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MACHINE MOVABLE AND ANGULARLY DISPLACEABLE ON THE GROUND

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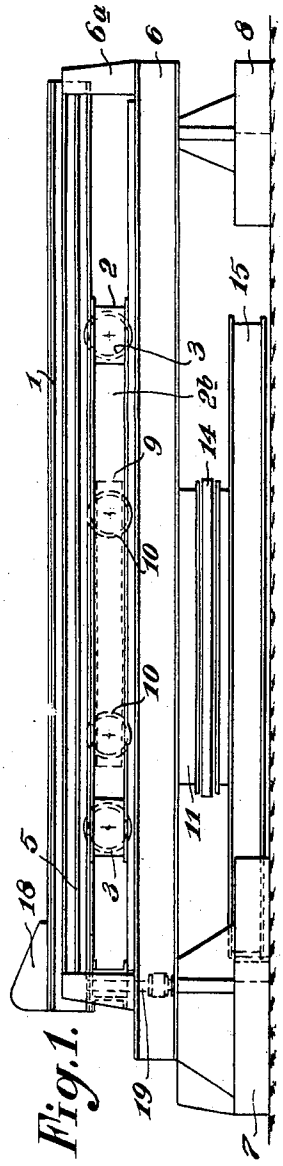


Fig. 1.

