

CONSTRUCTION PLATFORM APPARATUS AND METHOD OF INSTALLATION THEREOF

The invention relates to a construction platform apparatus for installation in a building structure and methods of installation thereof. The invention has particular,
5 but not exclusive, application in facilitating construction and maintenance procedures in, for example, elevator shafts, building atriums, and on building structure external surfaces.

For the avoidance of any doubt, it is clarified that application of the techniques
10 disclosed herein is not limited to land-based building structures. For instance, the construction platform apparatus and method described herein may be equally applicable in the construction and/or maintenance of other “building structures” such as a ship or other ocean-going vehicles (or structures thereon/therein), whether carried out in dock or while at sea.

15 Current practice for installation of construction platforms in building structures under construction and/or maintenance usually results in lengthy and complex procedures given, for example, the logistics and health and safety concerns posed any time human workers have to work at height. It is usually necessary to install a
20 temporary construction platform using, for example, a scaffold or a construction site elevator or the like. However, installation times for these structures tend to be lengthy and, once installed, the ability to modify these – for, say, changing conditions on site as construction develops – may be somewhat limited.

25 The invention is defined in the independent claims. Some optional features of the invention are defined in the dependent claims.

Significant technical benefits may be realised with a construction platform apparatus and/or method of installation thereof as described herein. For instance, such a
30 construction platform apparatus may provide a mobile, compact and stable working

platform which can be easily assembled and disassembled for use when desired to access, say, an elevator/lift shaft, building atrium, building structure external surface or the like, whether on land or in an ocean-going vehicle. Such a construction platform apparatus can be easily assembled by a small team from a location inside
5 the building structure, and offers a working platform surface to allow for complete repair, maintenance and installation without the need for dangerous tipping over or reaching by the user.

When we talk about “internal” and “external” in the context of using the platform in
10 say a building atrium, the “internal” area can be considered to be the area in which the support structure is erected, and the “external” area can be considered to be the volume in which the platform is disposed.

Additionally, such a construction platform apparatus may allow for construction or
15 maintenance procedures in which it is not required to install connector means (e.g. bolts or other fixings) to the building structure, thereby saving for the time and providing permanent disfiguration or marring of building structure surfaces at or adjacent the construction platform apparatus area of installation. Further, the construction platform apparatus may be installed without the need of an external
20 crane, for example a construction tower crane or other hoisting gear modules. Yet further, as the platform can be transported along the transport structure – e.g. up and down in the vertical direction, it is possible for construction and/or maintenance workers to be able to operate from the platform at varying heights relative to the apparatus support structure. Therefore, this may facilitate a greater working area
25 that can be reached from the platform without the need of having to move the support structure.

In an additional advantage, only shorter lengths of rack may be necessary when compared with conventional rack and pinion systems that require the entire length
30 of the rack railway to be seated on the ground. Hence a construction platform

apparatus as described herein can be installed in a suspended position anywhere in the building structure.

The entire rack weight can be reduced significantly to increase its mobility during
5 system installation because of the enhanced flexibility afforded on-site because the rack and railway length is easily variable.

In one arrangement, it is possible to hold the platform stationary relative to the support structure meaning that the rack railway can be slid freely relative to the
10 stationary platform and support structure.

The invention will now be described, by way of example only, and with reference to the accompanying figures in which:

Figure 1 is a perspective diagram illustrating an exemplary construction platform
15 apparatus assembled and installed in a building structure;

Figure 2A is an exploded perspective diagram illustrating components of an exemplary construction platform apparatus;

Figure 2B is a schematic elevational diagram illustrating an exemplary construction platform apparatus installed in a building structure;

20 Figure 3 is an exploded perspective diagram illustrating components of an exemplary support structure for a construction platform apparatus;

Figure 4 is an exploded perspective diagram illustrating components of an exemplary transport structure for a construction platform apparatus;

Figure 5 is an exploded perspective diagram illustrating components of an exemplary
25 platform assembly for a construction platform apparatus;

Figure 6 is a series of views illustrating exemplary mounting and transport arrangements for the mounting of the platform assembly on a transport structure;
and

Figure 7 is a detailed perspective view of a platform retainer bracket.

