Oct. 7, 1969 D. L. TATE 3,470,663

PEDESTAL UNIT FOR ACCESS FLOORS

Filed May 24, 1968 2 Sheets-Sheet 1

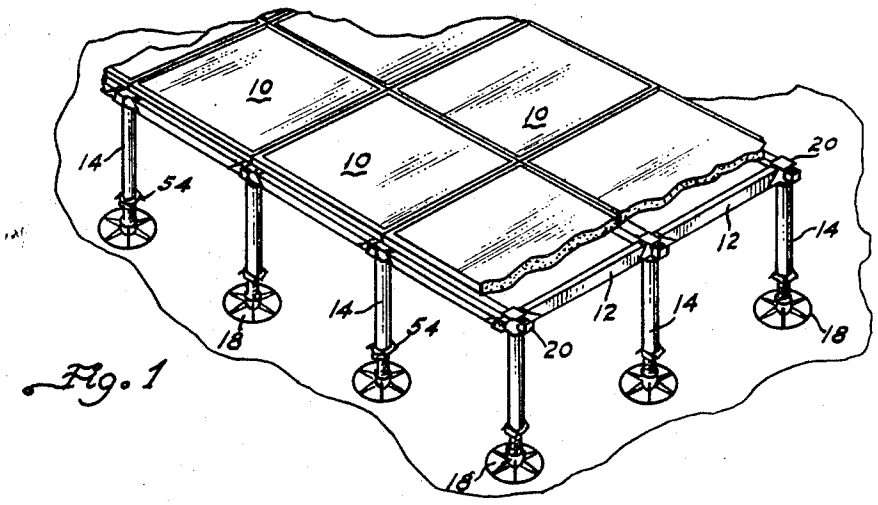

Fig. 1

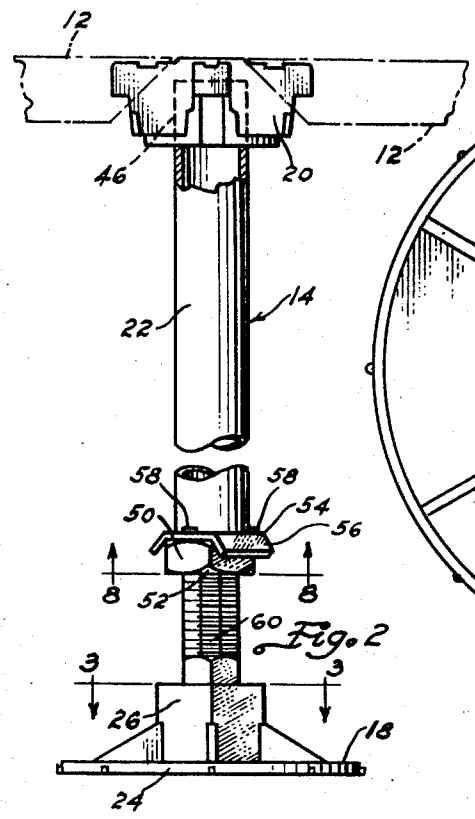

Fig. 2

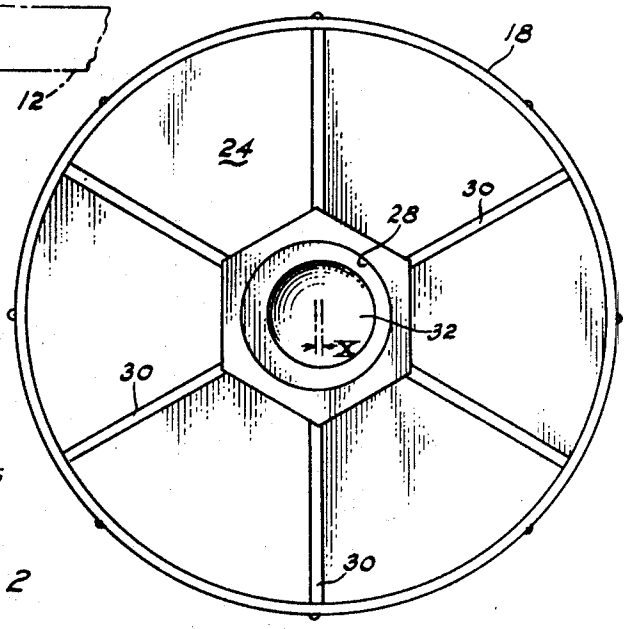

Fig. 3

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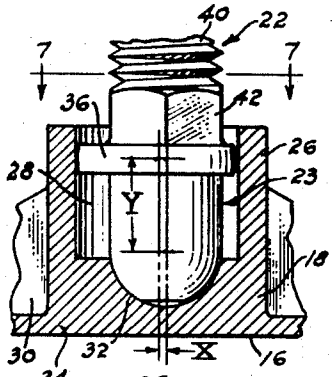

