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(54) **DRILLING PLATFORM**

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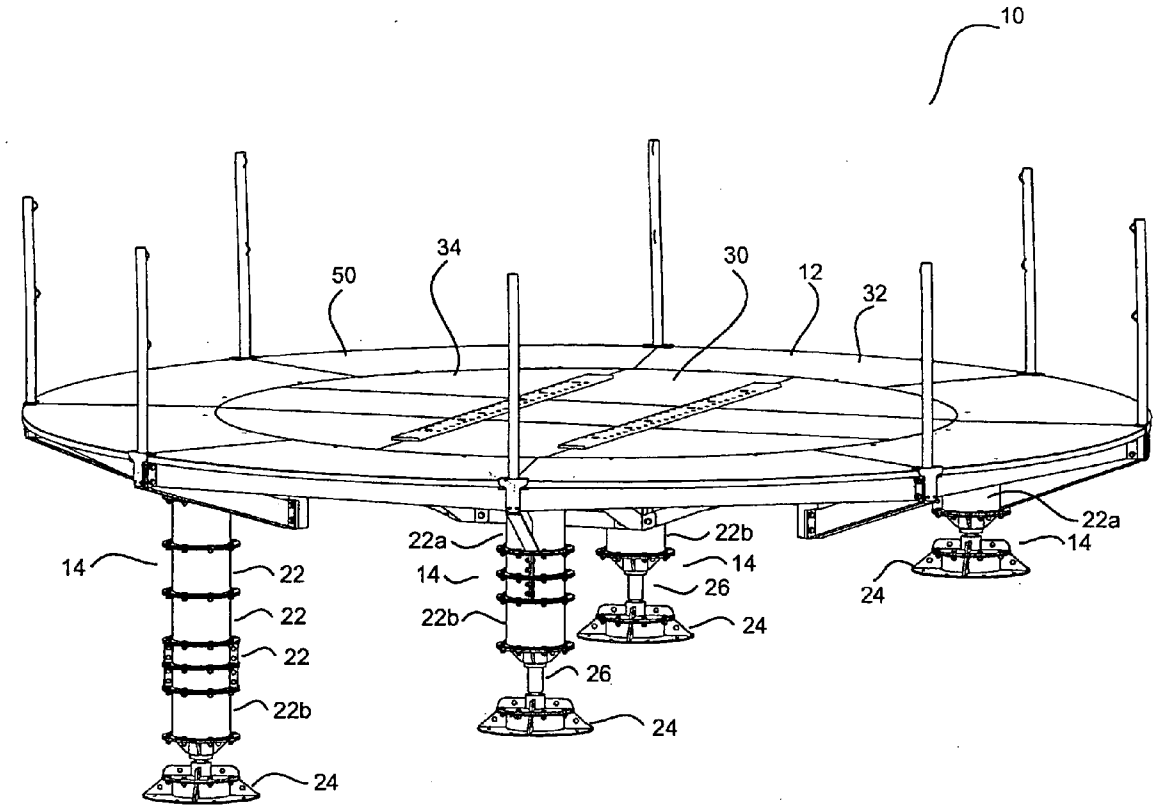
(57) **ABSTRACT**

A supporting structure for geological sample drilling equipment having a minimal environmental footprint is disclosed. The structure consists of a platform on which drilling equipment can be positioned, and a plurality of legs extending from the platform to the ground. The legs are of variable length, which allows the platform to be set horizontally even on uneven ground. The platform includes a rotatable portion so that the drilling equipment can be easily rotated to a desired orientation.



