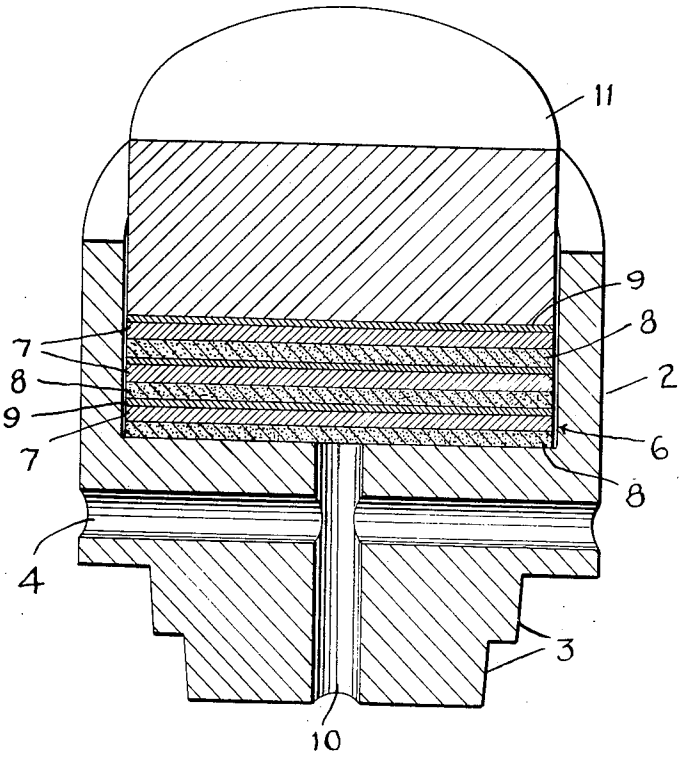
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PILE DRIVING HEAD

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Robert D. Budd INVENTOR

BY J. Blumberg ATTORNEY

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PILE-DRIVING HEAD

Robert D. Budd, New York, N. Y., assignor to Pierce Steel Pile Corporation, New York, N. Y., a corporation of New York

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The invention relates to the driving of pipe piles or sheet piling, and the subject of the invention is an improvement in driving heads which are placed on the pile to receive the blows of the steam or drop hammer.

In the driving of pipe piles much difficulty is experienced from distortion of the pile. This commonly takes the form of a bulging out of the wall immediately below the upper end, in addition to which the upper end may contract so as to lock the driving head against removal. Three or four lengths of pipe may be needed to make up a pile, the lengths being added successively and being coupled by means of sleeves, in which the pipe ends are required to have a fairly close fit. It becomes necessary, therefore, to cut off distorted ends of the pipes, and to cut them away from the driving head if locking has occurred. This adds a special labor cost, not to mention the gases and equipment used for cutting, but a more serious loss is the very considerable delay in operations, with all that that involves. There is also the waste of material cut off, which in the aggregate amounts to an item.

Some use has been made of driving heads containing a block of wood to soften the blows, but this expedient is unsatisfactory because the wood burns out rapidly under the heat of impact, and because it is not practicable to provide wood blocks which will afford just enough cushioning to save the piles from distortion or which will remain adequate as the driving proceeds.

The purpose of this invention is to provide a shock-absorbing head for the driving of metal piles, with which it is readily possible to have the piles as undeformed after driving as at starting, without, on the other hand, absorbing any substantial amount of energy. The object is also to provide the head with shock-absorbing means which will not burn out and which can be easily adjusted to meet requirements.

The driving head of this invention has a cup or recess in which a collection of discs is loosely placed, so that the blows must be transmitted through the layers. The shock-absorbing means consists essentially of a series of steel discs about half an inch thick, more or less, separated by layers or discs of compressible, non-combustible, and non-metallic material. The composition of the stack may be varied to some extent.

However, the most effective and efficient embodiment of the invention, and one which is desirably compact, employs a combination of strong metal discs, more especially steel, associated with non-metallic discs or layers of compressible and non-combustible material. Material of a fibrous nature is best for this purpose, and asbestos is especially advantageous, though vulcanized fiber or the like may be employed if not too brittle. In a shock-absorbing head of this character there is not only the possibility of slight movement between the discs but also the compressibility of the fiber layers which are gradually compacted. The effect of the compacting layer or layers is not merely a cushioning action but rather to develop slight localized distortion in the steel discs as the result of non-uniformity in the compacting layer causing it to support the steel layer unequally at different regions when the blows are received.