Fig. 4

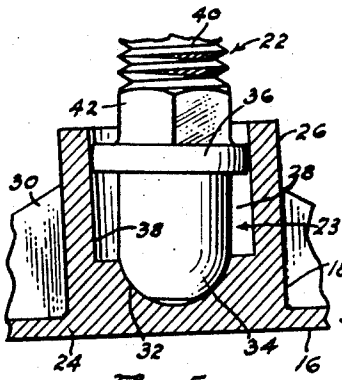

Fig. 5

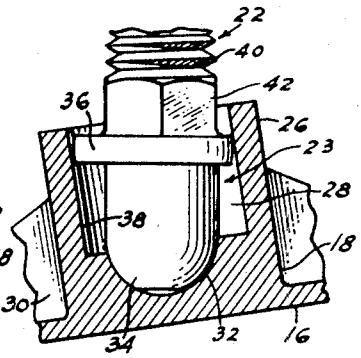

Fig. 6

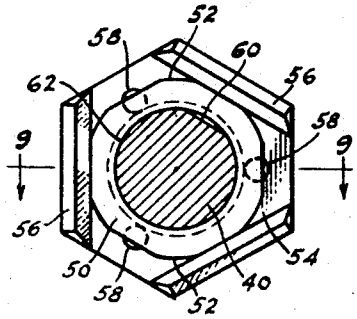

Fig. 8

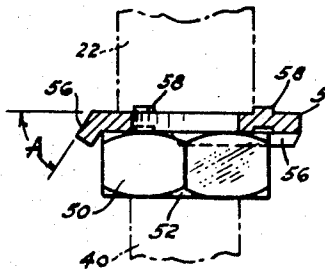

Fig. 9

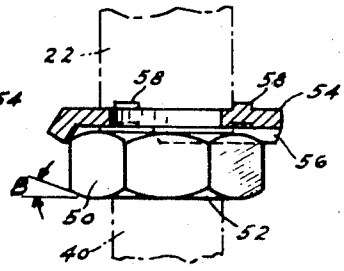

Fig. 10

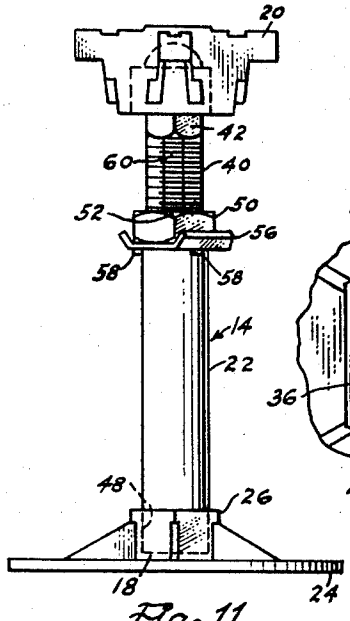

Fig. 11

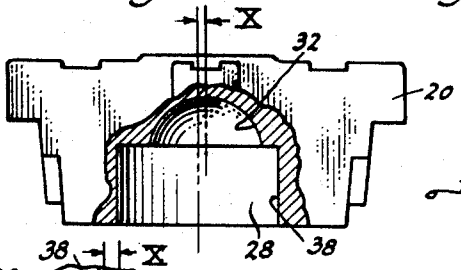

Fig. 12

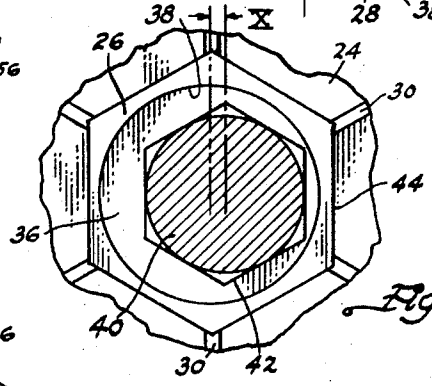

Fig. 7

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3,470,663

PEDESTAL UNIT FOR ACCESS FLOORS

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Int. Cl. E04b 5/43; E04c 3/32
U.S. Cl. 52—126 21 Claims