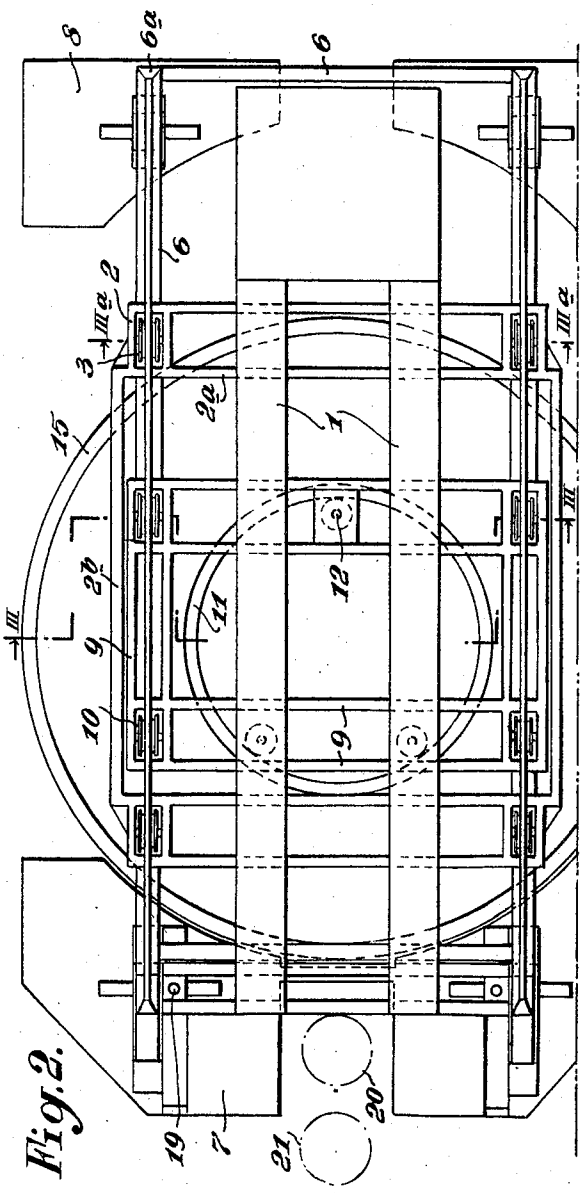


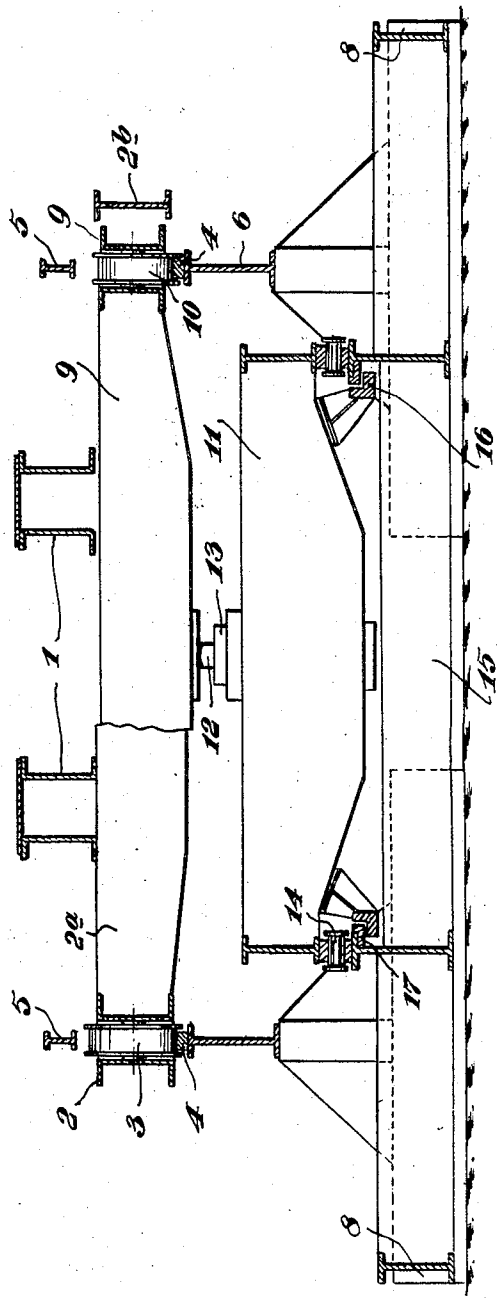
Fig. 2.

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Fig. 3.

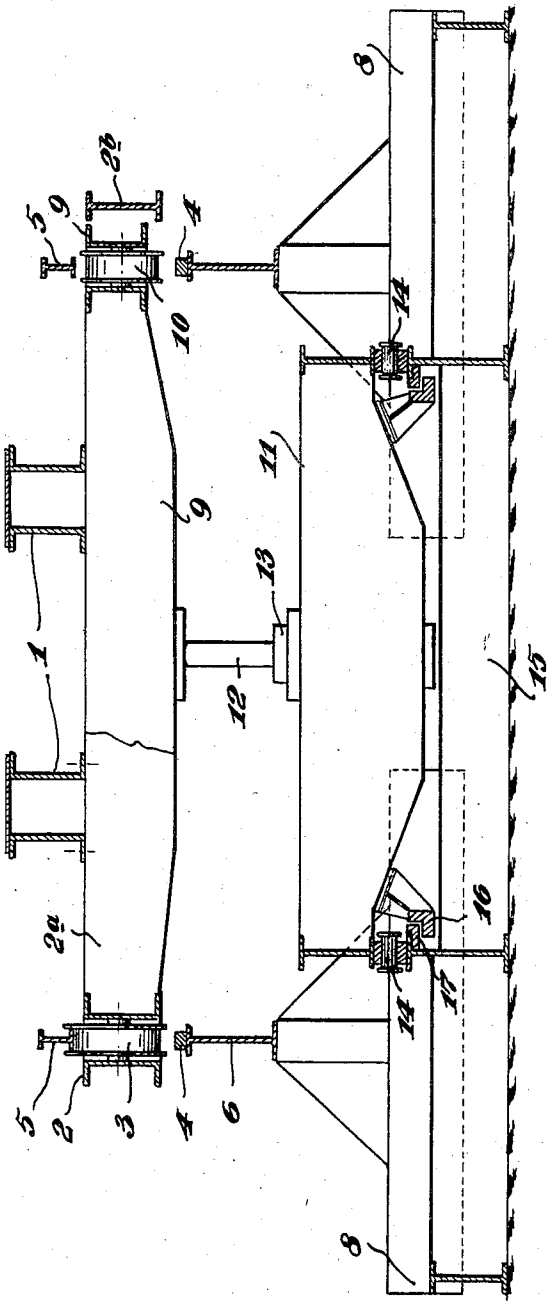


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Fig. 4.



