A. GIBB, T. G. MENZIES & R. CHALMERS.

DRIVING AND EXTRACTING PILES, POSTS, AND THE LIKE.

APPLICATION FILED AUG. 14, 1912.

1,102,652.

Patented July 7, 1914.

2 SHEETS—SHEET 1.

Fig. 1.

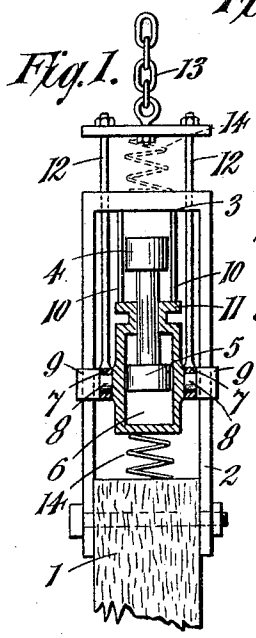


Fig. 2.

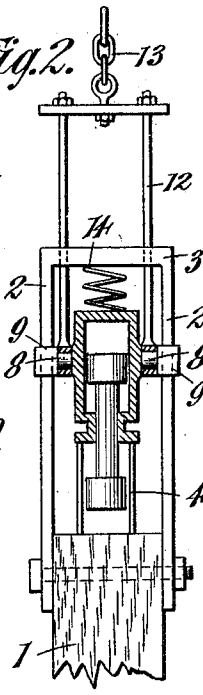


Fig. 3.

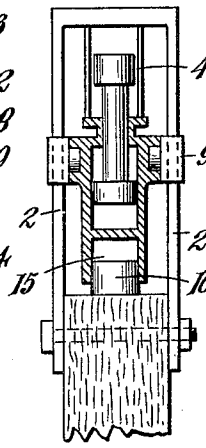


Fig. 4.

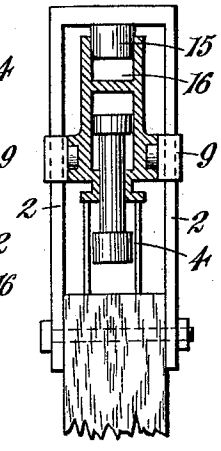


Fig. 5.

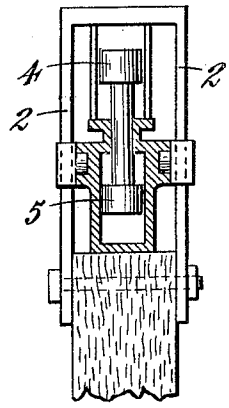
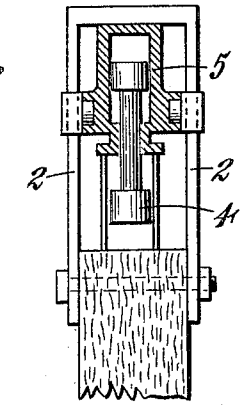


Fig. 6.



Witnesses
M. A. Hessing
C. H. Crawford

Inventors:
Alexander Gibb
Thomas Graham Menzies and
Robert Chalmers
by R. Singer Attorney

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

A. GIBB, T. G. MENZIES & R. CHALMERS.

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2 SHEETS—SHEET 2.

Fig. 7.

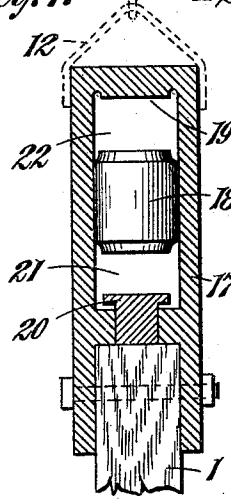


Fig. 8.

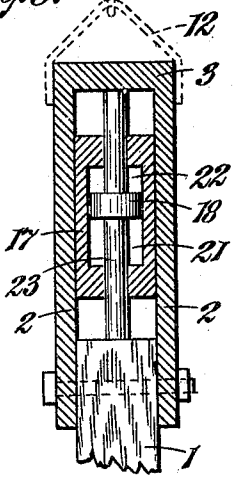


Fig. 9.

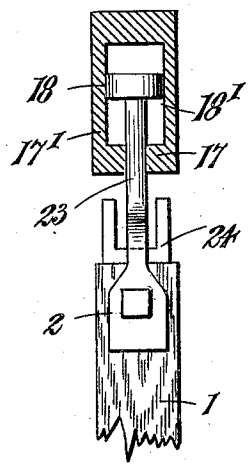
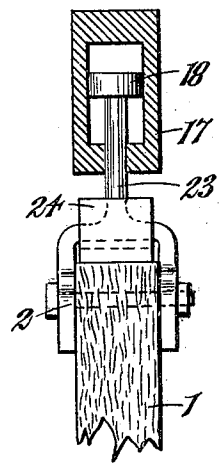


Fig. 10.



