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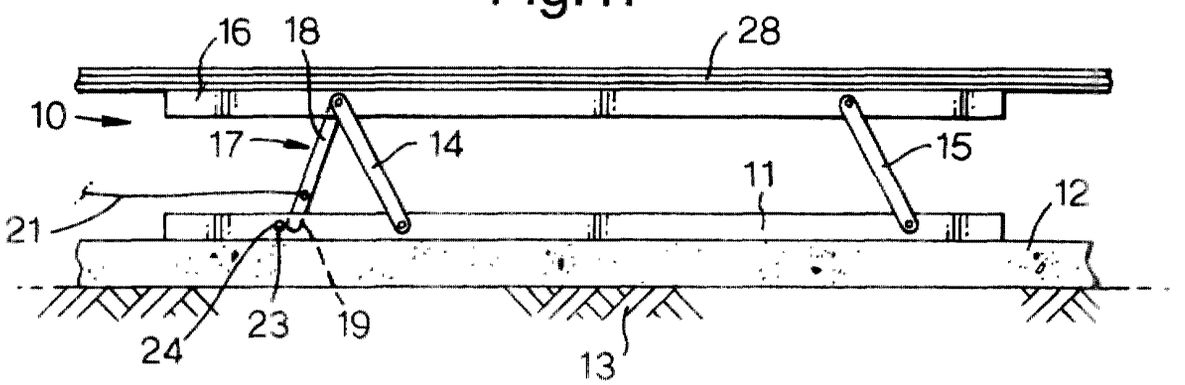
(54) Foundation raft

(57) A support mechanism for use in the formation of a concrete foundation raft or low level beam for a building or other superstructure, the support mechanism comprising: a base member (11) for engagement, in use, with the ground; a platform (16) for engagement, in use, with the raft or beam; connecting means (14,15) for connecting the base member and the platform such that they are relatively movable between a close configuration and an open configuration; and means (18) for, in use, retaining the base member and the platform in the open configuration.

Fig.1.



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Description

[0001] This invention relates to a support mechanism for use in the formation of a concrete foundation raft or beam.

[0002] When building on ground, which is liable to subsidence or heave, it is well known to erect the building or other superstructure on a raft or beam, itself supported by piles, with the underside of the raft or beam spaced above the ground by a void or compressible material. The void or compressible material, which prevents any heave from being significantly transmitted to the underside of the raft or beam, has, previously, taken a variety of forms.

[0003] Typically a collapsible or crushable spacer, made for example of hardboard, cardboard, and/or polystyrene has been used. However, these techniques are generally expensive. Furthermore, collapsible spaces can collapse prematurely, typically in wet weather, and crushable spacers require additional space to avoid the transmission of heave to the raft through the crushed material.

[0004] In our earlier British patent application No. GB 9719343.7, we disclose a method of constructing a concrete foundation raft or low level beam for a building or other superstructure comprising erecting formwork, which is held spaced above the ground by at least one interposed waterproof bag that is inflated with water or other liquid, pouring concrete in the formwork to form the raft or beam and, when the concrete has set, moving the water from the bag(s) to allow the bag(s) to collapse leaving a void between the underside of the raft or beam in the ground.

[0005] The present invention aims to provide a mechanism which overcomes the above problems and which is easy and cheap to manufacture and simple in operation.

[0006] According to the present invention, there is provided a support mechanism for use in the formation of a concrete foundation raft or low level beam for a building or other superstructure, the support mechanism comprising:

a base member for engagement, in use, with the ground;
a platform for engagement, in use, with the raft or beam;
connecting means for connecting the base member and the platform such that they are relatively movable between a closed configuration and an open configuration; and
means for, in use, retaining the base member and the platform in the open configuration.

[0007] The present invention is advantageous in that, by means of a simple support mechanism, a rigid structure is provided on which to construct the necessary raft or beam. The ability to collapse the support, when appropriate, ensures that it can be removed and reused. Furthermore, no additional fluids, as required by our previous application, need to be supplied to or removed from the location of the support mechanism. It is therefore easier to maintain a clean working environment.

[0008] Preferably, the connecting means comprises a first pair of identical legs, each leg pivotally connected at respective ends to one of the base member and the platform.