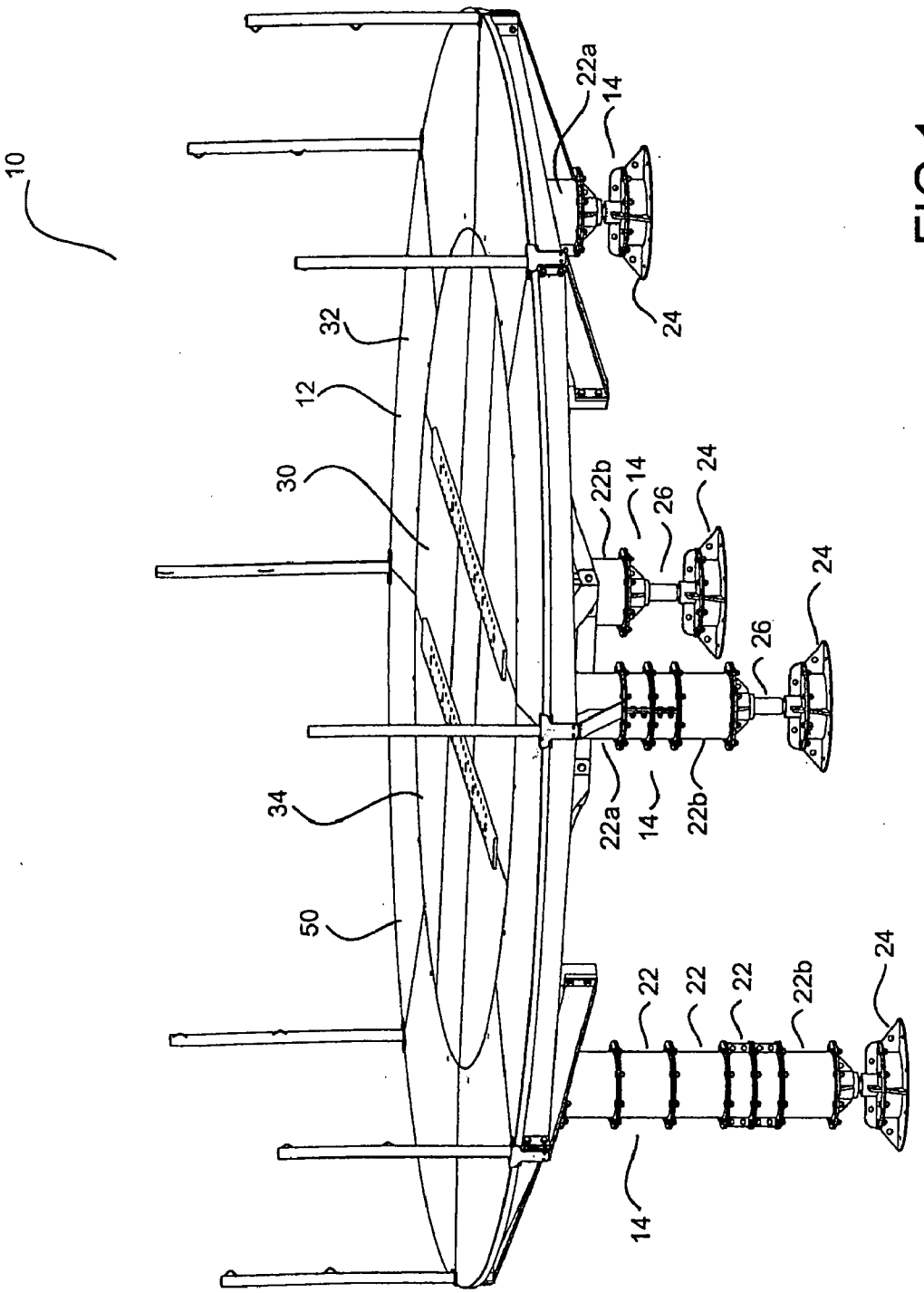

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FIG 1

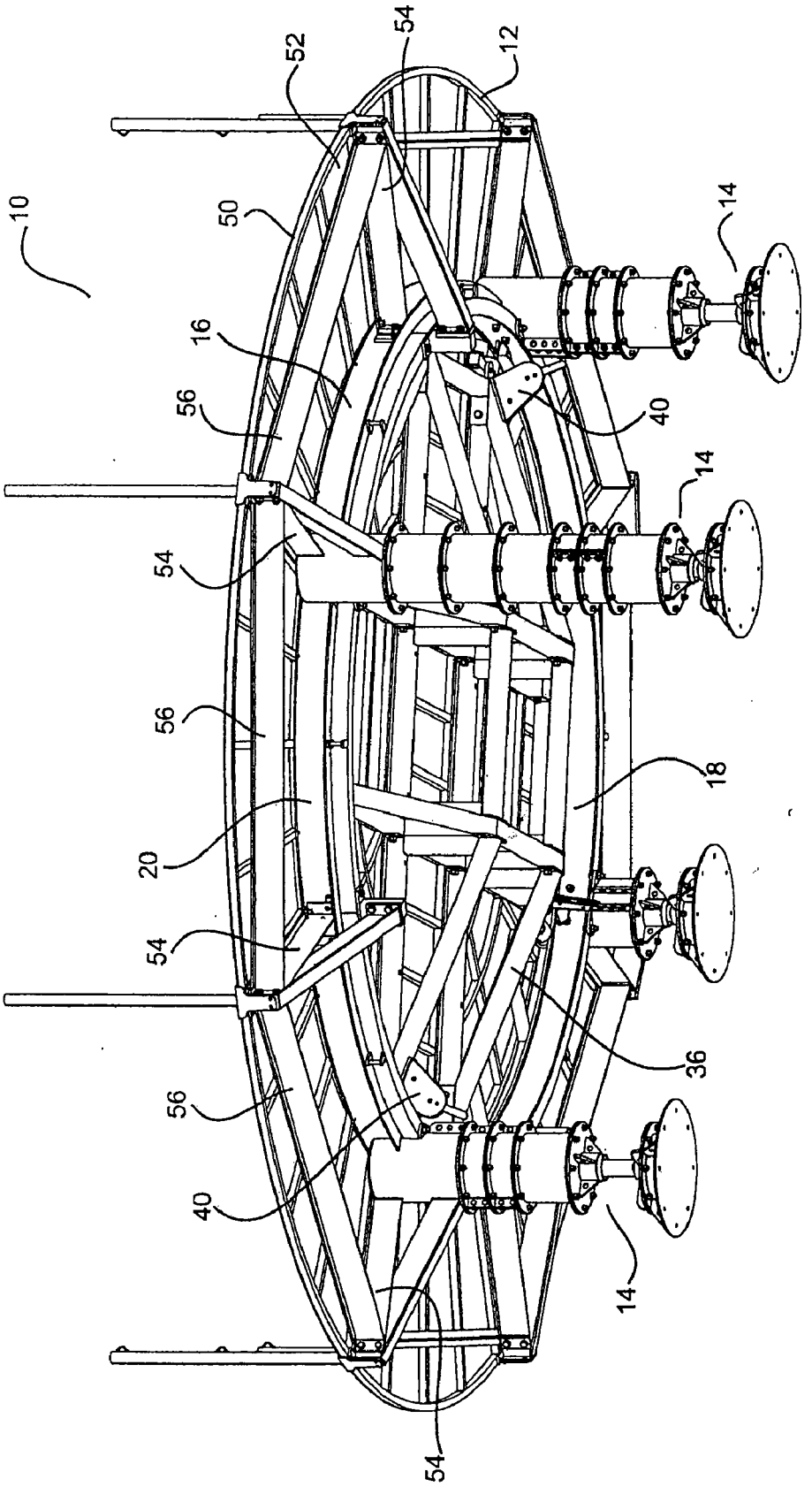

FIG 2

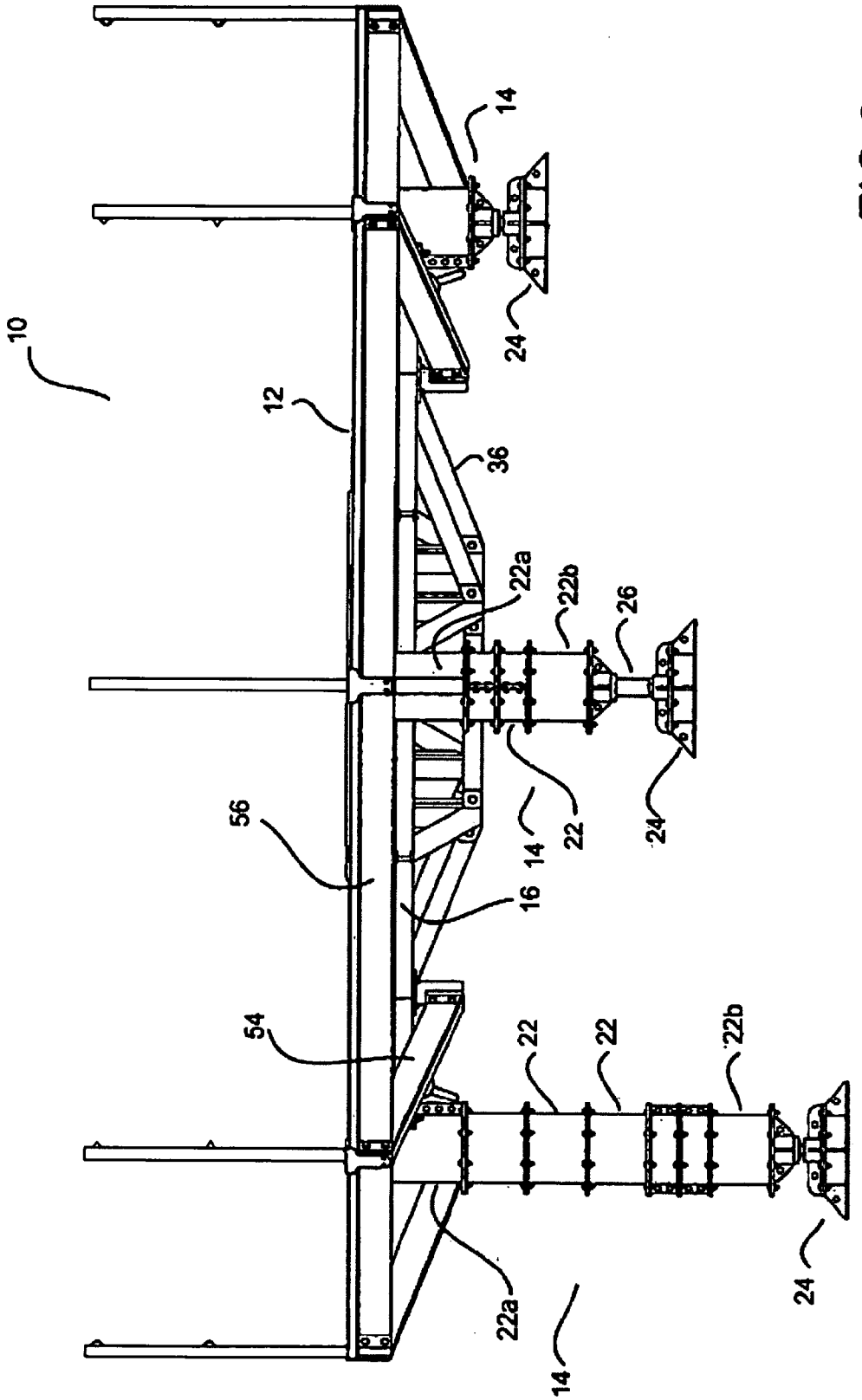

FIG 3

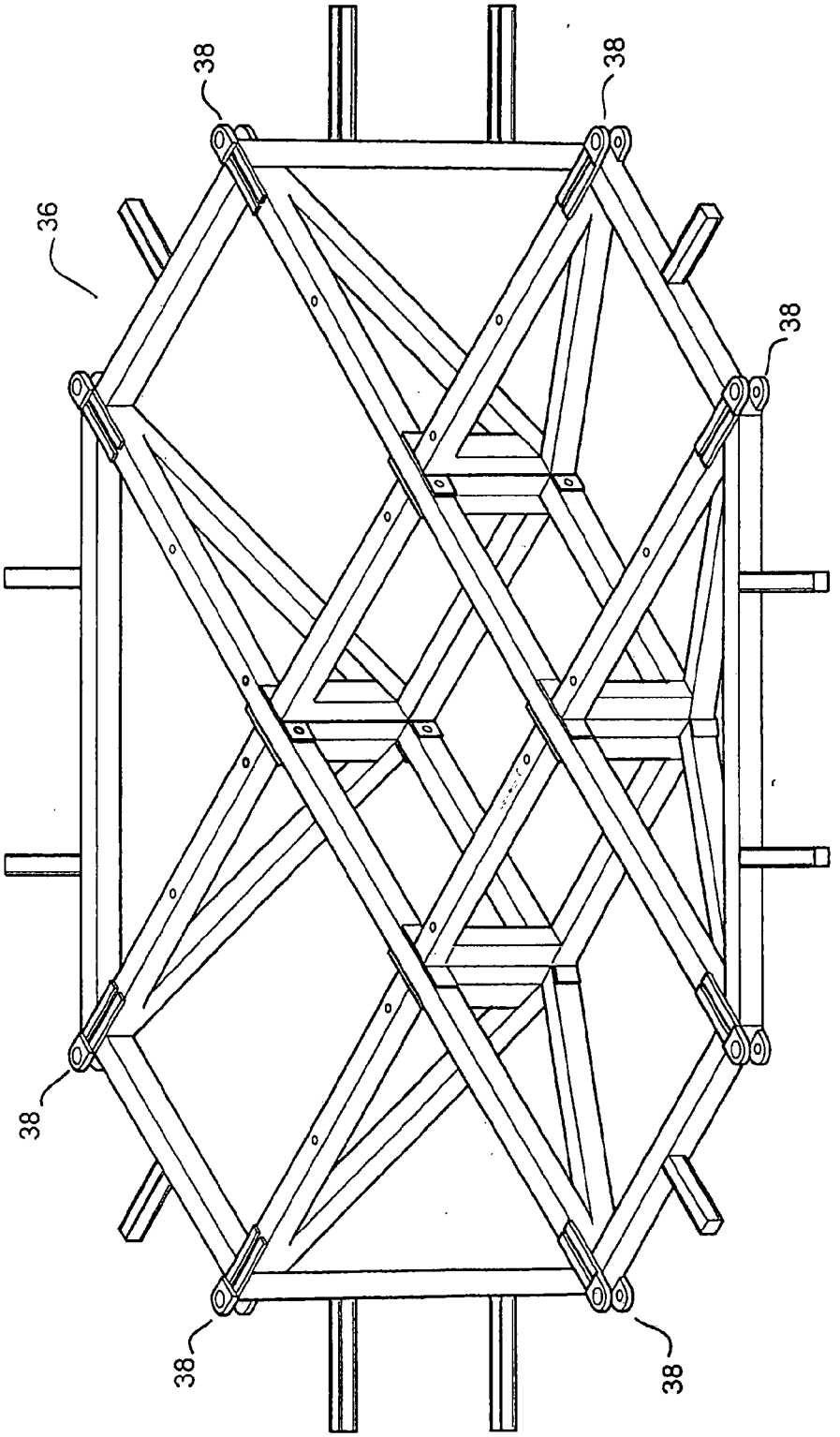

FIG 4

DRILLING PLATFORM

RELATED APPLICATION DATA

[0001] This application claims priority from AU Patent Application No.: 2008903188, filed Jun. 23, 2008 and PCT/AU2009/000792 filed Jun. 22, 2009, each of which is incorporated herein in its entirety by reference thereto.