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Referring first to Figure 1, a construction platform apparatus generally referred to by 100 is illustrated in perspective view. Construction platform apparatus 100 is installed in a building structure generally referred to by 102, and having an internal portion 104. In this example, internal portion 104 comprises a floor section internal to the building structure. Building structure 102 also comprises an “external” surface 106, external to the internal portion 104. In this respect, it is to be noted that in this context, “external” does not necessarily mean outside of the building structure. In the arrangement of Figure 1, external surface 106 is a wall surface of an elevator shaft (or elevator riser) which itself is internal to a building structure, where the internal portion of the building structure opens out into the elevator shaft through aperture or opening 108, which is in this example, a door frame of the elevator shaft. It will be appreciated that the construction platform apparatus 100 can be used in other elevator risers, such as those used for inspection lifts on, for example, an external façade of a building structure, or in an open atrium internal to a building structure as commonly seen in large hotels, ships and the like. Additionally, the mobile construction platform can be used for construction and/or maintenance on any building structure external surface – i.e. a surface open to the elements – of the building structure, not only on elevator risers.

The various components of construction platform apparatus 100, a method of installation thereof, and a method of operation thereof will become apparent from the following discussion, starting with Figure 2.

Figure 2A, as mentioned above, is an exploded perspective view illustrating a number of components of this exemplary construction platform apparatus. Construction platform apparatus 100 comprises a support structure 200, itself made up of a number of component parts with an exemplary arrangement therefor illustrated in and described below with reference to Figure 3. Construction platform apparatus 100 also comprises a transport structure 202, itself made up of a number of component parts with exemplary arrangements therefor illustrated in and

described below with reference to Figures 4 and 6. Construction platform apparatus 100 also comprises a platform 204, itself made up of a number of component parts with an exemplary arrangement therefore illustrated in and described below with reference to Figures 5 and 6.

- 5 Construction platform apparatus 100 may also be provided with rack stand 206. Construction platform apparatus 100 may also be provided with tension restraint member 208.

Figure 2B provides a schematic elevation diagram of construction platform apparatus 100 when installed in a building structure adjacent to an aperture 108 – in this example, an elevator doorway – opening into an elevator riser.

As noted above, the exemplary component parts, a method of installation and a method of operation will be described in further detail below. But, in summary, it is worthwhile noting that, as described herein, there is provided a construction platform apparatus 100 for installation in a building structure. Construction platform apparatus 100 comprises a support structure 200 comprising: a restraint member 304 (best viewed in Figure 3) for locating against a first internal portion 212 of the building structure thereby to restrain the construction platform apparatus 100 against rotation about a fulcrum F1. Construction platform apparatus 100 also comprises a support structure bracket 300 (best viewed in Figure 3) for disposal on a second internal portion 104 of the building structure. A transport structure 202 (best viewed in Figure 4 and Figure 6) is provided for disposal on an external portion 106 of the building structure, the transport structure 202 being arranged for fixing to the support structure bracket 300 through a building structure aperture 108. Platform 204 comprises an actuator 532 (best seen in Figures 5 and 6) operable to transport the platform 204 along the transport structure 202 in, in this example, the directions 210.

A method of installing a construction platform apparatus 100 – the apparatus comprising a support structure 200; a restraint member 304; a support structure bracket 300; a transport structure 202; and a platform 204 comprising an actuator 532 – in a building structure will also be described. Generally speaking, the method

5 comprises positioning the support structure 200 at least partially internal to the building structure; locating the restraint member 304 against the first internal portion 212 of the building structure to restrain the construction platform apparatus 100 against rotation about a fulcrum F1; disposing the support structure bracket 300 on a second internal portion 104 of the building structure; disposing the transport

10 structure 202 on an external portion 106 of the building structure and fixing the transport structure 202 to the support structure 200 through a building structure aperture 108; and arranging the platform for the platform to be transported along the transport structure by the actuator.

