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(54) **A DEVICE MEANT FOR FORCING PILES INTO THE GROUND**

VORRICHTUNG ZUM EINTREIBEN VON PFEILERN IN DEN BODEN

DISPOSITIF CONÇU POUR ENFONCER DES PIEUX DANS LE SOL

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Description

[0001] The invention relates to a forcing equipment meant for forcing piles, steel profiles and other elongated objects into the ground which forcing equipment comprises a body adaptive to a power machine, a vibration device attached to the body with the help of damper cushions and moveable grip jaws adjusted to the mentioned vibration device in order to grip the object to be forced at least with a side grip.

[0002] Forcing devices according to the above mentioned preamble are previously known in which forcing devices a vibration device is attached to the body of the forcing device with the help of damper cushions and another body is attached to the body of the forcing device in which case the other body surrounds partly the mentioned vibration device. Grip jaws are attached to the other body either to be stiff or to be turned with the help of a joint. A Finnish patent publication nr 106219 can be mentioned as an example.

[0003] In these solutions the whole structure must be disassembled if the vibration device needs to be changed. It is difficult to change the grip jaws because the moveable jaw can be changed only when the structure is disassembled and the change of the fixed jaw also demands the change of the other body at the same time. Usually in the known solutions the jaws are not changed. Instead the grip pieces of the jaws can be changed and then pieces with slightly different forms can be changed to replace them - if needed, such as for example when one forces round piles which have two slightly different diameter sizes. In the known solutions the vibration device is also not changed into a device of a second power class but a totally smaller of bigger forcing device will be provided.

[0004] In order to remove these disadvantages, a new forcing device has been developed which forcing device solves many problems related to the forcing devices and eases essentially the modifiability of the forcing device. It is characteristic of the invention that the body comprises an upper part including an attachment arrangement for attaching it to a working machine and comprises side parts directed from the upper part downwards between which side parts the vibration device and the grip jaws can be attached through cassettes comprising damping rubbers in which case the attachments comprise pin/hole attachments which can be opened by detaching the mentioned pins.

[0005] The advantage of the invention is the fact that thanks to a new type of a body chosen for the forcing device the vibration device with the grip jaws or only the grip jaws can be detached and changed.

[0006] When the vibration devices are thus interchangeable so that the distance s of their damper cushions stays constant in spite of the power class of the vibration device, vibration devices with various power classes can easily be changed into the forcing device. Similarly the grip jaws are congruent regarding their back part in other words their attachment in which case they are grip jaws which can be easily changed and are formed according to the objects to be forced. When the grip jaws are adjusted to the objects regarding their form the damages of the objects to be forced can be avoided during the forcing situations.

[0007] In the following the invention is described more detailed by referring to the accompanying drawings in which

Figure 1 shows a body of a forcing device.
Figure 2 shows a vibration device which can be adjusted inside the body of the forcing device of the figure 1.
Figure 3 shows a forcing device seen from above when the body is partly cut out.
Figure 4 shows a forcing device diagonally seen and partly disassembled.

[0008] In the figure 1 there is a body 1 of the forcing device according to the invention on top of which body there is a clip plate 2 for attaching it to a power machine, such as to an excavator through attachment elements 4, 5. There are gaps 3 in the body 1 to which gaps some parts of the damper cushions of the vibration device are located for attaching the vibration device 6 to this body.

[0009] In the figure 2 a vibration device 6 which can easily be changed and is adaptive inside the body 1 of the figure 1 is shown of which vibration device it is characteristic that the measure s stays constant although the power class of the device changes. Several vibration devices 6 of various power classes can thus be adjusted to the forcing device if various forcing powers are needed. The weights or the width d included in the vibration device 6 can change when the power class changes. Damper cushions 9 are attached to the sides of the vibration device 6 as structural caissons 7 in which case these caissons 7 are attached to be opened easily to the sides of the vibration device 6. Also gaps 8 have been directed through these cassettes 7 through which gaps joint pins 20 or 21 related to the attachment of the grip elements 10 can be adjusted. There is a jaw at the base of the vibration device 6 with which jaw one can force from the top of the pile or pull the pile up. The jaw comprises a fixed part 17, a moveable part 18 and a cylinder 19 which moves the moveable part 18.