ABSTRACT OF THE DISCLOSURE

A pedestal assembly to support and accurately align edge portions of adjacent access floor panels within a horizontal plane when a plurality of said pedestal assemblies are employed, each pedestal assembly comprising a base member having a lower surface positionable flatly in engagement with a generally horizontal supporting surface, a cap member engageable with floor panels, interconnecting pedestal-like means extending substantially vertically between said base and cap members, and adjustable means connecting one of said members with respect to one end of said interconnecting pedestal-like means and comprising a pair of transverse segments of spheres connected to said interconnecting pedestal-like means in substantially parallel relationship to each other and transverse to the axis of said interconnecting means and axially spaced apart therealong, perpendicular axes respectively passing through the centers of said transverse segments being parallel to each other and offset laterally and the axis of said interconnecting means being parallel to said perpendicular axes of said segments, and socket means formed in one of said members having surfaces thereon respectively complementary to the peripheries of said transverse segments of spheres and receiving the same for rotatable constant circumferential contact therewith, whereby when said connecting means is rotated about said axis relative to said socket in said one of said members, said axis moves in a compound manner through an infinite number of angular positions relative to said one of said members while moving from and returning to a perpendicular position relative to the plane of said one member so as to position the horizontal plane of said cap member parallel to a plurality of horizontal floor panels supported by a plurality of said pedestal assemblies.

Cross-references to related application

The pedestal assembly comprising the present invention is particularly useful in conjunction with supporting floor panels of the type comprising the subject matter of co-pending application, Ser. No. 529,067, and now Patent No. 3,396,501 and the pedestal assemblies also being adaptable to be supported by supporting surfaces other than sub-floors of buildings, such as bar-joist structures comprising the subject matter of co-pending application, Ser. No. 689,033.

Background of the invention

Access floors are the type which employ a plurality of similar shapes and sizes of rigid floor panels arranged to be supported in spaced relationship to appropriate supporting means below said floor panels, such as a subfloor which frequently is of somewhat uneven nature, though generally horizontal. Various means have been used heretofore to support such floor panels in adjacent, checkerboard relationship with respect to each other, for example, the most common means for this purpose comprising pedestals of various types which are engaged at the upper ends thereof by the corners of a plurality of adjacent floor panels. Another type of supporting means now

employed in conjunction with such floor panels comprises extending stringers in checkerboard relationship between the upper ends of a plurality of pedestal members of the type referred to, whereby the lower extremities of said floor panels engage said stringers so as to partially sustain the load imposed upon the floor panels and thereby supplement the supporting effect afforded by the pedestals.

Due particularly to manufacturing inaccuracies of pedestal members and especially caps and base assemblies thereof, as well as various kinds of unevenness provided in sub-floor supporting surfaces or other supporting means, difficulties have been encountered with respect to accurately positioning the cap members of pedestals within a plane which is precisely parallel to the intended and desired horizontal plane within which all of a plurality of floor panels are to be supported by such pedestal means.

Even in structures where, for example, floor tiles such as asphalt or plastic tiles are to be laid for support thereby, it is not uncommon that, in laying or finishing the floor, particularly where the same is a poured concrete floor, various degrees of unevenness are avoidable only with great difficulty. In contrast to such a surface, when access floors are to be supported by, for example, a poured concrete sub-floor, it is not infrequent that economics dictates somewhat rough finishing of the upper surface of such floors and the degree of roughness or unevenness in the level of the upper surface of the floor largely depends upon the skill or lack of skill of the workman.

Notwithstanding the condition in the upper surface of the means, such as a sub-floor, which is to support access floors comprising a plurality of similar rigid panels, it is imperative that the access floor panels be disposed very accurately and precisely within a common plane that is horizontal. To a certain extent, this can be accomplished by rendering supporting pedestals vertically adjustable. Such vertical adjustability of pedestals, however, does not compensate for the lack of parallelism of the upper surface of the cap of such pedestals precisely with the desired plane within which the panels of such access floor are to be disposed.