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to a platform on which machinery and other apparatuses can be operated. The invention has particular application as a platform on which geological sample drilling equipment can be located and operated. The invention is envisaged for use on land (as opposed to in the ocean), particularly in environmentally sensitive terrain.

[0004] 2. Description of the Prior Art

[0005] Mineral exploration often requires the use of drilling equipment to extract core samples. This drilling equipment must be carefully positioned, in order for a quality sample to be obtained.

[0006] Generally, the drilling equipment, such as a drill rig, must be located on substantially flat terrain. This means that earth moving equipment must often be utilised to clear and level a space for the drill rig before it can be deployed. In addition, it may be necessary for a drill rig to be oriented in a number of directions (azimuths) in order that samples can be collected by drilling in a required orientation. The amount of cleared and levelled space must be sufficient to allow both reorientations, by manual or mechanical means, and operation of the drill rig. Typically, drilling operations at a single site will require clearing of about 30 m^2. Of course, samples will typically be taken at a number of sites in a particular area, and thus the total amount of clearing required will be several times this figure.

[0007] In an environmentally sensitive location, this degree of clearing is highly undesirable. In some cases, the degree of environmental sensitivity may mean that drilling can not be undertaken at all. In other cases, the problems of clearing land for drilling can require such additional regulation and oversight as to greatly impinge on the profitability of the exploration being undertaken.