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MACHINE MOVABLE AND ANGULARLY DISPLACEABLE ON THE GROUND

Edgard Pickman, Brussels, Belgium, assignor to Compagnie Internationale des Pieux Armés Frankignoul, Société Anonyme, Liege, Belgium

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5 Claims. (Cl. 61—73)

Heavy-weight machines, particularly machines for driving or extracting piles or lining tubes are known, which include a platform supporting the operating machine proper and secured to a carrier frame for limited longitudinal motion with respect thereto, such carrier frame being provided with means for affording a bearing on the ground, while the platform is further secured to a thrust and directing table in such as way that a relative rotary motion may take place between the platform and the table, about a vertical axis extending at least approximately through the center of gravity of the machine. Further, such known machines have lifting means of the jack type cooperating with the table and adapted to lower the machine so as to cause it to rest on the ground through the medium of the bearing means of the carrier frame, or to raise the machine by causing it to rest on the ground through the medium of the table. In this way, one may produce a translative motion of the machine, including the table, when the machine rests on the ground through the medium of the carrier frame, whereas the machine, including the carrier frame, may have imparted to it a rotary motion when the machine rests on the ground through the intermediary of the table.

The term "thrust and directing table," as used above, refers to an assembly including a thrust table intended to afford a bearing on the ground and connected to the platform by means of a mechanism that includes means for permitting relative rotary movement between the thrust table and platform about a vertical axis and lifting means for raising the platform with the thrust table bearing on the ground.

In many operations performed by means of machines of the type described above it is useful that the center of gravity of the machine be close to the point of action or of operation of the machine, that is to say, the point where the latter applies its useful force, for example the point at which a pile or a tube is driven or pulled out. It will be clear, therefore, that the known machines suffer from the drawback that the center of gravity of the machine remains at all times close to the axis of the thrust and directing table.

According to the invention, the above disadvantage of the known machines is eliminated owing to the fact that the table is suspended from a secondary frame mounted for limited horizontal motion underneath the platform of the machine, parallel to the direction of the relative longitudinal motion occurring between the platform and the carrier frame. Owing to this arrangement, when the machine is in working position, that is to say, when it rests on the ground through the intermediary of the carrier frame, the platform may accomplish a translative movement with respect to the table, with the result that the center of gravity of the machine may thus be shifted from the vertical axis of the table, so that the machine is in a position to carry out actions at points situated outside the table in a more rational way and

to attain working points more distant from the axis of the table than has been possible hitherto.

According to one convenient way of carrying out the machine according to the invention, the secondary frame from which is suspended the thrust and directing table, which is provided with the lifting means, is formed as a wheeled truck mounted for limited longitudinal running motion with respect to the platform and with limited vertical play with respect to the lower face of the platform. For instance, the wheeled truck forming the secondary frame may be mounted for longitudinal motion within a wheeled truck of greater length, which is rigidly secured to the platform, the wheels of both trucks being mounted with vertical play between two common pairs of rails, each comprised of two vertically spaced rails, rigidly secured to the carrier frame of the machine, the vertical play between the upper face of the truck forming the secondary frame associated with the table and the corresponding lower face of the platform being smaller than the vertical play between the said wheels and the said rails. Preferably, the wheels of the truck forming the secondary frame of the table are smaller than the wheels of the truck associated with the platform.

Further features and advantages of the invention will appear from the following detailed description of an illustrative embodiment thereof which is to be read with reference to the accompanying diagrammatical drawings, in which:

Fig. 1 is a side elevation of a machine embodying the invention;

Fig. 2 is a plan view thereof;

Fig. 3 is a cross sectional view taken on line III—III of Fig. 2, with the upper left hand portion of Fig. 3 corresponding to the line of section III*a*—III*a* of Fig. 2, certain components being omitted for the clarity of the drawing; and with the machine shown resting on the carrier frame and the thrust and directing table being raised as in Fig. 1, and

Fig. 4 is a view similar to that of Fig. 3, but showing the machine resting upon the table and the carrier frame raised.

The machine embodying the invention includes a platform **1** which may have mounted thereon any desired mechanism, for instance a machine for driving and/or extracting piles, lining tubes, and the like. The platform is secured to a truck **2**, **2***a*, which is provided with four wheels **3** cooperating with two pairs of rails **4**, **5**, which are vertically spaced and are rigidly secured to a carrier frame **6** provided with bearing members **7**, **8**. The range of travel of the truck **2** on the rails **4**, **5** is limited by the uprights **6***a* supporting the rails **5**.