In addition to disposing the plane of the cap of a pedestal precisely parallel to the ideal, desired plane within which all of the panels of an access floor are to be disposed, it is further regarded as good principles of engineering to also dispose the axes of the supporting pedestals accurately perpendicular to said plane within which the floor panels are to be disposed, regardless of uneveness and lack of parallelism of the particular supporting surface for the base of the pedestals with respect to the plane in which said access floor is to be disposed accurately.

Summary of the invention

It is the principal purpose of the present invention to provide a pedestal assembly for use in supporting similar rigid panels which are to form an access floor disposed in spaced relationship to a lower, supporting surface, each such pedestal assembly comprising a base member, a cap member, and interconnecting means extending therebetween and having opposite end portions respectively engaging said base and cap members, in combination with adjustable means connecting one of said members with respect to one end portion of said interconnecting means in such manner that by relatively simple means which at most comprise a pair of wrenches, at least portions of said interconnecting means may be rotated about the axis thereof to establish the plane of the cap member in precise parallel relationship to the plane of the access floor within which the panels that comprise the same are to be disposed and supported by said pedestal assemblies,

within reasonable limits of the condition of the supporting surface which is engaged by the base member of such pedestal assemblies.

It is another object of the invention to provide said aforementioned adjustable connecting means in the form of a plurality of transverse, parallel spherical segments which are axially spaced apart and in regard to which axes extending vertically through the centers of said segments are parallel to each other but laterally offset from each other a predetermined, limited amount, said axes being also parallel to the axis of said interconnecting means extending between said base and cap members, and said spherical segments being disposed within complementary socket means formed in either said base member or cap member, as desired, whereby upon rotation of said interconnecting means and spherical segments about the axis of the same, said interconnecting means will be moved through an infinite number of angular positions while moving from and to a precise perpendicular position with respect to the plane of the member within which said socket is disposed in order that when said interconnecting means is in one of said infinite number of different angular positions, the plane of the cap member supported thereby will be precisely parallel to the desired horizontal plane of the access floor to be supported by said pedestal assemblies.

It is a further object of the present invention to form said interconnecting means with a plurality of longitudinally adjustable parts, one of said parts preferably comprising a tubular member and the other comprising a threaded stud closely slidable relative to one end of said tubular member, said spherical segments of said adjustable means being formed preferably on one end of said threaded stud which is received in complementary socket means formed in either said base member or cap member and the other member having an appropriate socket to fixedly receive the opposite end of the tubular member from that which receives said stud.

It is still another object of the invention to provide simple but effective means for longitudinally adjusting the length of the interconnecting means comprising said aforementioned tubular member and threaded stud, whereby it is only necessary to employ a simple form of nut having chamfered corners which cammingly engage angular detents on a washer-like locking member non-rotatably engaged by said threaded stud.

It is a still further object of the invention to selectively dispose said adjusting means between said interconnecting means and base or cap member in such manner that when the socket comprising part of said adjusting means is disposed in said base member, the entire pedestal assembly and especially the interconnecting pedestal-like means may be positioned precisely vertical to the plane of the horizontal access floor which is to be supported by said pedestal assemblies and, conversely, when the socket of said adjustable means is formed in the cap member, said cap member may be quickly and accurately positioned with its plane precisely parallel to the horizontal plane of said access floor, regardless of whether the interconnecting pedestal-like means extending between the base and cap members is precisely perpendicular to the plane of said access floor.

Details of the invention and the foregoing objects, as well as other objects thereof, are set forth in the following specification and illustrated in the accompanying drawings comprising a part thereof.

Brief description of the drawings

FIG. 1 is a fragmentary perspective view of one embodiment of a typical access floor assembly comprising panels supported by pedestal assemblies embodying principles of the present invention.

FIG. 2 is a vertical side elevation of a pedestal assembly embodying the principles of the present invention, the same being interrupted intermediately of its ends to foreshorten the view and portions of the panel supporting means being illustrated fragmentarily in phantom relative to the cap of the assembly.

FIG. 3 is a horizontal sectional plan view of the base of the assembly shown in FIG. 2 as seen on the line 3—3 of said figure.

FIG. 4 is a fragmentary vertical sectional view of the base and part of the adjustable connecting means between the base and pedestal means.