[0010] In the figure 3 a vibration device 6 located between the body 1 is shown which vibration device is attached to the body 1 with the help of damper cushions 9. The arms of the grip jaws 10 are located on top of the damper cushion cassette 7 and underneath it. The gaps 8 go through both the band 1, the gap of the grip jaws 10, through the gap of the cassette 7 and underneath correspondingly through the gaps of the grip jaws 10 and further through the band 14 of the lower part. The attachment can be done with a long joint pin 20 which penetrates all the parts or with short pins 21 which are separately below or above.

[0011] The moving of the grip jaws 10 is made with the help of a cylinder 16 the heads of which are attached to pivots 15. The cylinder 16 can be either at the upper or the lower part of the forcing device or at both parts or also at various heights of the baluster 12.

[0012] It becomes clear from the figure 4 how the vibration device 6 can be detached with the grip jaws 10 from the cassette 7 which is attached to the sides of the body 1 through rubber cushions 9. When the pins 11 are detached from the holes of the vibration device 6 and from the holes 23 of the cassette 7, the vibration device 6 comes loose from the cassette 7 for example downwards. It is possible to detach only the grip jaws 10, too, when the pins 20 or 21 are detached and also the long pins 12 running through the heads of the cylinders 16 and through the pivots 15 are detached.

[0013] The changing of the grip jaws 10 can easily be done when the joint pins 20 or 21 have been removed. Possibly the cylinder 16 must be detached. Also the band 14 comes loose when the joint pins 20 or 21 are being detached. It is easy to use a grip jaw series with the forcing device which grip jaw series has jaws 10 for various objects to be forced because the jaws 10 can easily be changed.

Claims

1. Forcing equipment meant for forcing piles, steel profiles and other elongated objects into the ground which forcing equipment comprises a body (1) which can be attached to a working machine, a vibration device (6) attached to the body (1) with the help of damper cushions (9) and moveable grip jaws (10) adjusted to the mentioned vibration device (6) in order to grip the object to be forced at least with a side grip, **characterized in that** the body (1) comprises an upper part (2) including an attachment arrangement (4), (5) for attaching it to the working machine and side parts directed from the upper part (2) downwards between which side parts the vibration device (6) and grip jaws (10); (17, 18) can be attached through cassette (7) comprising damping rubbers (9) in which case the attachments comprise pin/hole attachments (11, 23, 14); (20, 8) or (21, 8) which can be opened by detaching the mentioned pins (11, 20, 21).

2. Forcing equipment according to the claim 1, **characterized in that** the grip jaws (10) are adjusted to be attached to a cassette (7) or to a vibration device (6) with the help of joint pins (20), (21) in which case they can be detached, removed or changed after the detachment of the joint pins (20), (21) when the forcing device (6) stays in its place in the body (1).

3. Forcing equipment according to the claim 2, **characterized in that** the joint pins are of the type which goes through (20) either the cassette (7) or the vibration device (6) or they are adjusted (21) to a pivot mounting of only one jaw (10).

4. Forcing equipment according to the claim 1, **characterized in that** the cassettes (7) are attached to the opposite sides of the vibration device (6) with a pin/hole attachment (11, 23, 14).

5. Forcing equipment according to the claim 1, **characterized in that** the cassette (7) is attached to the vibration device (6) with a pin/hole attachment and the grip jaws (10) are attached to the cassette (7) with a pin/hole attachment (20, 8) or (21, 8).

6. Forcing equipment according to the claim 1, **characterized in that** the jaws (10) can be detached at the upper and lower part of the vibration device (6) after the joint pins (20), (21) have been detached.

7. Forcing equipment according to the claim 1, **characterized in that** the jaws (10) can be detached when the cylinder (16) and the pin (12) moving them have been detached.

8. Forcing equipment according to the claim 1, **characterized in that** the pins (20); (21) attaching the grip jaws are combined to each other with the help of a band (14).

Patentansprüche

1. Eintreibvorrichtung zum Eintreiben von Pfeilern, Stahlprofilen und anderen länglichen Objekten in den Boden, wobei die Eintreibvorrichtung einen Körper (1), der an einer Arbeitsmaschine befestigt werden kann, eine Vibrationsvorrichtung (6), die am Körper (1) mittels Dämpfungspolstern (9) befestigt ist, und bewegliche Greifbacken (10) aufweist, die auf die genannte Vibrationseinrichtung (6) eingestellt ist, um das einzutreibende Objekt mindestens mit einem Seitengriff zu greifen, **dadurch gekennzeichnet, dass** der Körper (1) ein oberes Teil (2) aufweist, das eine Befestigungsanordnung (4), (5) zum Befestigen desselben an der Arbeitsmaschine und Seitenteile aufweist, die von dem oberen Teil (2) nach unten verlaufen, wobei zwischen diesen Seitenteilen die Vibrationseinrichtung (6) und die Greifbacken (10); (17,18) durch eine Kassette (7), welche Dämpfungsgummis (9) aufweist, befestigt werden kann, wobei in diesem Fall die Befestigungen Sift-/Lochbefestigungen (11, 23, 14); (20, 8) oder (21,8) aufweisen, welche durch Lösen der genannten Stifte (11, 20, 21) geöffnet werden können.