Witnesses
H. M. Hopkins
C. A. Crawford

Inventors:
Alexander Gibb
Thomas Graham Menzies
Robert Chalmers
by E. Singer Attorney

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C

UNITED STATES PATENT OFFICE.

ALEXANDER GIBB, OF ST. MARTIN'S ABBEY, THOMAS GRAHAM MENZIES, OF FERRY CRAIG, NORTH QUEENSFERRY, AND ROBERT CHALMERS, OF RHUFAADA, NEWPORT, SCOTLAND.

DRIVING AND EXTRACTING PILES, POSTS, AND THE LIKE.

1,102,652. Specification of Letters Patent. Patented July 7, 1914.

Application filed August 14, 1912. Serial No. 715,069.

To all whom it may concern:

Be it known that we, ALEXANDER GIBB, THOMAS GRAHAM MENZIES, and ROBERT CHALMERS, subjects of the King of Great Britain, and residing, respectively, at St. Martin's Abbey, Perthshire, Ferry Craig, North Queensferry, Fifeshire, N. B., and Rhufaada, Newport, Fifeshire, N. B., Scotland, have invented new and useful Improvements in and Relating to the Driving and Extracting of Piles, Posts, and the like, of which the following is a specification.

Our invention has reference to the driving and extracting of piles posts and the like and relates more particularly to improvements in the apparatus described in the specification forming part of our Letters Patent of the United States of America numbered 1014295 patented January 12th 1912, wherein apparatus is described in which a power driven hammer is employed to operate on an anvil carried by the pile or the like with or without supporting means for the hammer independently of the pile for the purpose of extracting or assisting in the extraction of a pile or the like from the position in which it is fixed.

Now the object of the present invention is to provide means whereby piles or the like may be both driven and extracted by one and the same apparatus.

With this end in view our invention in its broadest aspect contemplates a construction wherein a power driven device is caused to operate in such a manner as to either drive or extract piles or the like at will.

More specifically stated the invention consists in so arranging a power driven hammer upon a pile or the like that it may either be reversed to deliver blows in opposite directions at will or may be caused to deliver blows in opposite directions at will without changing its relative position with respect to the pile.

In order that our invention may be readily understood and carried into effect by those skilled in the art to which it appertains we will now proceed to describe the same in detail for which purpose reference should be had to the accompanying drawings in which:—

Figure 1 represents more or less diagrammatically a reversible device embodying the present invention and illustrating its position for extracting a pile or the like. Fig. 2 is a view of the same device in position for driving a pile. Figs. 3 and 4 illustrate a slightly modified form of the invention in which the cushioning springs shown in Figs. 1 and 2 and hereinafter more particularly referred to are replaced by cushioning cylinders. Figs. 5 and 6 show a device similar to that shown in Figs. 3 and 4 but in which cushioning means are entirely dispensed with. Figs. 7 and 8 are diagrammatic views of a device which by suitable distribution of the motive fluid may be employed either for driving or extracting piles or the like preferably without changing its relative position with respect to the pile. Figs. 9 and 10 illustrate elevations taken at right angles to one another of a slightly modified form of apparatus hereinafter more particularly referred to.

Referring now to Figs. 1 and 2 to the pile or post 1 is secured appropriate attachments 2 for a striking plate or anvil 3 against which—when the device is employed for extracting a pile—the blows from the hammer head 4 are delivered. The hammer head 4 is actuated by fluid pressure operating on the piston 5 working in the cylinder 6 all as will be well understood. The cylinder 6 is provided with bearings 7 adapted to receive trunnions 8 or other reversible attachments carried by the cheek pieces 9 slidably mounted upon the attachments 2. In order that the hammer head 4 may operate through its normal effective stroke distance pieces 10 which may be adjustable as to length are secured to the gland 11 or the cylinder 6. The fluid pressure hammer as a whole is supported by the stirrup 12 which is free with respect to the anvil 3 and to which a chain or the like 13 may be attached in order that an external pull may be exerted thereon when necessary as by a crane for example. Supporting and cushioning springs 14 are preferably interposed between the bottom of the cylinder 6 and the head of the pile 1 and also between the anvil 3 and the stirrup 12. The functions of the springs 14 are to absorb the recoil of the cylinder 6 and to assist in supporting the cylinder in its correct position. As above stated with the parts in the position illus-

trated in Fig. 1 the device is adapted for withdrawing a pile or post. In order to utilize the same device for driving a pile it is only necessary to reverse the hammer bodily so as to cause the blows to be delivered upon the head of the pile instead of upon the anvil 3 and this is effected in accordance with our present invention by turning the hammer bodily about the trunnions 8 or other reversible attachments which may be used and sliding the cheek pieces 9 upon the attachments 2 so as to cause the device to occupy the position shown in Fig. 2.