15 Thus, the exemplary construction platform apparatus 100 illustrated offers significant technical benefits. For instance, the platform can be installed for operation on a façade 106 “external” from “internal” the building structure. Also, and as noted above, the restraint member (or restraint members) 304 are provided for locating against a first internal portion 212 of the building structure. In this

20 exemplary arrangement, the first internal portion 212 is the soffit projecting down towards the floor portion 104 from the ceiling 214. As shown, in this example, the restraint member(s) 304 extend from bracket 300 in a non-vertical orientation at an angle θ from vertical, although other arrangements are possible. For instance, the restraint member(s) 304 may extend from bracket 300 in a vertical

25 orientation to locate against another internal portion of the building structure, such as ceiling corner 216 from where the soffit extends. Provision of the restraint member (or restraint members) 304 for locating against first internal portion 212 of the building structure restrains construction platform apparatus 100 from rotation in direction 218, generally downwards and back in the direction towards the external

30 surface portion 106b, about fulcrum F1. Construction platform apparatus 100 will

naturally tend to rotate about fulcrum F1 in direction 218, especially if workers (not shown) or any other load is disposed upon the platform 204. By locating the restraint member(s) 304 against first internal portion 212, this provides, at least in part, the restraining action and also restrains the components of construction platform
5 apparatus 100 internal to the building structure from rotating about fulcrum F1 in direction 220, generally upwards and towards aperture 108.

Further, with the provision of an actuator (not shown in Figure 2) in the platform, where the actuator is operable to transport, for example, drive, the platform along
10 the transport structure in the directions 210, it is possible to vary the elevation of the platform with respect to the building structure. Thus, a greater range of construction and/or maintenance operations may be undertaken while the support structure 200 remains stationary within the building structure.

15 Referring to Figure 3, the support structure 200 will now be described in more detail. Support structure 200 comprises a support structure bracket 300, also known as a "platform sliding bracket". Support structure bracket 300 is arranged for disposal on a flat or generally flat surface 104 internal to the building structure, as depicted in Figure 1 and Figure 2. Support structure 200 further comprises one or more
20 compression props 302 and one or more restraint members 304.

In the ensuing discussion, a number of components of the support structure 200, the transport structure 202 and the platform 204 are provided in pairs, such as having two compression props 302 and two restraint members 304. However, it will be
25 appreciated that other numbers of these components may also be employed, including one of any or all of the components, although these may be sized and arranged to cater for the anticipated mechanical loads the platform apparatus will be subjected to.

In the example of Figure 3, support structure bracket 300 is arranged in a generally rectangular configuration having first receiving members 306 – the function of which will be discussed shortly – arranged in parallel formation, generally aligned or parallel with the direction of extension of the platform 204 through or from aperture 108. The generally rectangular configuration of the support structure bracket 300 is completed by connecting bracket members 308 running in a direction orthogonal, or generally orthogonally, to the direction of extension of the first receiving members 306 so that, when viewed in plan, the two member pairs 306, 308 form a rectangular shape. Typically, during installation, the connecting bracket member 308 for disposal closest to aperture 108 will be positioned at or adjacent floor edge 108a (see Figure 1) and oriented in parallel or generally parallel alignment therewith.

First receiving members 306 each comprise a first end 310 and a second end 312, with the second ends 312 been for disposal at or adjacent aperture 108 and floor edge 108a. The first receiving members 306 each comprise pin or bolt holes 314. First receiving members 306 are arranged for receiving, at their first ends 310, sliding frame members 316, in this example first ends 318 thereof. In the example of Figure 3, first receiving members 306 are generally hollow, having internal bore dimensions larger than the external bore dimensions of the sliding frame members 316. The sliding frame members 316 are each slid into the first ends 310 of first receiving members 306, then slid all the way through so that they extend, at least partially, out of the second ends 312 of the first receiving members 306, and through aperture 108 to connect with the transport structure 202 as will be described with reference to Figure 4. That is, it will be appreciated that the support structure bracket 300 comprises a first receiving member 306 for receiving a sliding frame member 316, the sliding frame member 316 being for sliding through the first receiving member 306 and extending beyond an end 312 of the support structure bracket 300 arranged for disposal towards the building structure aperture 108 for the transport structure 202 to be fixed to the sliding frame member 316.

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Sliding frame members 316 each comprise pin or bolt holes 320 for alignment with the pin or bolt holes 314 in the first receiving members 306. Once aligned, pins or bolts (not shown) are inserted therethrough to retain the sliding frame members 316 fixed relative to the first receiving members 306. Of course, other arrangements for the construction of the bracket, including other sliding arrangements – where one member slides relative to another – are also possible.