[0008] The present invention seeks to provide a means by which drilling can be undertaken with a reduced environmental impact or 'footprint'. Other advantages and uses of the invention will become apparent from the following description.

SUMMARY OF THE INVENTION

[0009] In accordance with a first aspect of the present invention there is provided a supporting structure for geological sample drilling equipment, the structure comprising a platform on which geological sample drilling equipment can be positioned, and a plurality of legs, at least some of which are variable length, which support the platform above the ground, in use. Advantageously, this means that the drilling equipment can be located above the ground, thus obviating or at least reducing the need for ground disturbance and vegetation clearance beneath the drilling equipment. Preferably, all of the legs are independently variable in length.

[0010] When used on sloping or irregular terrain, the supporting structure might be most stably positioned in a particular angular configuration determined by the ground conditions. This angular configuration may not correlate to a desired angle for drilling. In a further aspect, the platform of the supporting rig includes a rotatable portion on which the drilling equipment may be positioned, the rotatable portion being able to rotate relative to the position of the legs. Preferably, the rotatable portion rotates about an axis substantially parallel to an elongate direction of the legs, that is, about a substantially vertical axis in use. This allows the drill rig to be angularly positioned (aligned) independently of the positioning of the supporting structure legs. The legs may thus be located to provide maximum stability to the platform, with the precise orientation of the drilling equipment to be determined by rotation of the rotatable portion of the platform. Further, drilling may occur at a number of locations about the supporting structure periphery, without the need for relocation of the legs.

[0011] Each leg may have more than one mechanism for varying its length. The legs may be modular, and be formed from a plurality of modules arranged to be coupled together in order to change the leg length by a discrete amount. Additionally, the legs may include a continuously variable adjustment means, such as feet which can be extended from or withdrawn into the legs by suitable means, such as hydraulic control. This allows the modules to be used to approximate the required leg length, and the adjustment means to be used for 'fine tuning' to provide the precise length required. In one embodiment of the invention, the leg modules are cylindrical sections including flanges at either end to allow coupling to adjacent modules. In an alternative embodiment, the legs may include a plurality of telescoping members.

[0012] Preferably, the platform has two parts, an annular fixed portion and a circular rotatable portion, located centrally within the annular portion. The annular fixed portion may be comprised in part by a plurality of independently removable sections. This allows a section to be removed to permit the use of drilling or other equipment between any removed section. The nature of the annular section allows flexibility of annulus size dependent on the level of confinement on a particular site.

[0013] In a preferred form, the supporting structure includes a substantially circular force transferring ring, on which the legs and annular portion are fixed and which supports the rotatable portion. The force transferring ring may include a track in which supporting rollers for the rotatable portion are located.

[0014] The rotatable portion may include releasable fixing means, such that when the fixing means is in a first position the rotatable portion is able to rotate relative to the fixed portion, and when the fixing means is in a second position the rotatable portion is restricted from rotation relative to the fixing means.

[0015] The supporting structure is preferably formed from a plurality of parts which may be connected by suitable means, such as bolting, whereby each of the parts can be carried manually. It is envisaged that the structure may be assembled on-site.

[0016] It will be appreciated that the supporting structure can additionally provide a stable, horizontal and directionally variable mounting platform for other machinery, including operating as a fixed platform for landing helicopters. In accordance with another aspect of the present invention, there is provided a supporting structure for apparatus, the structure comprising a platform, and a plurality of legs, each of variable

length, which support the platform above the ground, wherein the platform includes a rotatable portion on which the apparatus may be positioned, the rotatable portion being able to rotate relative to the position of the legs. The apparatus may, for instance, be geological sample drilling equipment, or it may be a helicopter.

