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ROTARY MEANS FOR FACILITATING THE DRIVING OR EXTRACTION OF PILES OR THE LIKE

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Fig. 2

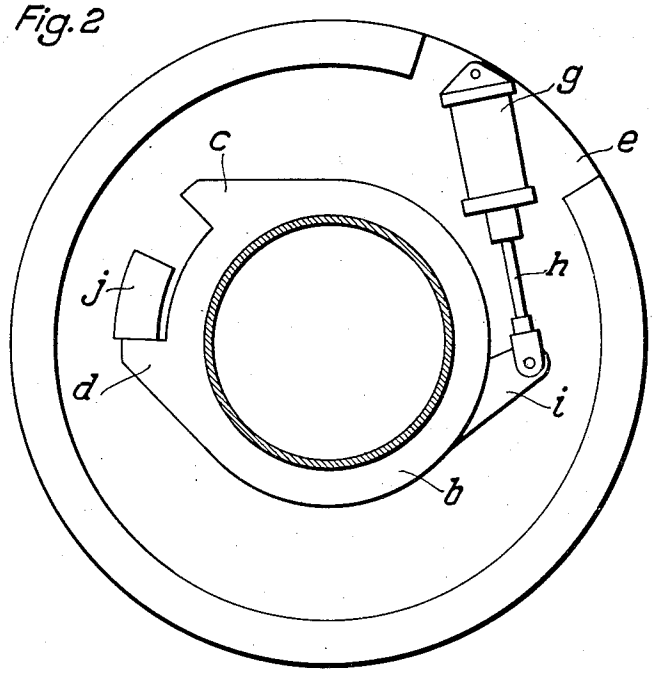
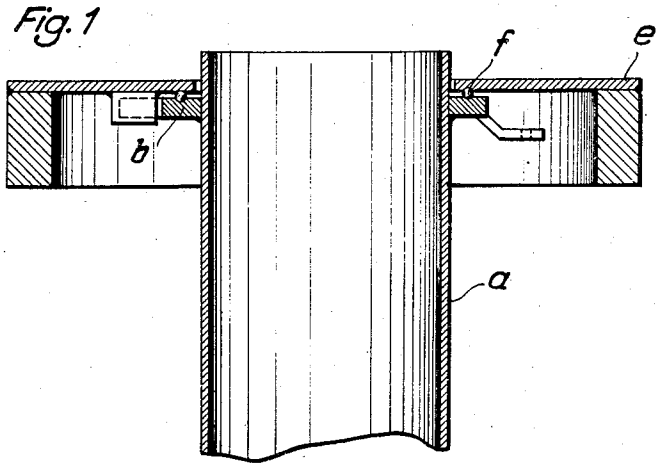


Fig. 1



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ROTARY MEANS FOR FACILITATING THE DRIVING OR EXTRACTION OF PILES OR THE LIKE

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7 Claims. (Cl. 61—73)

This invention relates to a rotary device, working in opposite directions alternately, for facilitating the driving or the withdrawal of piles, bore tubes or the like in the ground.

It is known that piles, driving tubes and the like in so far as they are not driven into the ground by supplementary loading or by impact ramming, are forced into the ground by being rotated to and fro. This alternating movement in opposite directions has hitherto been effected by hand or by means of mechanical appliances. The manual actuation requires several workmen, while with the mechanical appliances the reaction to the forces, which are often very considerable, incidental to the alternating rotation, has to be taken up by the boring crane or drilling rig, and this necessitates a correspondingly good anchorage. Since the static friction of the pile or tube in the transition from a state of rest to a state of motion is considerably greater than the dynamic friction during motion, the appliances furthermore have to be dimensioned for this most unfavourable case.

This invention provides a very simple and much better appliance, with which the rotation to and fro of the piles or the like is facilitated and which has the advantage that no fixed point outside the apparatus is required for taking up the reaction forces. According to the invention the beginning of each rotary movement is initiated by an impact, which overcomes the greater initial friction. For this purpose an inertia mass is provided, which is rotatably mounted around the pile or other body to be driven alternating rotary motion being imparted to this inertia mass by means of a device connecting the inertia mass with the pile or other such body, and the rotary motion being limited by abutments provided on the periphery of the pile or the like, with conversion of the kinetic energy imparted to the inertia mass into impacts acting tangentially to the periphery of the pile or the like.