FIG. 5 is a view similar to FIG. 4 but showing the relatively movable parts of the adjustable connecting means in a different rotatable relationship from that shown in FIG. 4.

FIG. 6 is a view similar to FIGS. 4 and 5 but showing the relatively movable parts of the adjustable connecting means in the maximum position of angular disposition between the same.

FIG. 7 is a fragmentary transverse sectional view of the lower portion of the pedestal assembly as seen on the line 7—7 of FIG. 4.

FIG. 8 is a transverse sectional view of locking means for relatively movable parts of the pedestal portion of the assembly as seen on the line 8—8 of FIG. 2.

FIG. 9 is a fragmentary vertical sectional elevation as seen on the line 9—9 of FIG. 8.

FIG. 10 is a view similar to FIG. 9 but showing the locking nut rotated to camming position with respect to the lock washer engageable therewith.

FIG. 11 is a vertical sectional elevation of another embodiment of pedestal assembly from the embodiment shown in FIGS. 2–6 and in which the adjustable connecting means is disposed between the cap and upper end of the pedestal means of said assembly.

FIG. 12 is an enlarged, partially vertically sectional side elevation of the cap member of the embodiment shown in FIG. 11.

Description of the preferred embodiments

Referring to FIG. 1, a typical elevated access floor is illustrated therein. Said floor comprises a plurality of closely positioned, rigid floor panels **10** of uniform size and either rectangular or square in shape. Said panels normally are supported by one of several means, one of said means including rigid stringers **12** which extend between the upper ends of pedestal assemblies **14**, the bases **18** of the assemblies **14** firmly abutting a suitable supporting surface **16** such as a sub-floor. The sub-floor **16**, for example, may be a poured cement floor. However, it also is possible to dispose the bases **18** of the pedestal assemblies **14** along the upper surface or flanges, for example, of beam means, not shown.

Another method of supporting the floor panels is to simply support the adjoining corners of a plurality of such floor panels by the cap **20** of the pedestal assemblies **14**. Under such circumstances, the corners of the panels **10** and the portions of the caps **20** which they engage for support have at least complementary portions readily capable of sustaining the loads imposed upon the caps **20** by machines, furniture, or other forms of load disposed upon the panels **10**. As has been indicated above, one very common and popular use for access floors which employ panels **10** or the like is in conjunction with supporting computer equipment which requires a rather unusual amount of electrical conductor cables and the like to be connected thereto and leading from suitable sources of current.

In order for such rather abnormal quantity of cables to be mounted safely yet conveniently with respect to such machines, the panels **10** are supported in spaced relationship above the supporting surface **16** so that an appropriate space may be provided below the floor panels **10** to accommodate such cables and any other conductors or conduits which may be desired or required. Such electrical conductors are mentioned as only one type of equipment which may be housed within the space between the

floor panels **10** and the supporting surface **16**, whereby the foregoing description is not intended to be restricted to the use of electrical conductors. Actually, the space between the floor panels **10** and supporting surface **16** also may constitute a plenum chamber capable of being used to distribute heating or cooling air, accommodate heating or cooling ducts, or otherwise.

In normal establishments requiring the use of access floors of the type referred to above, it is essential that the floor panels **10** be disposed precisely within a common plane which, under normal circumstances, is substantially exactly horizontal. The panels also must be susceptible individually to being removed when desired for rearrangement of items supported thereby and corresponding rearrangement of conductors of conduits disposed within the space between the floor panels **10** and the supporting surface **16**.

Normally this may be accomplished by suitable implements usually involving suction connections of handles to a selected floor panel which is to be elevated from its normally supported position upon the upper ends of the pedestal assemblies **14**. The interengagement between the panels **10** and pedestal assemblies **14**, however, is such that when removal of a panel occurs, normally the caps **20** of the pedestal assemblies **14** have interconnecting means, which do not comprise part of the present invention, for maintaining undisturbed the corners, for example, of the remaining panels in associated and supported relationship by the caps **20** of the pedestal assemblies **14**.