A second truck **9** forming a secondary frame is mounted for longitudinal motion within the truck **2**. In the example illustrated, the truck **2** comprises a portion **2***b* of greater width having arranged therein the truck **9** which is provided with wheels **10**, the latter wheels also cooperating with the rails **4**, **5** and having a smaller diameter than the wheels **3**. The truck forming the secondary frame **9** is connected to a directing table **11** through a central jack or through several jacks, preferably of the hydraulic type, spaced around the periphery of the table **11** and operated by means of pipes conveying driving fluid, not shown in the drawings. One component of each jack, for instance the piston **12**, is fixed to the truck **9**, whereas the other component, viz. the cylinder **13**, is fixed to the table **11**. The table **11** is rotatably coupled, through the medium of a roller bearing **14**, with a seating or thrust table **15** having a surface large enough to be able to afford a satisfactory distribution of the weight of the machine on the ground. Brackets **16**, fixed to the table **11**, are engaged under

an annulus 17 which is rigidly secured to the table 15, so as to provide for the centering of the two components 11 and 15 and for sustaining and carrying along the table 15 when the table 11 is lifted.

The machine illustrated is particularly suitable for supporting an apparatus for driving and/or extracting piles, lining tubes, and so on, the guide-poles of such apparatus being intended to be mounted at the location occupied by the projections 18 of the platform 1. In order to secure a satisfactory distribution of the forces when a tube or the like is being pulled out, two mechanical jacks 19 are provided at the platform 1 and are brought into contact with the bearing members 7 when such withdrawal is to be effected. The jacks 19 are slightly spaced from the bearing members 7 when other operations are being performed.

In the position shown in Figs. 1, 2 and 3, the machine as a whole rests on the ground by means of the bearing members 7, 8, the table 15 being spaced from the ground by means of jacks each formed by a piston 12 and a cylinder 13, which have lifted the table 11 from which the table 15 is suspended by the brackets 16. In this position, the wheels 3, 10 of the trucks 2, 9 rest upon the rails 4 of the carrier frame 6, with the upper face of the truck 9 forming the secondary frame being spaced from the lower face of the platform 1. The truck 9 can not be moved further to the left, in which direction the machine is fed to perform the work of driving or extracting piles, etc., since the table 15 is held back by the bearing members 7. The circle 20 shows the location of the most advanced pile that can be normally handled with the machine in the position of Figs. 1, 2 and 3. However, the truck 2 and the platform 1 may be moved still further to the left, independently of the truck 9, through a distance equal to the free space available between the trucks 2 and 9, to the right of the latter, which makes it possible to handle a pile in the location indicated by the circle 21. It will be seen that the fact that the center of gravity of the machine may be brought close to the operating point of the machine, outside the table 15, is very advantageous, especially as far as extraction of tubes, and the like, is concerned. When it is desired to shift the machine, the truck 2 is brought back to the position where the center of gravity of the machine comes to lie approximately on the axis of rotation of the table 11. Then, the lifting jacks 12, 13 are operated so that the seating table 15 will be made to bear on the ground and, thereupon, the truck 9 forming the secondary frame will be raised so as to cause it to engage the platform 1 and raise the latter in turn, together with the truck 2 which is secured thereto and whose wheels 3 will then be brought into contact with the upper rails 5, so that the carrier frame 6 will also be raised, together with the bearing members 7, 8, so as to attain the position shown in Fig. 4. The frame 6 will then be resting upon the wheels 3 by means of the rails 5, whereas the wheels 10 remain disengaged from the rails 5 by reason of the difference between the diameters of the relatively small wheels 10 and the relatively large wheels 3. In this position, the assembly consisting of carrier frame 6 and bearing members 7 and 8 may be moved by running on the wheels 3, in the direction in which the machine is to be fed. Then, if the bearing members 7, 8 are again lowered onto the ground, the trucks 2 and 9 will be able to be moved on the rails 4 and it will thus be possible to bring the platform 1 to a new position of work. Moreover, when the machine assumes the position shown in Fig. 4, all the other components of the machine may be rotated as a whole on the table 15, so as to change the angular position of the machine. The aforesaid linear and angular displacements may be produced by any suitable means, for instance, hydraulic or mechanical driving means.

In order to make sure that the wheels 3, 10 will remain in alignment with the rails 4, 5 during the relative vertical displacements of those components, one may provide mutual guide means of any character, though, normally, such components do not run the risk of undergoing a relative lateral displacement while effecting those small vertical displacements.