[0009] Preferably, the connecting means further comprises a second pair of identical legs, each leg pivotally connected at respective ends to one of the base member and the platform. The second pair of legs may form a parallelogram linkage with the first pair of legs, the base member and the platform.

[0010] Preferably the retaining means includes a strut which is provided, in use, between the base and the platform. The retaining means may comprise a leg and a foot portion, the foot portion being, in use, in contact with either the base or the platform. Preferably, the foot portion is pivotally connected to the leg.

[0011] Preferably the retaining means is pivotally connected at one end to one of the base or the platform and, at the other end, is held in place, in use, by the frictional force between the retaining means and the other of the base or platform. Additionally, a barrier, preferably made of wood, can be provided to abut the front (in the likely direction of slip of the strut) of the foot portion or strut to give an additional resistance to movement of the strut.

[0012] The present invention also envisages a method of forming a concrete foundation raft or low level beam for a building or other superstructure, the method comprising the steps of:

erecting formwork, which is spaced above the ground by means of a support mechanism as described above;
pouring concrete in the formwork to form the raft or beam; and
when the concrete is set, releasing the support mechanism to provide a void between the underside of the raft or beam and the ground.

[0013] Preferably the support mechanism is, after use, recovered so that it can be reused.

[0014] One example of the present invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is a schematic side view of the present invention in the open configuration;
Figure 2 is a schematic side view of the present invention in a partially closed configuration;
Figure 3 is a view from one end of the support mechanism shown in Figure 1;
Figure 4 is a diagrammatic representation of the forces acting around the retaining means of the present invention; and

Figures 5a and 5b show an alternative construction of the connecting means of the present invention.

[0015] As can be seen in Figures 1 and 2, a support structure 10 is shown in the open configuration and includes a base member 11, formed preferably of a metal channel section, resting on top of blinding 12 which is provided over the surface of ground 13. A first 14 and a second 15 pair of legs interconnect the base portion 11 with a platform 16 on which, in use, a deck or beam 28 can be formed. The pairs of legs 14, 15 are pivotally connected at each end to either the base 11 or the platform 16 such that the base 11 and the platform 16 are relatively movable between the open configuration shown in Figure 1, in which they are spaced apart and a closed configuration in which the spacing therebetween is reduced.

[0016] A strut 17, comprising a leg 18 and a foot portion 19, retains the support mechanism 10 in the open configuration. The foot portion 19, in this construction, is merely the lower portion of the leg 18 but it is envisaged that it could be a distinct element, pivotally connected to the leg 18 so that the lower surface 20 of the foot can maintain the greatest contact area with the upper surface of the base 11. In an alternative construction, the foot portion 19 may be rigidly connected to the leg 18. In use, the foot portion is positioned so that it remains stationary with respect to the base 11 to ensure the support mechanism 10 remains in the open configuration. This is done by ensuring that it is at an appropriate angle to the vertical such that the frictional force between the foot portion 19 and the base 11 is sufficient to prevent the support mechanism collapsing. This is explained in greater detail with reference to Figure 4. Additionally, a barrier 23 could be provided, in the construction through holes 24 formed in the two upstanding side portions 25 of the base member 11, such that it abuts the front (in the direction in which the foot will slip) of the foot portion 19 and acts as a safety mechanism to increase the resistance to movement of the foot portion 19. The barrier is preferably formed from a thin piece of wood.

[0017] As can be seen in Figure 2, by pulling on a tension wire 21 in a direction indicated by arrow 22, the frictional force between the foot portion 19 and base 11 is overcome and the barrier 23, if provided, is broken and the strut 17 can then be displaced. The platform 16 is therefore allowed to move towards the base member 11 by the pivoting action of the legs 14, 15. In this way, the collapsed support mechanism 10 can be removed from beneath the deck or beam 17 and can be reused in another application. The tension wire, in this example, is formed from a steel wire but could, of course, be made of any suitable material.

[0018] Figure 4 shows forces which are acting in the region of the support mechanism around the strut 17. Angles α and β are chosen such that the component of the weight W acting through the strut 17 provides a horizontal component H_p which is equal to or only slightly less than the total of the frictional force F_F between the lower surface of support member 17 and the upper surface of base 11 and the force F_B exerted by the barrier 23. Whilst α and β can be any combination of angles so long as the strut 17 does not slip, preferably they are between 1° and 45° depending upon the load W, the materials used and the shape of the foot portion 19. It is more preferable that angle β is greater than angle α.