2. Eintreibvorrichtung gemäß Anspruch 1, **dadurch gekennzeichnet, dass** sich die Greifbacken (10)

einstellen lassen, um an einer Kassette (7) oder an einer Vibrationsvorrichtung (6) mit Hilfe von Gelenkstiften (20), (21) befestigt zu werden, wobei sie in diesem Fall nach Ablösen der Gelenksstifte (20), (21) gelöst, entfernt oder ausgewechselt werden können, während die Eintreibvorrichtung (6) an ihrem Ort im Körper (1) bleibt.

3. Eintreibvorrichtung gemäß Anspruch 2, **dadurch gekennzeichnet, dass** die Gelenkstifte von der Bauart sind, die entweder durch die Kassette (7) oder die Vibrationseinrichtung (6) verläuft (20), oder sie auf ein Drehlager von nur einer Backe (10) eingestellt (21) sind.

4. Eintreibvorrichtung gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die Kassetten (7) an den gegenüberliegenden Seiten der Vibrationsvorrichtung (6) mit einer Stift-/Lochbefestigung (11, 23, 14) befestigt sind.

5. Eintreibvorrichtung gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die Kassette (7) an der Vibrationsvorrichtung (6) mit einer Stift-/Lochbefestigung (11, 23, 14) befestigt ist und die Greifbacken (10) an der Kassette (7) mit einer Stift-/Lochbefestigung (20, 8) oder (21, 8) befestigt sind.

6. Eintreibvorrichtung gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die Backen (10) am oberen und unteren Teil der Vibrationsvorrichtung (6) abgenommen werden können, nachdem die Gelenkstifte (20), (21) gelöst wurden.

7. Eintreibvorrichtung gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die Backen (10) abgenommen werden können, wenn der sie bewegende Zylinder (16) und der Stift (12) gelöst wurden.

8. Eintreibvorrichtung gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die Stifte (20); (21), über die die Greifbacken befestigt sind, mit Hilfe eines Bandes (14) miteinander verbunden sind.

Revendications

1. Equipement d'enfoncement destiné à enfoncer des pieux, des profilés en acier et d'autres objets allongés dans le sol, lequel équipement d'enfoncement comprend un corps (1) qui peut être fixé à une machine de travail, un dispositif vibrant (6) fixé au corps (1) avec l'aide de coussinets d'amortissement (9) et de mâchoires de préhension mobiles (10) ajustées au dispositif vibrant (6) mentionné afin de saisir l'objet à enfoncer au moins avec une préhension latérale, **caractérisé en ce que** le corps (1) comprend une partie supérieure (2) comprenant un agencement de fixation (4), (5) pour le fixer à la machine de travail et des parties latérales dirigées depuis la partie supérieure (2) vers le bas, parties latérales entre lesquelles le dispositif vibrant (6) et les mâchoires de préhension (10) ; (17, 18) peuvent être fixés par le biais d'une cassette (7) comprenant des gommes d'amortissement (9), auquel cas les fixations comprennent des fixations à broche/trou (11, 23, 14); (20, 8) ou (21, 8) qui peuvent être ouvertes en détachant les broches (11, 20, 21) mentionnées.

2. Equipement d'enfoncement selon la revendication 1, **caractérisé en ce que** les mâchoires de préhension (10) sont ajustées pour être fixées à une cassette (7) ou à un dispositif vibrant (6) avec l'aide de broches de jonction (20), (21) auquel cas elles peuvent être détachées, retirées ou changées après le détachement des broches de jonction (20), (21) lorsque le dispositif d'enfoncement (6) reste à sa place dans le corps (1).

3. Equipement d'enfoncement selon la revendication 2, **caractérisé en ce que** les broches de jonction sont du type qui passe à travers (20) soit la cassette (7) soit le dispositif vibrant (6) ou elles sont ajustées (21) à un montage à pivot d'une seule mâchoire (10).