It is to be noted that a vertical play is provided between the truck 9 forming the secondary frame and the platform 1, in order that the truck 2 with the platform 1 may travel freely when the machine assumes the position shown in Fig. 3. Moreover, the vertical play between the wheels 3, 10 and the rails 4, 5 has been made larger than the play between the truck 9 and the platform, in order that, during the lifting step (Fig. 4), the axles of the wheels will not assume the load of lifting the platform, since the force required to this end should be applied directly by the truck 9 to the said platform. Moreover, the wheels 3 should be given a larger diameter than that of the wheels 10 in order that the wheels 3 should act alone on the rails 5 for lifting the carrier frame 6 with its bearing members 7 and 8. This arrangement provides for a good stability of the carrier frame and its bearing members when the carrier frame moves towards the position shown in Fig. 4, while at the same time preventing any action upon the wheels of the truck 9 during the translative motion of the platform.

It will be understood that the invention is not restricted to the construction as described and illustrated, since various changes may be made therein without departing from the spirit of the invention.

I claim:

1. A machine which is movable and angularly displaceable on the ground, comprising a platform adapted to support an operating machine, a carrier frame, means connecting said platform to said carrier frame and permitting limited relative longitudinal movement and limited vertical play therebetween so that said platform and carrier frame form an assembly, bearing means on said carrier frame adapted for bearing engagement with the ground, a secondary frame underneath said platform, means connecting said secondary frame to said assembly formed by the carrier frame and platform and permitting limited horizontal movement, parallel to the direction of said relative longitudinal movement of the carrier frame and platform, and also limited vertical play with respect to said assembly, a thrust table adapted for engagement with the ground, and mechanism suspending said thrust table from said secondary frame and including means permitting relative rotary movement of said thrust table and secondary frame about a vertical axis and lifting means operative to raise said secondary frame relative to said thrust table so that, with the latter bearing on the ground, said secondary frame engages said platform and lifts the latter through a distance exceeding said limited vertical play between said platform and carrier frame, thereby to raise the latter with said bearing means thereon while said thrust table supports the machine on the ground.

2. A machine as in claim 1; wherein said carrier frame includes vertically spaced apart upper and lower rails, and said means connecting the platform to the carrier frame includes a first truck secured to said platform and having wheels between said upper and lower rails with the diameter of said wheels being less than the vertical spacing between said upper and lower rails by the amount of said limited vertical play between the platform and carrier frame; and wherein said secondary frame is in the form of a second truck having wheels between said upper and lower rails of the carrier frame with the diameter of said wheels of the second truck being less than said vertical spacing between the rails by an amount which is greater than said limited vertical play between said secondary frame and said assembly.

3. A machine as in claim 2; wherein the diameter of said wheels of the second truck is smaller than the diameter of the wheels of the first truck so that, when said

platform is lifted by said secondary frame, said wheels of the first truck will engage said upper rails to raise said carrier frame while said wheels of the second truck are still spaced from said upper rails.

4. A machine as in claim 1; wherein said mechanism suspending the thrust table from said secondary frame includes a lower part rotatable with respect to said thrust table about said vertical axis, and said lifting means comprises at least one jack between said secondary frame and said lower part.

5. A machine which is movable and angularly displaceable on the ground, comprising a platform adapted to support an operating machine, a carrier frame, means connecting said platform to said carrier frame and permitting limited relative longitudinal movement and limited vertical play therebetween, bearing means on said carrier frame adapted for bearing engagement with the ground, a secondary frame underneath said platform and adapted to act upwardly against the latter, means connecting said secondary frame to said carrier frame and permitting limited vertical play therebetween as well as limited relative horizontal movement between said secondary and carrier frames, and hence between said secondary frame and said platform, parallel to the direction of said limited longitudinal movement between said carrier frame and platform, said limited vertical play between said secondary frame and carrier frame being large enough to permit said secondary frame to act upwardly against said platform independently of any upward action of said secondary frame on said carrier frame, a thrust table adapted for engagement with the ground, and mechanism suspending said thrust table from said secondary frame and including means permitting relative rotary movement between said thrust table and secondary frame about a vertical axis and lifting means operative to raise said secondary frame relative to said thrust table so that, with the latter bearing on the ground, said secondary frame engages said platform and lifts the latter through a distance exceeding said limited vertical play between said platform and carrier frame, whereupon the latter is suspended from said platform with said bearing means raised clear of the ground.

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