At the first end 312 of the first receiving members 306, there are provided platform stopper members 322. These are downward facing members, projecting downwards from the support structure bracket 300, and may be members which are arranged for fixing on to the first end 312, or, say, integrally cast with the first receiving members 306. The platform stopper members 322 are intended for disposal parallel to “external” surface 106b (see Figure 1) and comprise holes for receiving position stoppers 324 which are pins or bolts (or other fixings). The position stoppers 324 extend through these holes to abut against surface area 106b, although it is possible also for the position stoppers to be fixed to fixing points (not shown) at surface area 106b. Positioning of these position stoppers 324 contribute to retaining support structure bracket 300 securely.

Coming back to the compression props 302, these are, in this example, mounted on support structure bracket 300, such as by means of their own fixing brackets 326, mounted on or fixed to first receiving members 314. The compression props 302 are compressible to facilitate the fixing of the restraint members 304 against the, for example, soffit as illustrated in Figure 2B. Fixing brackets 326 are installed at a suitable position along the length of the first receiving members 306 but, advantageously, are provided at or near the second ends 312 of the first receiving members 306. In this way, the compression props may extend vertically upwards, for fixing to the restraint members 304 as described below.

Referring to the rack stand 206 illustrated in Figure 2A, the members of the rack stand may be fixed at their bottom ends to the fixing brackets 326 as well, and then fixed to the transport structure 202 as described below with reference to Figure 4. The rack stand 206 provides extra vertical support during the first installation,
5 helping with the alignment but having a main function to fix the angle of the vertical direction of compression props 302 at 90 degrees.

Restraint members 304 are, in this example, mounted on support structure bracket 300, such as by means of their own fixing brackets 328, mounted on or fixed to first
10 receiving members 314. Fixing brackets 328 are installed at a suitable position along the length of the first receiving members 306 but, advantageously, are provided at or near the first ends 310 of the first receiving members 306. In this way, the restraint members 304 may extend at a suitable non-vertical angle θ as illustrated in Figure 2B, for the compression props to be fixed thereto.

15 Support structure bracket 300 may also be provided with adjustable base jacks 330 which can be installed and adjusted to account for any uneven surfaces on the internal portion 104 of the building structure.

20 The restraint members 304 are comprised of main props 332 and adjustable (telescopic) jacks 334 for locating against the (second) internal portion of the building structure, such as portion 212 illustrated in Figure 2B, omitted for the sake of clarity from Figure 3. In one exemplary arrangement, adjustable telescopic jacks 334 are provided with angled members 336 having surfaces arranged at around 90
25 degrees to one another complementing the external right-angled surfaces of the soffit 212 so as to restrain the construction platform apparatus as described above with reference to Figure 2B.

In at least one arrangement, the main props 332 are provided with brackets 338 for
30 a tension hanger bar 340 to be fixed thereto. Tension hanger bar 340 provides

additional mechanical support, maintaining the main props 332 secure in their desired spaced relationship.

In at least one arrangement, the main props 332 are provided with brackets 342 for
5 the upper ends of the compression props 302 to fix onto. As perhaps best seen in Figures 1 and 2, the support structure bracket 300, the compression props 302 and the restraint members 304 when installed and fixed together as described above, may form a generally rectangular arrangement when viewed in elevation.

10 Tension restraint member 208 has a first end 344 for fixing to support structure 200 at, for example, the brackets 342 fitted on the main compression props. The second ends 346 of tension restraint member 208 may be fitted to the transport structure 202, which will now be described with reference to Figure 4. That is, the construction platform apparatus 100 may also comprise a tension restraint member 208 arranged
15 for fixing at a first end 344 to the support structure 200 and for fixing at a second end 346 to the transport structure 202.