One of the difficulties experienced in assembling and positioning access floors with respect to a sub-floor or other type of supporting surface has been in regard to disposing particularly the caps **20** of the pedestal assemblies so that the panel supporting means thereon, or the stringer supporting means, or both, are accurately disposed in precise parallel relationship with respect to the horizontal plane which is to comprise the supporting surfaces afforded by the assembly of floor panels **10**. Not only should the supporting portions of the caps **20** be disposed in accurate parallel relationship with said horizontal floor surface when a plurality of the floor panels are jointly supported by the pedestal assemblies **14** but, said parallel relationship of the supporting portions of the caps **20** should remain in such parallel relationship when one or more floor panels are removed from support by any individual pedestal assembly, whereby only one or several of the remaining floor panels are engaged in supporting relationship with the cap **20** of any particular pedestal assembly.

Another difficulty which has been experienced heretofore in the construction and installation of access floors with respect to maintaining said supporting means of the caps **20** of the pedestal assemblies **14** in said aforementioned precise parallel relationship to the planar floor surface is due to the supporting surface **16** which is engaged by the bases **18** of the pedestal assembly being uneven and otherwise irregular. This frequently occurs when a poured concrete floor is installed and only relatively rough troweling thereof is used to finish the same, particularly when it is known that access flooring is going to be installed over such sub-floor and economics requires that building costs be maintained at a minimum.

Especially where the supporting surface **16** contains so-called wavy spots and the required position of a certain pedestal assembly is such that the base **18** thereof is to be disposed on a surface which slopes to a certain degree with respect to the plane to be occupied by the access floor comprising panels **10**, it is obvious that, in the absence of suitable means to change the situation, the interconnecting pedestal member **22** which extends between the bases **18** and caps **20** of the pedestal assemblies **14** will not be perpendicular to the desired floor plane to be formed by the panels **10**. Furthermore, the supporting portions of the caps **20** of such pedestal assembly will not be parallel to said plane of the desired floor surface under such circumstances.

In accordance with the principles of the present invention it has been found that a relatively simply but highly effective expedient can be utilized to effect, in particular, the disposal of the supporting surface portions of the caps **20** of the pedestal assemblies **14** precisely in parallel relationship with the plane of the desired access floor which is to be formed by the rigid floor panels **10** that are to be supported by the caps **20** of such pedestal assemblies. Such expedient comprises the employment of adjustable connecting means **23** which, as desired, may be utilized to interconnect either the lower end of the pedestal member **22** with the base **18** of each assembly or connect the upper end of the pedestal member **22** with the cap member **20** of each pedestal assembly **14**.

Referring particularly to FIGS. 2–6, the embodiment of the invention wherein the adjustable connecting means **23** is disposed between the base **18** and the lower end of the pedestal member or unit **22** is shown in detail. Attention is particularly directed to FIGS. 4–6 wherein three successive adjustable positions are illustrated particularly for purposes of describing the principles of the adjusting means, which details are as follows.

In FIGS. 2 and 4–6, it will be seen that the base **18** has a preferably circular bottom flange **24** of suitable area, the lower surface of which flatly abuts a supporting surface **16** at a location dictated by the intersecting corners of the floor panels **10**, regardless of whether said location on surface **16** happens to be wavy or irregular and nonparallel to the plane to be formed by the floor panels **10**. Extending upward from the bottom flange **24** of each of the bases **18** is a boss **26**. Preferably, the bases **18** may be die cast from metal but the invention is not to be restricted to forming such bases in that manner since other methods and materials may be employed if desired. The boss **26** of each base is provided with a cavity **28** which is of a compound nature and extends downwardly from the upper end of said boss. Preferably, the outer surface of boss **26** is of a geometrical cross-sectional configuration, such as a hexagon, as is best shown in FIGS. 3 and 7. Also, the outer portions of the bottom flange **24** are reinforced by suitable diagonal bracing ribs **30**.

One of the principal features of the present invention comprises the fact that it has been found that by arranging a pair of eccentrics in a certain relationship with respect to one end of the pedestal means extending between the cap and base of a pedestal assembly and provide socket means either in the cap or base which are complementary to said eccentrics, a substantial range of different angular positions of the axis of the pedestal means with respect to the transverse plane of the cap or base can be achieved so as preferably to dispose the supporting surfaces of the cap of such pedestal assembly in precise parallelism with the plane of the access floor to be formed by a plurality of the floor panels **10**.