[0017] In accordance with a further aspect of the invention, there is provided a method of locating geological sample drilling equipment for use, the method including the steps of providing a supporting structure for the drilling equipment, the structure comprising a platform having a rotatable portion on which the drilling equipment can be positioned, and a plurality of legs, each of variable length, which support the platform above the ground, locating the supporting structure such that the legs support the platform, positioning the drilling equipment on the rotatable portion, and rotating the portion such that the drilling equipment is oriented in a desired direction.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] It will be convenient to further describe the invention with reference to preferred embodiments of the supporting structure of the present invention. Other embodiments are possible, and consequently, the particularity of the following discussion is not to be understood as superseding the generality of the preceding description of the invention. In the drawings:

[0019] FIG. **1** is an upper perspective of a drilling equipment supporting structure in accordance with the present invention;

[0020] FIG. **2** is a lower perspective of the drilling equipment supporting structure of FIG. **1**;

[0021] FIG. **3** is a side view of the drilling equipment supporting structure of FIG. **1**; and

[0022] FIG. **4** is a perspective of a supporting framework for a rotatable portion of a platform within the supporting structure of FIG. **1**.

DESCRIPTION OF PREFERRED EMBODIMENT

[0023] FIGS. **1** to **3** show a supporting structure **10** which is arranged to support geological sample drilling equipment (not shown). The supporting structure **10** includes a circular platform **12** which is supported by four legs **14**. The legs **14** are evenly spaced around a periphery of the platform **12**.

[0024] Referring to FIG. **2**, it can be seen that the key structural element of the supporting structure **10** is a substantially circular force transferring ring **16**. In the embodiment of the drawings, the ring **16** is formed by two circular C-channel members, an inner member **18** having the channel opening inwardly with the web defining an outer diameter, and an outer member **20** having the channel opening outwardly, with the web defining an inner diameter. The respective webs of the inner and outer members **18**, **20** are joined by suitable means such as bolts.

[0025] Each of the legs **14** is formed from a plurality of cylindrical modules **22**. Each of the modules **22** has an upper flange and a lower flange, allowing adjacent modules to be bolted to each other. The length of the legs **14** can thus be determined by the number and size of modules used to form leg **14**. An upper module **22***a* of each leg **14** is fixed to the ring **16**. A lower module **22***b* of each leg **14** has a foot **24** extending outwardly there from.

[0026] Each foot **24** is mounted on a shaft **26** which is arranged to move under hydraulic power into or out of the respective lower module **22***b*. The effective length of the shaft **26** can thus be readily adjusted.

[0027] The platform **12** has two parts, a circular rotatable portion **30** and a fixed annular portion **32**.

[0028] The circular rotatable portion **30** includes a level surface **34** which is supported by a framework **36**. The framework **36**, best seen in FIG. **4**, includes a plurality of roller couplings **38** spaced about its circumference. The roller couplings **38** are arranged to receive rollers (not shown), which locate with a track defined by the ring **16** and permit rotation of the circular rotatable portion with respect to the ring **16**.

[0029] The circular rotatable portion **30** also includes a releasable fixing means in the form of a plurality of brakes **40**. The brakes **40** are mounted to the framework **36**, and are selectively operable with the ring **16**. When the brakes **40** are engaged with the ring **16**, the circular portion **30** is restricted from rotating relative to the ring **16** and the legs **14**. When the brakes **40** are not engaged with the ring **16**, the circular portion can freely rotate relative to the ring **16**.

[0030] The fixed annular portion **32** includes a level surface **50** which is co-planar with the level surface **34** of the rotatable portion **30**, and which extends around the rotatable portion **30**. The level surface **50** is secured to the ring **16** by means of a supporting framework **52**. The supporting framework **52** includes a plurality of radial supports **54**, with adjacent radial supports **54** connected by an outer connecting member **56**. A level surface **50** is formed from a number of interlocking sections, with each portion of the level surface **50** being supported between adjacent radial supports **54** by a single connecting member **56**. It is thus possible to remove a single section of the level surface **50** without affecting the remainder of the level surface **50**.

[0031] In the embodiment of the drawings, each section corresponds to a 45° curvature of the annular portion **32**. In use, the supporting platform **10** may be assembled on site. Each of the components described above is formed from readily connectable parts, each of which can be carried manually.

In order to carry out a drilling operation at a desired site, an assessment is first made of the site in order to choose the most appropriate locations for the feet **24** to be firmly supported. Once these locations are determined, the legs **14** are each constructed such that the ring **16** connecting their upper modules **22***a* is substantially horizontal. This will require choosing a suitable type and number of modules **22** for each leg **14**. In order to make the platform **12** perfectly horizontal, some hydraulic adjustment of each foot **24** within its lower module **22***b* may be required.