[0019] Figures 5a and 5b show an alternative construction which could be used in place of one or more of the pairs of legs 14, 15. Instead of providing pairs of legs, a channel section 26, acting as a single leg, is pivotally connected through holes 29, on each side 27 to the base member 11 and to the platform 16. The use of the channel section 26, rather than the pair(s) of legs does not affect or alter the operation of the support structure 10.

Claims

1. A support mechanism for use in the formation of a concrete foundation raft or low level beam for a building or other superstructure, the support mechanism comprising:

   a base member for engagement, in use, with the ground;
   a platform for engagement, in use, with the raft or beam;
   connecting means for connecting the base member and the platform such that they are relatively movable between a close configuration and an open configuration; and
   means for, in use, retaining the base member and the platform in the open configuration.

2. A support mechanism according to claim 1, wherein the pivot means comprises a first pair of identical legs, each leg pivotally connected at respective ends to one of the base member and the platform.

3. A support mechanism according to claim 2, further comprising a second pair of identical legs, each leg pivotally connected at respective ends to one of the base member and the platform.

4. A support mechanism according to claim 3, wherein the first and second pairs of legs form a parallelogram linkage with the base member and the platform.

5. A support mechanism according to any one of the preceding claims, wherein the retaining means includes a strut which is provided, in use, between the base and the platform.

6. A support mechanism according to any one of the preceding claims, wherein the retaining means comprises a leg and a foot portion, the foot portion being, in use, in contact with either the base or the platform.

7. A support mechanism according to claim 6, wherein a leg and a foot portion, the foot portion being, in use, in contact with either the base or the platform.

8. A support mechanism according to claim 7, wherein the foot portion is pivotally connected to the leg.

9. A support mechanism according to any one of claims 5 to 9, wherein the strut is pivotally connected at one end to one of the base or the platform and, at the other end, is held in place, in use, by the frictional force between the strut and the other of the base and/or platform.

10. A support mechanism according to any one of claims 5 to 9, further comprising a barrier abutting the front of the strut, in the likely direction of slip of the strut, to give additional resistance to movement of the strut.

11. A method of forming a concrete foundation raft or low level beam for a building or other superstructure, the method comprising the steps of:

directing formwork, which is spaced above the ground by means of a support mechanism according to any one of the preceding claims;
pouring concrete in the formwork to form the raft or beam; and
when the concrete is set, releasing the support mechanism to provide a void between the underside of the raft or beam and the ground.

12. A method according to claim 10, further comprising the step of recovering a support mechanism after use so that it can be reused.

Fig.1.

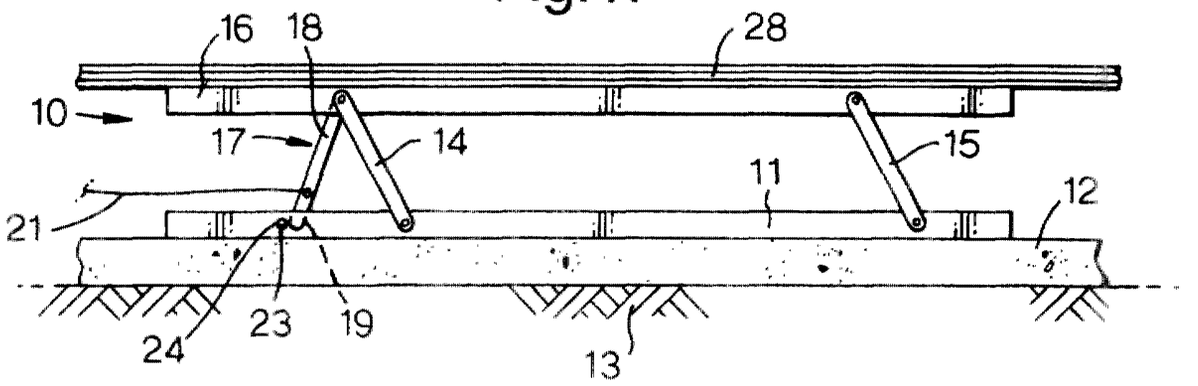

Fig.2.