4. Equipement d'enfoncement selon la revendication 1, **caractérisé en ce que** les cassettes (7) sont fixées aux côtés opposés du dispositif vibrant (6) avec une fixation à broche/trou (11, 23, 14).

5. Equipement d'enfoncement selon la revendication 1, **caractérisé en ce que** la cassette (7) est fixée au dispositif vibrant (6) avec une fixation à broche/trou et les mâchoires de préhension (10) sont fixées à la cassette (7) avec une fixation à broche/trou (20, 8) ou (21, 8).

6. Equipement d'enfoncement selon la revendication 1, **caractérisé en ce que** les mâchoires (10) peuvent être détachées au niveau de la partie supérieure et de la partie inférieure du dispositif vibrant (6) après que les broches de jonction (20), (21) ont été détachées.

7. Equipement d'enfoncement selon la revendication 1, **caractérisé en ce que** les mâchoires (10) peuvent être détachées lorsque le cylindre (16) et la broche (12) les déplaçant ont été détachés.

8. Equipement d'enfoncement selon la revendication 1, **caractérisé en ce que** les broches (20) ; (21) fixant les mâchoires de préhension sont combinées les unes aux autres avec l'aide d'un ruban (14).

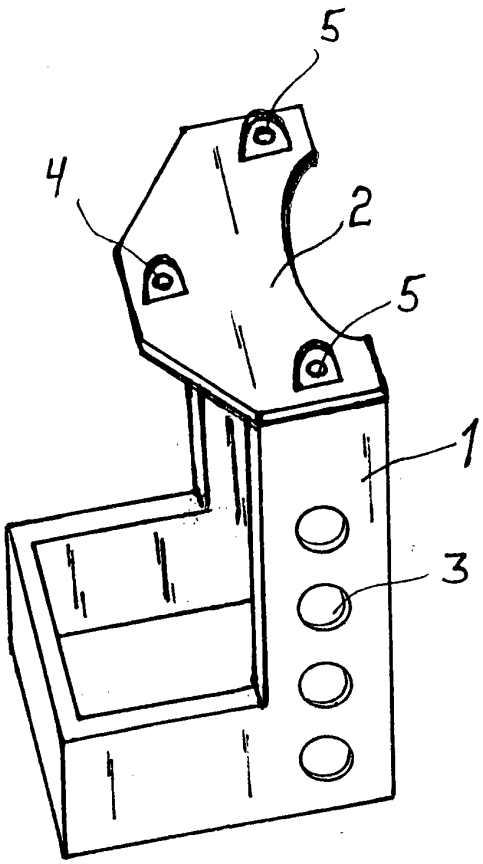


Fig.1

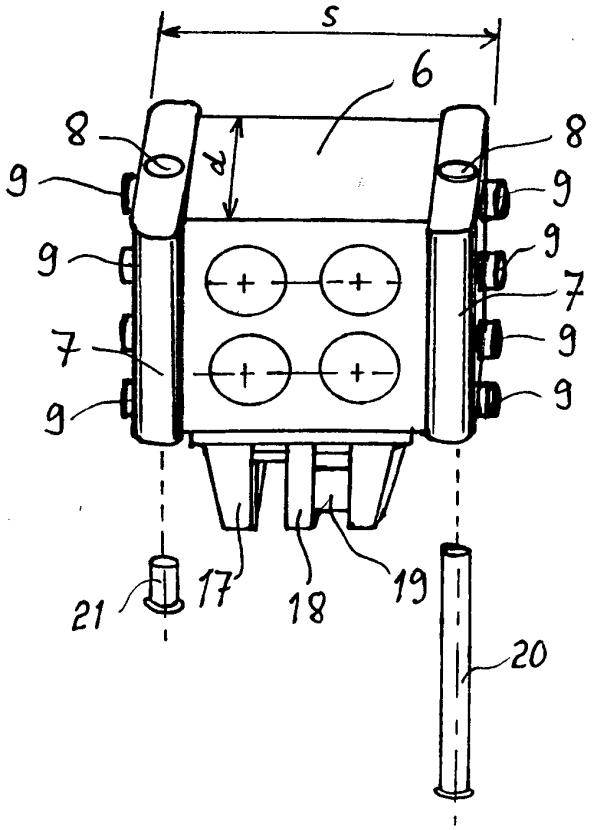


Fig.2

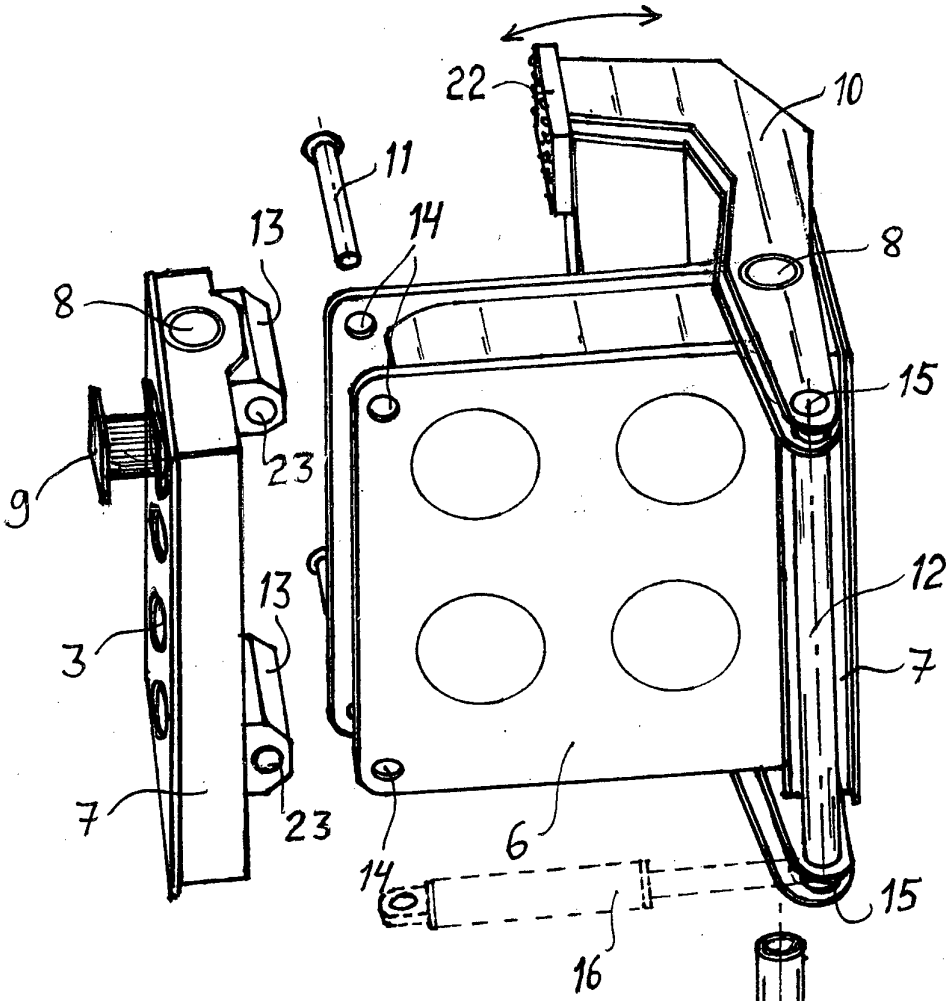

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Fig. 4

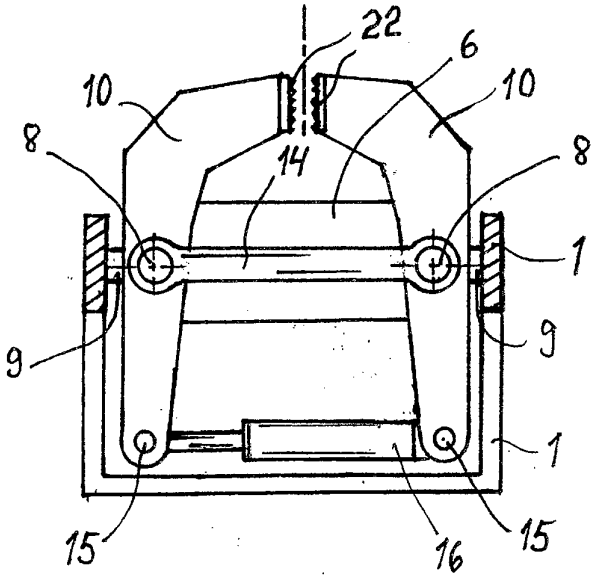

22
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16
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Fig. 3

REFERENCES CITED IN THE DESCRIPTION

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