To all whom it may concern:

Be it known that we, CHARLES R. GOW and JOHN E. PALMER, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Processes of Making Concrete Structures, of which the following is a specification.

This invention relates to improvements in the construction of buildings, walls, or other engineering structures, the improvements particularly relating to the formation of the columns or piles, so that it is possible to utilize a foundation which would ordinarily be unsuitable to support the weight of the structure which is to be carried on such foundation.

Heretofore it has been customary to seek a suitable material for a foundation below the surface of the ground, which foundation can usually be found by going deep enough. It has been customary in such cases to drive wooden piles of a sufficient length to penetrate the desired stratum of firm material. This is preferable as a usual thing to excavating to a considerable depth and refilling the excavation with masonry or other material. Wooden piles, however, have several disadvantages, among which may be mentioned the following: Each individual pile being necessarily small in sectional area, its supporting power is consequently small. Hence a large number of such piles are required to safely carry any great weight. Again, wooden piles are subject to rapid decay unless continually submerged in water. Consequently it is necessary to excavate at least to the lowest level of the ground-water in order to cut the piles off at this level and commence masonry from this point. Furthermore, it is impossible to drive piles inside of an ordinary building, as a sufficient amount of head-room is necessary for the pile-driving apparatus, which is necessarily of a considerable height.

In the case of existing buildings or other structures where settlements take place, threatening the stability of the structure, it is often necessary to secure a new foundation from which to support these walls. In such a case wooden piles would be out of the question.

For all such purposes, as above mentioned, we propose to employ a concrete pile having an enlarged footing according to our invention, which we will now proceed to describe, and particularly point out in the claims.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a sectional view of a pipe or a plurality of sections of pipe joined end to end and driven into the earth, the material within said pipe having been removed and the hole extended to a distance below the lower end of said pipe. Fig. 2 represents a view similar to Fig. 1, but illustrating a further step in the process. Fig. 3 represents a similar view, but representing the final step in the process and at the same time illustrating our improved pile or column as an article of manufacture.

Similar reference characters designate similar parts throughout the several views.

A hollow pipe, tube, or box a of any required size or shape is sunk into the ground by driving, weighting, or otherwise. This pipe, tube, or box may, if required, be put down in short sections, one section being coupled to the preceding one as the work progresses. If necessary, pipes in one-foot lengths could be coupled together as they are driven, thus allowing the work to proceed under walls or where the height might be limited. When the pipe has been sunk to the required depth or to the material in which the foundation is to be formed, it is cleared out by one of several well-known methods, such as the water-jet, or, if it becomes necessary, this clearing-out process may be carried on simultaneously with the sinking of the pipe. A hole b equal in diameter to that of the pipe is excavated by the same process to a depth of a foot or more below the base of the pipe and in the material on which the footing is to rest. It will be understood that the hole thus formed may be in any natural foundation that may be selected for the pile or column below the surface of the earth. After the hole has been excavated below the lower end of the pipe a it is laterally enlarged, as represented at b in Fig. 2, by any suitable excavating means. For instance, a common form of expander or cutter, which may be...
collapsed, so as to allow of its being lowered through the pipe, may be inserted into the hole b below the base of the pipe, and by then rotating such expander or cutter by means of a suitable rod extending through the pipe a to the surface the cavity b’ may be formed of the desired shape, it being understood, of course, that any suitable means, such as water-jets, may be employed for washing out the material cut by the expander and during the opening movements of such expander. The cavity b’ thus formed may now be completely pumped out or cleared out by any suitable method, leaving a free open chamber formed in the material immediately below the pipe. This enlarged cavity or space is now filled with a mixture of concrete, cement, or other suitable analogous moldable material, as indicated at c in Fig. 3, after which the pipe a itself may be filled with the same material, as at c. If it is desired to withdraw the pipe a, this may be done simultaneously with the filling process, leaving the space originally occupied by the pipe entirely filled with concrete.

Of course it will be understood that the size of the column and of its enlarged footing or of either one relatively to the other may be readily determined for any given case, one of the objects of the invention being to provide means whereby the number of columns or piles necessary may be limited to the simplest number possible, while still able to secure all of the footing that may be required for the weight that is to be carried.

We claim—

1. The process of making a pile or column having an integral enlarged footing, said process consisting in first sinking a shell, then excavating within such shell to a point below the lower end thereof, then laterally enlarging the portion of the excavation below the shell, then filling the enlargement with concrete through the shell to form a base, and finally filling the shell with concrete to form the body of the pile integral with the enlarged base.

2. The process of making a pile or column having an integral enlarged footing, said process consisting in first sinking a shell, then excavating within such shell to a point below the lower end thereof, then enlarging the lower portion of the excavation and forming it with a flat base and conical sides, then filling the enlargement with concrete through the shell to form a base, and finally filling the shell with concrete to form the body of the pile integral with the enlarged base.

In testimony whereof we have affixed our signatures in presence of two witnesses.

CHARLES R. GOW.
JOHN E. PALMER.

Witnesses:

A. W. HARRISON,
R. M. PIERSON.