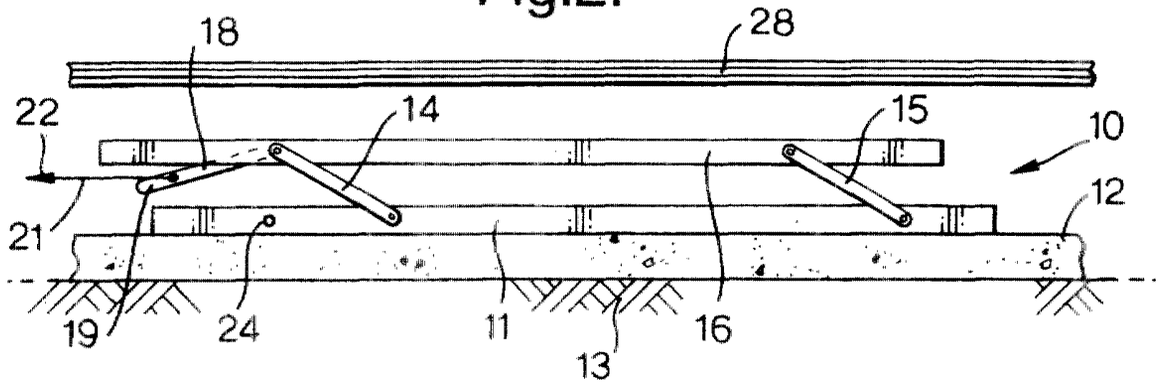

Fig.3.

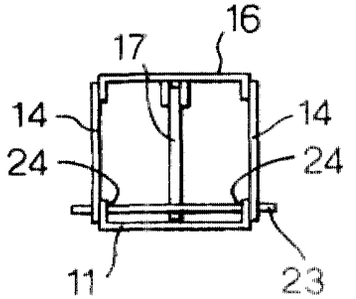

Fig.4.

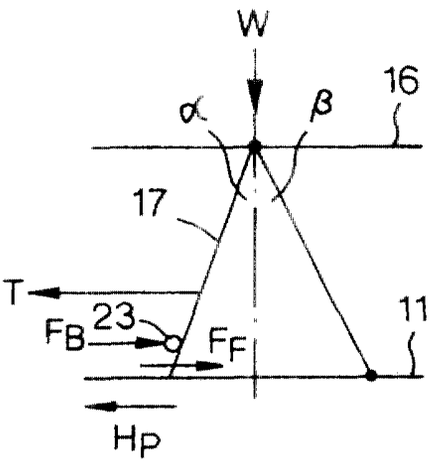

Fig.5a.

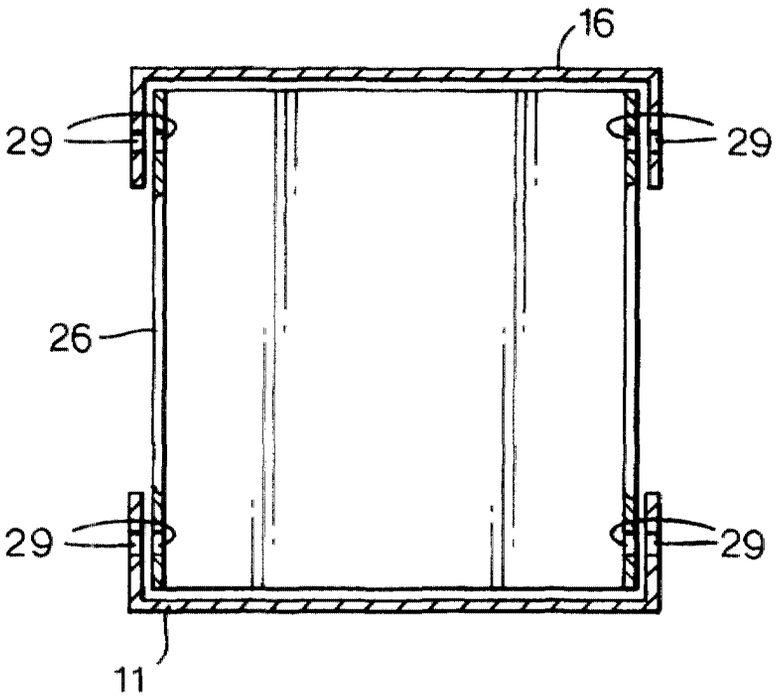

Fig.5b.