Referring now to Figs. 3 and 4 the hammer instead of being suspended independently by means of the stirrup 12 is supported between the pile and the anvil by means of the cushioning cylinder 15 and piston 16. The cushioning cylinder 15 is arranged to have the motive fluid admitted to it so that together with its piston 16 it performs similar functions to the spring 14 in Figs. 1 and 2. An apparatus constructed as indicated in Figs. 1 and 2 may be provided with a similar cushioning cylinder in place of the spring 14. Similarly the cushioning cylinder and piston in Figs. 3 and 4 may be replaced by springs. The operation and reversing of the device as indicated in Figs. 3 and 4 as a whole is effected in a manner similar to that described with reference to Figs. 1 and 2.

Figs. 5 and 6 illustrate a construction wherein the cushioning devices (as the springs 14 or the cylinder 15 and piston 16) are entirely dispensed with and this form of the device may be employed with or without external pull when used as an extractor.

In Figs. 7 and 8 we have shown two forms of hammer wherein the direction in which the blows are delivered is determined by suitable distribution of the motive fluid. In Fig. 7 the cylinder 17 in which the piston 18 works is supported directly upon the head of the pile 1 and is provided internally at its upper end with a striking surface 19 and a preferably loose anvil 20 at its lower end or the anvil 20 may be formed similar to the striking surface 19 that is to say integral with the cylinder 17. The piston 18 is caused to reciprocate within the cylinder 17 by the alternate admission and exhaust of motive fluid to and from the cylinder spaces 21 and 22 respectively. When the device is used for extracting the distribution of motive fluid is so arranged that the piston 18 will strike the anvil face 19 at the end of the upward stroke but on the return stroke it will come to rest before reaching the anvil 20. For driving the distribution of the motive fluid is so arranged that the lower anvil 20 is struck by the piston 18 at the end of its downward stroke but on its upward stroke it is brought to rest and reversed without striking the anvil face 19. In Fig. 8 the piston 18 is stationary upon the rod 23 while the cylinder 17 reciprocates in guides formed upon the attachment 2 or the piston rod 23. According as the working fluid is distributed in the cylinder spaces 21 and 22 the cylinder 17 will be caused to strike either the head of the pile 1 or the anvil 3. A stirrup 12 may if desired be employed with either of these forms of the invention to exert an external pull when extracting.

In the construction shown in Figs. 9 and 10 the piston 18 piston rod 23 and attachments 2 are formed in one piece and the cylinder 17 which may be guided in its reciprocation on the piston rod 23 or mounted in independent guides forms the ram. Seated loosely on the pile 1 is an anvil 24 adapted when the device is employed for driving to receive the blows of the ram or cylinder 17. When the apparatus is used for extracting piles the distribution of the motive fluid is so determined that the cylinder end 17′ will strike the under surface 18′ of the piston 18 in a manner similar to that described with reference to Fig. 8 and when employed for driving the cylinder end 17 will strike the top of the anvil 24.

Although we have in the drawings forming parts of this specification illustrated our improved device as applied to the driving and extracting of wood piles or posts it is of course to be understood that the invention is equally applicable to the driving and extracting of sheet metal piling and the like while instead of employing one hammer a plurality of hammers may be so mounted as to operate simultaneously upon a pile.

We claim:

1. In apparatus for driving and extracting piles and the like, a vibrating hammer, means for attaching same to the pile, striking surfaces for said hammer, and means whereby said hammer may be reversed and operated to deliver blows upon either of said striking surfaces at will substantially as described.

2. In apparatus for driving and extracting piles and the like an anvil and means for attaching same to the pile, a vibrating hammer slidably mounted upon said anvil-attaching means and means whereby said hammer may be reversed and operated to deliver blows in the proper direction substantially as described.

3. In apparatus for driving and extracting piles and the like an anvil and means for attaching same to the pile, a vibrating hammer trunnions carried thereby cheek pieces slidably mounted upon said anvil-attaching means and in which said trunnions are adapted to engage and means whereby said hammer may be operated to deliver blows in the proper direction substantially as described.

4. In apparatus for driving and extracting piles and the like an anvil and means for attaching same to the pile, a vibrating hammer trunnions carried thereby cheek pieces slidably mounted upon said anvil-attaching means and in which said trunnions are adapted to engage and means whereby said hammer may be operated to deliver blows in the proper direction and cushioning means for the hammer substantially as described.

ALEXANDER GIBB.
THOMAS GRAHAM MENZIES.
ROBERT CHALMERS.

Witnesses:
RONALD W. CURRIE,
JAS. PENMAN.

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