Figure 4, as mentioned above, is an exploded perspective diagram illustrating components of an exemplary support structure for a construction platform
20 apparatus, such as the one of Figure 1. Transport structure 202 is, in this example, basically a “rack railway” along which the platform 204 may travel, as mentioned above with reference to Figure 2B. Thus, this “rack railway” comprises two extended member assemblies, which extend parallel to one another along the “external” surface (which may be as defined above with reference to Figure 1) 106 of the
25 building structure. A number of the component parts of the rack railway will be described in more detail with reference to Figure 6, but for now, it is sufficient to say that the rack railway comprises a series of brackets which facilitates fixing of the rack railway in a number of ways. For instance, the transport structure 202 comprises a first pair of brackets 400 where the first ends 318 of the sliding frame members 316
30 may be affixed to. That is, this first brackets 400 allows the transport structure to be

affixed to/mounted on the support structure bracket 300 as described above and as will also be described below with reference to Figure 7 (and an alternative arrangement will also be described with reference to this Figure 7). Therefore, the transport structure 202 is held stationary by its fixing to the first density hundred
5 and 18 of the sliding frame members 316 of the support structure bracket 300.

Transport structure 202 comprises a second pair of brackets 402 to which rack stand 206 may be affixed, therefore also providing further structural support as the rack stand 206 may also be fixed to support structure bracket 300 as described above
10 with reference to Figure 3.

Transport structure 202 comprises a third pair of brackets 404 for the second end 346 of tension restraint member 208 to be fixed to.

15 Transport structure 202 comprises a rack 406 – hence the label “rack railway” portions of which are shown projecting from an internal elongate member 408 of the transport system. In a preferred arrangement, the rack 406 is welded to the internal elongate member 408. This internal elongate member 408 is described in more detail with reference to Figure 6, particularly Figure 6B. For now, it is sufficient
20 to say that this is generally disposed at least partially within an external elongate member 410. Series of modular lengths of the internal and external elongate members 408, 410 may be provided to make up the length of the transport structure as desired.

25 In this context, the use of “internal” and “external” with respect to these elongate members 408, 410 is intended simply to convey the meaning that the members 408 are partially surrounded by the members 410, with the members 410 having an opening slot therein for the rack 406 to extend through.

A tubular pipe coupler 412 may be provided for further structural reinforcing, particularly to assist with maintaining the desired spacing between the individual “rack rails” – the series of members 408, 410 – which make up the rack railway of the transport structure. The tubular pipe coupler may be fixed to/mounted on the
5 rack rails through the coupler rack ties 414.

Wall mounted rack ties 416 are provided to space the rack rails from, and support the rack rails on, the external wall portion 106. These may be magnetic or electromagnetic for temporary fixing to magnetic parts of the external surface 106.
10 The wall mounted rack ties may provide an additional benefit in that, where site circumstances allow, the rack stand 206 may not be necessary as the wall mounted rack ties may provide sufficient support during the installation process. Alternatively, and where circumstances require, the wall mounted rack ties may be arranged for fixing to external portion 106 using, for example, bolts or the like. Otherwise, and as
15 mentioned above, construction platform apparatus 100 may be installed without the need for any other bolt or bolt-like fixings. An adjustable rack railway jack 418 is provided. This is an adjustable jack for stabilising the real rack in a lift shaft mounted from wall to wall. In this arrangement, the wall mounted rack ties do not need to be fixed to the external surface 106.

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Referring to Figure 5, the platform assembly 204 is now described in more detail. Platform assembly 204 comprises a support frame made, in this example, from two parts: a support frame part A 500 and a support frame part B 502. Platform 204 further comprises a pair of platform restraint members 504, each of which may be
25 referred to as a “pinion slider”, and described in more detail below with particular reference to Figure 6.

The platform restraint members (pinion sliders) 504 are each provided with tension hanger brackets 506 and pinion slider brackets 508 on which the platform part A 500
30 may be fixed/mounted at the first ends 510 of platform part A 500. The method of

assembly and construction of the support frame parts 500, 502 are, in this example, similar to the construction and assembly of the support structure bracket 300 described above with reference to Figure 3 but, of course, other arrangements are also possible. In this example, the elongate members of platform part A 500 extending away from aperture 108 have second ends 512 for receiving the first ends 514 of the elongate members of the platform part B 502. That is, the internal bore dimensions of the elongate members of the platform part A 500 are greater than the external bore dimensions of the elongate members of the platform part B 502 so that the elongate members of the platform part B 502 may be received within the elongate members 500. But of course, other arrangements are possible for the construction of the platform frame 500, 502, including other sliding arrangements.