With this rotary appliance there is preferably utilized as an inertia mass a weight-loaded disc, or flywheel supported upon a check ring of the pile or the like, preferably by means of ball bearings so as to be readily rotatable, there being connected to the periphery of this disc the cylinder of a compressed-air motor, the piston rod of which is attached to the periphery of the pile or the like.

Further features and details of the invention will be gathered from the accompanying drawings, in which:

Figure 1 shows diagrammatically in sectional elevation one constructional example of the apparatus according to the invention;

Figure 2 is a view of the apparatus shown in Figure 1 as seen from below.

Upon a bore tube *a* is welded a ring *b*, which is provided with abutments or stops *c* and *d*. A circular plate *e* is rotatably mounted by means of a ball bearing *f* upon the ring *b*. Upon the plate *e* is secured a compressed-air piston engine *g*, the piston rod *h* of which is pivoted to

a lug *i* secured to the ring *b*. Between the abutments *c* and *d* a tappet or lug *j* is welded to the plate.

The method of operation is as follows: When the piston rod *h* is exerting a pull on the lug *i*, since the bore tube is fixed in the ground, the plate *e* rotates about the bore tube with increasing speed until the tappet *j* strikes against the abutment or stop *c*. By this impact the bore tube is impelled to rotate through a small angle. At the same moment the compressed-air motor *g* is reversed, so that the plate *e* is now rotated in the opposite direction, until the tappet or lug *j* strikes against the abutment or stop *d*, and the bore tube executes a slight rotation in the opposite direction. As the fly wheel continues to oscillate back and forth it continues to deliver blows alternately on stops or abutments *c* and *d*. The force or impact of these blows is, of course dependent on the weight of the fly wheel and the rate of deceleration of the fly wheel upon striking the stops.

The controlling of the compressed-air motor may be effected automatically or by hand. The apparatus could however, be operated by any other type of motor.

The kinetic energy may alternatively be produced by two pulling or thrusting devices acting in opposite directions instead of by a pulling and pushing device.

This appliance has the advantages that no fixed point independent of the bore tube is needed, that the apparatus can be employed without alteration both for sinking and for withdrawing a pile or a bore tube, and that the initial friction is overcome by an impact.

I claim:

1. A rotary appliance working alternately in opposite directions for facilitating the driving in and extraction of piles, bore tubes or the like, comprising: an inertia mass mounted rotatably on the pile, means connecting the inertia mass with the pile to impart alternating rotary movements to said inertia mass, a lug on said inertia mass, and abutments fitted to the pile to stop each alternating rotary movement of said inertia mass by engagement with said lug to convert the kinetic energy of the inertia mass into impacts acting on said pile.

2. A rotary appliance as claimed in claim 1, further comprising: a ring on the pile, said inertia mass comprising a weight-loaded disc mounted on said ring, a ball bearing interposed between the weight-loaded disc and said ring to facilitate rotation of the said disc, said means to impart alternating rotary movement to said inertia means comprising a compressed-air motor, including a cylinder and a piston reciprocable therein, the cylinder of said motor being attached to the periphery of said disc and its piston being attached to the said ring on the pile.

3. An appliance to impart torsional impacts to a casing comprising a ring secured to said casing; impact delivering means in the form of a fly wheel mounted for rotation on said ring, anti friction means interposed between said ring and said fly wheel, a pair of stop means on said ring and at least one lug on said fly wheel and means to rotate said fly wheel rapidly in alternate directions to cause said lug to strike said stops alternately whereby torsional impacts are imposed on said casing first in one then in the other direction about its axis.

4. The appliance of claim 3 in which the means to rotate said fly wheel is mounted on said ring and said fly wheel.

5. The appliance of claim 3 in which the means to rotate said fly wheel comprises a compressed air motor mounted on said ring.

6. The appliance of claim 3 in which the means to rotate said fly wheel comprises a cylinder mounted on said ring, a piston in said cylinder and a connecting rod connecting said piston to said fly wheel.

7. An appliance to impart intermittent impacts to a casing in a direction normal to the length of said casing comprising a ring secured to said casing, a rotary impact delivery means in the form of a fly wheel rotatably mounted on said ring, means to rotate said fly wheel alternately in each direction, a pair of stop means mounted on said ring, and a lug on said fly wheel engaging said stop means alternately to stop the rotation of said fly wheel by the impact of said lug against one or other said stop means.

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