concrete when the shell is removed thus effectually filling the opening left by the removal of the shell. The tendency to form a vacuum beneath the shell, with its attended evils, is thereby avoided.

Furthermore, as has been graphically illustrated in Figs. 3 and 7 of the drawings, where the shell L is a sectional shell, the removal of one section, as for instance the section 4, by allowing the auxiliary container to spread into the space left by removal of this section, as seen at 10 in said Figs. 3 and 7, imposes upon the container a certain degree of strain tending to draw the container in a direction away from the remaining sections of the pile. The friction against these remaining sections of the pile: that is, along the surface 11 of said sections 4 and 5, is thereby reduced so that said sections 4 and 5 may thereafter be more readily removed. Of course, as the sections are removed, however, the excessive weight of the unset concrete will stretch the container thruout its circumference so that the paper is forced into engagement with the surrounding earth.

As illustrated in the drawings one section of the pile, for instance the section 4, which should be first withdrawn, is preferably a narrower section than the sections 5 and 6. The section 4 being relatively narrower, may be withdrawn without the use of excessive force, and thereafter, due to the reduction of friction against the surface of the sections 5 and 6, as just referred to, said sections 5 and 6 may be withdrawn with equal facility as was the section 4 notwithstanding their relatively greater width.

The paper auxiliary container also is relatively cheap so that it may be left within the earth without imposing an objectionable expense upon the contractor; that is, the cost of the paper container is markedly small when compared with the advantages attained by its use.

The paper container being left in the earth and containing the concrete after the shell has been removed, serves to retain the concrete in proper pile form resting directly upon the upper surface of the nose piece 1, which, of course, remains buried in the earth after the shell is removed. This advantage, of course, increases in importance in proportion to the degree of softness of the earth thru which the pile extends, and being coupled with the fact that the paper provides for the formation of a certain degree of unevenness in the surface of the pile, according to the different portions of the surrounding earth, gives to the use of the paper bag one of its most important values.

Altho, of course, the paper container may be inserted within the shell at any time either before or after the shell is driven, and altho the concrete may be placed within the container after the shell is fully driven, yet it has been determined that the preferable method to follow in this respect is to place the container within the shell prior to the driving of the shell and to pour in the concrete while the shell is being driven, the concrete being poured in at a rate suitable to maintain the level thereof, as 12, approximately the same as the level of the surrounding earth, as indicated in the drawing, Fig. 1. This method has the decided advantage of producing a certain degree of agitation of the concrete sufficient to exclude the formation of voids in the concrete. It also serves to remove a suitable proportion of the wrinkles in the paper container so that the paper is pressed into appropriate engagement with practically the whole inner surface of the shell leaving perhaps only such wrinkles as tend to increase the expansibility of the container for accomplishing the results as above set forth.

The modification Figs. 5 and 8 disclose

substantially the same structure as that already described; that is, it illustrates a shell and a paper container G therein, the same as in the other figures. In addition it illustrates a second container, as H, arranged outside of the shell. The two containers are of identical construction, and it has been found that under certain circumstances, for instance where the earth is extremely soft so as to offer little resistance to the spreading of the pile, use of the two containers, as illustrated, is of advantage since one serves as a reinforcement for the other. It is also to be noted that the position of the shell sections between the two containers renders the shell sections more easily removable than where one surface of the shell sections is in direct contact with the more or less granular surface of the surrounding earth.

In some instances it may be desirable to employ the outer container H while omitting the inner container G. This arrangement will have many of the advantages above referred to with respect to the container G as will be obvious.

As many changes could be made in this construction without departing from the scope of the invention as defined in the following claims, it is intended that all matter contained in the above description, or shown in the accompanying drawings, shall be interpreted as illustrative only and not in a limiting sense.

As has been above referred to, this invention comprehends the use either of a sectional or a non-sectional shell, and in this connection it should be made clear that where the non-sectional shell is employed, such shell being, of course, not tapered, may be lifted bodily from the earth leaving the concrete with its paper container resting upon the nose piece. As the shell is lifted the weight of the unset concrete will cause the paper container to expand for its entire circumference into the space left by the removal of the shell, and thus prevent tendency to the formation of vacuum in said space. The paper shell in this instance, as well as in connection with the sectional shell, will serve to bind together the component parts of the concrete material and thus prevent any portion of the concrete from being lifted away from other portions while the shell is being withdrawn. In this manner one of the greatest difficulties in concrete pile formation is overcome. The frictional resistance to the lifting of the shell is not felt by the concrete material of the pile but is felt only by the outer surface of the paper which, of course, is suitably strengthened to withstand it.

The paper shell obviously also produces materially less friction against the surface of the shell than would the concrete material, therefore enabling the shell to be removed with much less difficulty.

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

1. The herein described method of forming a concrete pile which consists in providing a sectional shell with a separate flexible container therein, driving said shell with said container into the earth, filling said container with unset concrete material, then removing one section of the shell while the concrete is still unset so as thus to permit a portion of the container under the pressure of the unset concrete to move into the space left by said removed section thus to relieve pressure against the remaining shell sections, and thereafter removing said remaining shell sections.

2. The combination with a pile shell adapted to be driven into the earth for receiving concrete thereinto, of a container adapted to be placed within said shell, the container being intended to receive unset concrete therein for forming the pile, being expansible under pressure of the unset concrete so as to extend into the space left in the earth by the removal of the shell, and being of a character to hold the concrete material out of engagement with the surface of the shell during the removal of the shell.

3. The combination with a pile shell adapted to be driven into the earth for receiving concrete thereinto, of a container adapted to be placed within said shell, the container being intended to receive unset concrete therein for forming the pile, being expansible under pressure of the unset concrete so as to extend into the space left in the earth by the removal of the shell, and being of a character to receive and sustain the lifting strains imparted to the pile by the removal of the shell, and thereby to prevent lifting of portions of the concrete material away from other portions during the removal of the shell.

In testimony whereof I affix my signature in the presence of two witnesses.

MAURICE BLUMENTHAL.

Witnesses:
L. GESSFORD HANDY,
MAY SCHULZ.