The elongate members of the platform part B 502 have second ends 516 and tension hanger brackets 518 may be mounted at or near these ends 516.

As also with the support structure bracket 300, the platform frame parts A and B may be provided with pin or bolt holes 520, 522 which are aligned and pins or bolts inserted therethrough to retain the parts A and B fixed relative to one another.

Platform 204 is provided with platform deck portions 524 resting on and/or fixed to either or both of the platform frame parts A and B. These platform deck portions 524 form the platform surface area upon which workers may work and/or loads may be disposed.

As noted above, tension hanger brackets 506 are provided on the platform restraint members (pinion sliders) 504. Also, tension hanger brackets 518 are provided on the platform support frame part B. Tension rods 526 having first and second ends are fitted to platform 204, with the ends of the tension rods 526 being fitted respectively to the brackets 506 and 518. Thus, with the tension rods 526, the platform 204 may be a cantilever platform. Thus, the cantilever action also assists to restrain the

platform 204 from rotation in downwards direction 218 about fulcrum F2, and external surface portion 106b, as viewed in Figure 2B.

It is perhaps best seen in Figure 6C – and will be described in more detail with reference to that figure – but platform 204 is provided with one or more pinions 528 having teeth for engaging with teeth of the racks 406 of the transport system. The pinions 528 are mounted on a pinion shaft 530 which in turn is fixed to or mounted on the pinion slider brackets 508 described above. Platform 204 is also provided with an actuator 532 mounted on an actuator shaft 534. The actuator 532 comprises a gear 536 arranged to drive a pinion shaft gear 538 mounted on the pinion shaft 530. Thus, an actuator such as an electric motor can be provided to drive the pinion which in turn causes the platform to be transported along the rack 406 of the transport system 202, thereby displacing platform 204 and allowing its height to be varied relative to the building structure.

Figure 6 provides more detail relating to the manner in which the platform restraint member (pinion slider) operates, and also more detail concerning the mounting and arrangement of the platform actuator and pinion. Looking first at Figure 6A this provides a perspective view of some components of the platform 204, including the tension hanger brackets 506 and the pinion slider brackets 508 of the platform restraint member 504 mounted with the rack railway of the transport system 202. Figure 6B provides a sectional detail of the internal elongate member 408, external elongate member 410 of the transport system 202 and a part of the tension hanger bracket 506.

In this example, the internal elongate member 408 is of a circular or generally circular cross section, but other arrangements are possible. The internal elongate member 408 may be solid or at least partially hollow, although a hollow or partially design may be preferred to keep manufacturing costs low, and to minimise the load burden on the construction platform apparatus, as long as sufficient mechanical

strength may be provided. External elongate member 410 has a first portion 410a which is also circular or generally circular in cross-section which is hollow to surround partially the internal elongate member 408, with an internal bore dimension of the hollow section being just greater than an external bore dimension of the internal elongate member 410, so that there is a complementary fit. (A gap is shown between the internal bore of portion 410a and the external bore of member 408 purely for illustrative purposes. It will be realised that a snug complementary fit will be preferred.) External elongate member 410 also has at least one second portion 410b, of generally rectangular cross-section projecting from the first portion 410a. In this example, the external elongate member 410 has two second portions 410b, each extending in opposing directions from the first portion 410a. These opposing directions are generally transverse the direction of extension of the platform part A members 500.

The external elongate members 410 may be provided with a first surface portion 602, which in this example is made up of any or all of the surfaces 602a, 602b, 602c, three of the external surfaces of the generally rectangular second portion 410b. The inner surfaces (faces) 602d of the generally rectangular second portion 410b define a gap 600 through which the rack 406 extends.

In this example, surface 602a of the generally rectangular second portion 410b faces generally in a direction 604 towards the internal portion of the building structure, and in the direction of the aperture 108.

In this example, the rack 406 is mounted on a first surface portion 606 of the internal elongate member 408, with the first surface portion 606 – and, thereby, the rack 406 – extending generally in a direction 607 opposite direction 604, away from the internal portion of the building structure and away from the direction of the aperture 108. That is, the platform restraint member 504 comprises a first surface portion 610a for contacting with a first surface portion 602a of the transport

structure 202, the first surface portion 602a of the transport structure 202 being arranged for disposal facing in a direction 604 generally towards the building structure, the first surface portion 610a of the platform restraint member 504 being complementary to the first surface portion 602a of the transport system 202.