The material of the compacting layers may have a tendency to pulverize under the hammering, in which event the puffs of air which are created when the discs are forced together would blow the particles out of the head. To avoid frequent replacement of these discs I may employ one or more discs of malleable metal, such as lead or even copper, to serve as a packing by flowing laterally and squeezing against the wall of the recess.

While the hammer might be so formed as to enter the cup and act directly on the assemblage of discs, it is much better to transmit the blows to the relatively thin discs through a heavy steel anvil resting in the cup on top of the pile of discs and of sufficient height to project at all times above the head.

While the invention is referred to as a shock-absorbing head, it is to be understood that its function is to modify or control the effect of the impacts only in the sense of avoiding or minimizing distortion in the pipe being driven, it being equally important to preserve the effectiveness of the hammer as a means for sinking the pipe into the ground. The purpose, therefore, is not to dissipate the force of the blows but to eliminate the destructive effect of wasted energy which ordinarily produces distortion in the pipe.

The accompanying drawing, forming part hereof, shows a practical embodiment of the driving head in sectional perspective.

The steel driving head proper 2 is preferably formed at the bottom with a plurality of portions 3 of reduced diameter to enter pipe piles of different sizes and to provide shoulders to rest on the upper end of the pipe. A cross hole 4 may be drilled through the solid part of the head to receive a chain for connecting the head with the hammer to obviate unnecessary handling.

The upper part of the head is made with a cylindrical flat-bottomed recess 6 so that it is substantially like a cup. In the lower half, more

or less, of this recess the discs are placed. The drawing illustrates a typical assemblage which has been found satisfactory in practice, but it will be understood that the number, materials and relative arrangement of the discs can be varied. As shown, there are three steel discs 7, each resting on a disc 8 of asbestos sheeting and having over it a lead disc 9.

A short steel cylinder 11 is placed in the upper part of the cup, resting on the collection of discs and projecting sufficiently above the top of the head so that it will continue to take the blows of the hammer notwithstanding decrease in thickness of the compressible layers.

Steel discs cut from half-inch plate and asbestos discs having initially substantially the same thickness have been used with good effect, whereas the lead discs may be about one-eighth of an inch thick, but it will be understood that these proportions are given merely by way of illustration and are in no sense limiting.

It has been found that the heads could be used for about a week of active service without replacement of the compacting or packing discs. The asbestos discs become gradually thinner as the result of compression, and at any sign of distortion in the pipe the collection of discs should be removed and fresh asbestos discs should be put in. The lead disc or discs also require renewing. To facilitate removal of the discs a drive-out hole 10 may be drilled, extending from the bottom of the head to the center of the bottom of the recess of the cup.

The desired effect of the shock-absorbing means is secured by varying the number of the discs, or by using more of one kind than of another, in accordance with the size of the pile and the earth conditions.

I claim:

1. A pile-driving head comprising a head proper formed with a cup, said head proper adapted to rest on the upper end of a tubular pile to transmit the driving stress thereto, shock-absorbing means in said cup consisting of a loose assemblage of steel discs separated by layers of non-metallic, non-combustible, compressible material, and an anvil resting on said assemblage.

2. A pile-driving head comprising a head proper resting on the upper end of a tube to transmit the driving stress thereto and having a cup cavity, and shock-absorbing means in said cavity comprising a number of steel discs and interjacent discs of non-metallic, non-combustible compressible material.

3. A pile-driving head comprising a head proper resting on the upper end of a tube to transmit the driving stress thereto and having a cup cavity, and shock-absorbing means in said cavity comprising a loose assemblage of steel discs associated with interjacent discs of non-combustible fiber, together with one or more discs of soft metal to serve as a packing.

4. A head for driving steel tubes, said head comprising a head proper resting on the upper end of the tube to transmit the driving stress thereto and having a cup cavity, and cushioning means in said cavity comprised essentially of a series of steel discs and non-combustible fiber discs separating the steel discs so as to develop slight local distortion therein under the blows of the hammer, sufficient to overcome bulging out of the upper part of the tube without substantial absorption of energy.

5. A head for driving steel tubes, said head comprising a head proper resting on the upper end of the tube to transmit the driving stress thereto and having a cup cavity, and cushioning means in said cavity comprised essentially of a series of steel discs separated by layers of non-combustible material which will compact non-uniformly.

6. A pile-driving head adapted to be applied to the upper end of a steel tube, said head comprising a head proper resting on the upper end of the tube to transmit the driving stress thereto and having a cup cavity, cushioning means in said cavity comprised essentially of a plurality of steel discs alternating with non-combustible compacting layers, and a steel impact block resting on the discs and projecting above the cup.

ROBERT D. BUDD.