[0032] The platform **12** can then be assembled onto the ring **16**, and drilling equipment placed upon the circular rotatable portion **30**.

The rotatable portion **30** is then rotated to bring the drilling equipment to its desired angular position. This will involve the drilling equipment being directed to drill ostensibly through the fixed annular portion **32**. In order to allow drilling to proceed, the relevant section of the annular portion **32** can be removed. Where drilling is required within the radius of the ring **16**, a portion of the circular rotatable portion **30** may be similarly removed.

[0033] Prior to drilling the brakes **40** may be engaged, to ensure that the platform **12** remains rigid.

[0034] When drilling at that location has been completed, the section of the annular portion **32** can be replaced, and the brakes disengaged. The rotatable portion **30** can then be rotated to bring the drill to another desired angular location, and the above process repeated.

[0035] It will be appreciated that drilling can therefore take place with the drilling equipment supported sufficiently highly from the ground that the only impact to the environment, other than where the drill is penetrating the ground, is beneath the feet **24**. It is envisaged that this will reduce the local ground disturbing footprint from within the order of 30 m^2 to within the order of 1 m^2.

[0036] It will be appreciated that although the supporting structure has been described for use in relation to drilling, it may have other valuable uses. For instance, it may provide a landing site for a helicopter which is both safer and has a smaller environmental impact than landing pads currently in use. Other uses and advantages will be apparent to a skilled user.

Modifications and variations as would be apparent to a skilled addressee are deemed to be within the scope of the present invention.

1. A supporting structure for geological sample drilling equipment, the structure comprising a platform on which geological sample drilling equipment can be positioned, and a plurality of legs, at least some of which are of variable length, which support the platform above the ground, in use.

2. A supporting structure as claimed in claim **1**, wherein each of the legs is of variable length.

3. A supporting structure as claimed in claim **1**, wherein the platform of the supporting rig includes a rotatable portion on which the drilling equipment may be positioned, the rotatable portion being able to rotate relative to the position of the legs.

4. A supporting structure as claimed in claim **3**, wherein the rotatable portion rotates about an axis substantially parallel to an elongate direction of the legs.

5. A supporting structure as claimed in claim **3**, wherein the platform has two parts, an annular fixed portion and a circular rotatable portion, located centrally within the annular portion.

6. A supporting structure as claimed in claim **5**, wherein the annular fixed portion is comprised of a plurality of independently removable sections.

7. A supporting structure as claimed in claim **5**, wherein the supporting structure includes a substantially circular force transferring ring, on which the legs and annular portion are fixed and which supports the rotatable portion.

8. A supporting structure as claimed in claim **7**, wherein the force transferring ring includes a track in which supporting rollers for the rotatable portion are located.

9. A supporting structure as claimed in claim **3**, wherein the rotatable portion includes releasable fixing means, such that when the fixing means is in a first position the rotatable portion is able to rotate relative to the fixed portion, and when the fixing means is in a second position the rotatable portion is restricted from rotation relative to the fixing means.

10. A supporting structure as claimed in claim **1**, wherein each leg of variable length has more than one mechanism for varying its length.

11. A supporting structure as claimed in claim **10**, wherein the legs are modular, and are formed from a plurality of modules arranged to be coupled together in order to change the leg length by a discrete amount.

12. A supporting structure as claimed in claim **10**, wherein the legs include a continuously variable adjustment means.

13. A supporting structure as claimed in claim **12**, wherein the continuously variable adjustment means comprises feet which can be extended from or withdrawn in to the legs by hydraulic control.

14. A method of locating geological sample drilling equipment for use, the method including the steps of providing a supporting structure for the drilling equipment, the structure comprising a platform having a rotatable portion on which the drill rig can be positioned, and a plurality of legs, each of variable length, which support the platform above the ground; positioning a drill rig on the rotatable portion, and rotating the portion such that the drill rig is oriented in a desired direction.

15. A method of locating geological sample drilling equipment as claimed in claim **14**, where the structure is provided by positioning feet of the platform legs at desired locations, adjusting the length of the legs to desired heights and then installing the rotating portion of the platform atop the legs.

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