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Further, it will be appreciated that the transport structure 202 comprises a second surface portion 606 disposed facing in a direction 607 generally away from the first surface portion 602a of the transport structure 202, the second surface portion 606 of the transport structure 202 comprising a rack 406 for engagement with a pinion 528 on the platform 204, the actuator 532 of the platform 204 being operable to drive the pinion 528 thereby to transport the platform 204 along the transport structure 202.

As mentioned, a part of the tension hanger bracket 506 is also illustrated in Figure 6B. This part comprises a generally C-shaped section 608, which may be provided with a first surface portion 610, which in this example is made up of any or all of the surfaces 610a, 610b, 610c, the three internal surfaces of the C of the C-shaped portion.

A similar lower pinion slider bracket C-shaped section 612 is provided on the pinion slider brackets 508 to which the platform support frame part A 500 is fixed/mounted. The C-shaped section 612 of the pinion slider brackets 508 has its own "internal" surface(s), in this example, internal surfaces 614c, 614c, 614c which may be similarly sized and shaped to the bracket portion 608 of the tension hanger bracket 506. Tension hanger bracket 506 and pinion slider bracket 508 are joined by an elongate member 507, with the two brackets 506, 508 and elongate member 507 forming the platform restraint member 504, in one particularly simple form thereof.

With the action described above with reference to Figure 2B, restraining the tendency of the platform to rotate in direction 218 about fulcrum F2, surface 610a of

C-shaped section of the pinion slider bracket 508 will be urged against surface 602a of the generally rectangular portion of the elongate member 410, with the elongate member 410 – e.g. the generally rectangular section thereof – providing a load-bearing function for the tension hanger bracket 506 and the pinion slider bracket

5 508. In some arrangements, these surfaces are smooth – or at least relatively smooth – allowing them to slide over one another with minimal, or at least acceptable, friction so that the platform restraint member – also known as the pinion slider – may slide along the rack railway/transport system 202, under the driving force of the actuator 532. That is, the construction platform apparatus 100

10 further comprises a platform restraint member 504 arranged to interact with the transport structure 202 to restrain the platform against rotation about a second fulcrum F2.

Figure 6C provides another perspective view, with extra detail relating to the

15 actuator and pinion arrangement on platform 204. Elongate member 507 of the platform restraint member 504 may be more clearly seen, and the manner in which it joins the tension hanger bracket 506 and the pinion slider bracket 508. The rack railway/transport system 202 is omitted from this view for the sake of clarity.

20 Pinion slider bracket 508 mounts pinion 528 on pinion shaft 530. Pinion shaft 530 extends from one pinion slider bracket 508 to the other, with ends of the shaft 530 being received/mounted in complementary holes in the brackets 508. Actuator 532 – in this example, an electric motor – is mounted on actuator shaft 534. Actuator shaft 534 extends from one pinion slider bracket to the other as well, with ends of the

25 shaft 534 being received/mounted in complementary holes in the brackets 508. A gear 536 is also mounted on the actuator shaft 534, which interacts and engages with a gear 538 on pinion shaft 530. Thus, operation of the actuator – e.g. the electric motor – operates the gear wheels 536, 538 to rotate the pinion shaft 530 which, in turn, rotates the pinion wheels 528. As mentioned above, the pinion

30 wheels 528 – or, more specifically, teeth thereon – are arranged to engage with

teeth on the rack 406 of the transport system 202. So, when the actuator is reversible, e.g. it is a reversible electric motor – then, depending on the direction of rotation of the actuator, platform 204 may be driven along the transport system 202 in the directions 210 illustrated in Figure 2B. The teeth of the pinion inter-engaging
5 with the teeth of the rack, along with the load-bearing function of the platform restraint member 504 described above may be designed to be sufficient to bear the load of the platform, and any additional load placed thereon.

Figure 7 provides another view of the fixing of the first end 318 of the sliding frame
10 members 316 to the first brackets 400 of the transport structure 202. In an alternative arrangement, the fixing bolts fixing the first end of the sliding frame members 316 to the first brackets 400 removed and, instead, one or more platform retainer brackets 700 is/are provided for retaining the platform 204 stationary relative to the support structure. In one exemplary arrangement, the platform
15 retainer brackets 700 are provided with an aperture 702 through which the first ends 318 of the sliding frame members. Bolts 704 are inserted through the boltholes 706 in the retainer brackets, with the board is also being inserted through holes in the pinion slider brackets 508, thereby retaining the platform 204 fixed relative to the support structure bracket 300. Given that the transport structure 202 rails are no
20 longer fixed relative to the support structure bracket 300, these now may be moved relative to the support structure bracket 300 (and the platform 204) by operation of the actuator. This facilitates installation of the transport structure modular series described above with reference to Figure 4, as the rack rails may be added section by section from adjacent the aperture 108. Thus it will be appreciated that the
25 construction platform apparatus 100 may comprise a platform retainer brackets 700 for retaining the platform 204 stationary relative to the support structure 200.

It will be appreciated that the invention has been described by way of example only. Various modifications may be made to the techniques described herein without
30 departing from the spirit and scope of the appended claims. The disclosed

techniques comprise techniques which may be provided in a stand-alone manner, or in combination with one another. Therefore, features described with respect to one technique may also be presented in combination with another technique.

CLAIMS

1. A construction platform apparatus for installation in a building structure, the construction platform apparatus comprising:
 - 5 a support structure comprising:
 - a restraint member for locating against a first internal portion of the building structure thereby to restrain the construction platform apparatus against rotation about a fulcrum; and
 - a support structure bracket for disposal on a second internal portion
 - 10 of the building structure;
 - a transport structure for disposal on an external portion of the building structure, the transport structure being arranged for fixing to the support structure bracket through a building structure aperture;
 - a platform having an actuator operable to transport the platform along the
 - 15 transport structure; and
 - a platform restraint member arranged to interact with the transport structure to restrain the platform against rotation about a second fulcrum and wherein the platform restraint member comprises a first surface portion for contacting with a first surface portion of the transport structure, the first surface
 - 20 portion of the transport structure being arranged for disposal facing in a direction generally towards the building structure, the first surface portion of the platform restraint member being complementary to the first surface portion of the transport system.
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2. The construction platform apparatus of claim 1, wherein the transport structure comprises a second surface portion disposed facing in a direction generally away from the first surface portion of the transport structure, the second surface portion of the transport structure comprising a rack for engagement with a pinion on

the platform, the actuator of the platform being operable to drive the pinion thereby to transport the platform along the transport structure.

3. The construction platform apparatus of claim 1 or claim 2, wherein the support structure bracket comprises a first receiving member for receiving a sliding frame member, the sliding frame member being for sliding through the first receiving member and extending beyond an end of the support structure bracket arranged for disposal towards the building structure aperture for the transport structure to be fixed to the sliding frame member.

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4. The construction platform apparatus of any preceding claim further comprising a platform retainer bracket for retaining the platform stationary relative to the support structure.

15 5. The construction platform apparatus of any preceding claim further comprising a tension restraint member, the tension restraint member being arranged for fixing at a first end to the support structure and for fixing at a second end to the transport structure.

20 6. A method of installing a construction platform apparatus in a building structure, the construction platform apparatus comprising:
a support structure;
a restraint member;
a support structure bracket;
25 a transport structure;
a platform comprising an actuator; and
a platform restraint member;
the method comprising:
positioning the support structure at least partially internal to the building

30 structure;

- locating the restraint member against a first internal portion of the building structure to restrain the construction platform apparatus against rotation about a fulcrum;
- 5 disposing the support structure bracket on a second internal portion of the building structure;
- disposing the transport structure on an external portion of the building structure and fixing the transport structure to the support structure bracket through a building structure aperture;
- 10 disposing the platform restraint member to interact with the transport structure to restrain the platform against rotation about a second fulcrum, with a first surface portion of the platform restraint member contacting with a first surface portion of the transport structure, the first surface portion of the platform restraint member being complementary to the first surface portion of the transport system, and arranging the first surface portion of the transport structure facing in a direction
- 15 generally towards the building structure; and
- arranging the platform for the platform to be transported along the transport structure by the actuator.