Preferably also in accordance with the principles of the invention, the pair of eccentrics referred to comprise segments of spheres which may be either of the same or different diameters. The spherical segments are selected so as to be parallel to each other and said segments extend through the centers of said spheres which are in a predetermined spaced relationship relative to an axis passing perpendicularly through said parallel segments. Further, axes passing perpendicularly through the centers of said spherical segments are transversely spaced from each other a predetermined distance. Especially for purposes of employing this principle in the present invention, whereby substantial loads may be sustained in a direction parallel to the axis of the pedestal assemblies, one of the spherical segments is substantially hemispherical.

Also in accordance with the preferred arrangement of the present invention, the socket means which comprise the cavity **28** extending inward from the upper end of the

boss 26 of the base 18, as specifically illustrated in FIGS. 4–6, comprises a hemispherical socket surface 32 which is complementary to the lower hemispherical shape of lower segment 34. For purposes especially of facilitating assembly, the lower spherical segment 34 is of a smaller diameter than the upper spherical segment 36 which is slidably received within the upper cylindrical portion 38 which defines cavity 28 and in the bottom of which the hemispherical socket surface 32 is formed. However, it will be seen particularly from FIGS. 3, 4 and 6 that the center of the socket surface 32 is laterally offset with respect to the center axis of the cylindrical portion 38 of cavity 28.

The lateral offset between said centers is the same as the lateral offset between axes passing perpendicularly respectively through the centers of the parallel spherical segments 34 and 36. In FIGS. 3, 4 and 7, said offset is designated by the symbol X. Similarly, the axial space between the centers of said spherical segments 34 and 36, as shown in FIG. 4, is designated by the symbol Y. Referring to FIG. 4, the axes illustrated therein which respectively pass through the centers of the upper and lower spherical segments 34 and 36 are perpendicular to the bottom flange 24 of base 18.

By referring to FIGS. 4–6, it will be seen that the lower and upper spherical segments 34 and 36 are unitarily connected and are formed on the lower end of a threaded stud 40 which also is integral therewith and includes a hexagonal section 42 preferably immediately adjacent the upper spherical segment 36. The threaded stud 40 is closely and slidably received within the lower end of the tubular pedestal member 22 and means to be described hereinafter are provided by which axial adjustment may be effected in order to provide the desired vertical height between the base 18 and cap 20 of each of the pedestal assemblies 14. However, it is to be understood that when the pedestal member 22 is referred to generically herein, it includes an interfitting tubular member and threaded stud 40.

In order that the present invention shall follow sound and acceptable engineering practice, it is preferred that the pedestal member 22 be disposed with its axis precisely perpendicular to the plane of the access floor to be formed by the assembly of floor panels 10. Accordingly, the preferred embodiment of the invention is that which is illustrated in FIGS. 2–7, wherein the lower end of the pedestal member 22, which includes the threaded stud 40, is interconnected to the base 18. In the relative position of the base 18 and pedestal member 22 shown in FIG. 4, it is assumed that the parallel perpendicular axes passing respectively through the centers of the lower and upper spherical segments 34 and 36 are also perpendicular to the bottom surface of the flange 24 of the base 18.

Also in the embodiment of FIGS. 2–7, it will be seen that the axis of the stud 40 and, correspondingly, of the pedestal member 22, is coincident with the axis passing through the center of the lower spherical segment 34. In accordance with the principles of the invention, however, it is not essential that the axis of the pedestal member 22 be coincident with one of the perpendicular axes passing through the centers of either of said spherical segments; it is only essential that the axis of the pedestal member 22 be parallel thereto and, if desired, said axis may be parallel to but offset laterally from both of the parallel axes passing perpendicularly through the centers of the lower and upper spherical segments 34 and 36. To simplify the illustration and construction, however, in FIGS. 4–6, the axis of the pedestal member 22 and its threaded stud 40 have been shown as coincident with the perpendicular axis of the lower spherical segment 34.

Assuming with respect to FIGS. 4–6 that the pedestal member 22 is held non-rotatably, such as by engaging the hexagonal section 42 of stud 40 with a wrench, while another wrench is used to rotate the base 18 about the axis of the pedestal member 22 by engaging the preferably hexagonal exterior surface 44 of boss 26, relative movement between the base and pedestal member will occur and is equivalent to rotating both of the lower and upper spherical segments 34 and 36 simultaneously about their respective axes as far as the base 18 is concerned. Due to the lateral offset of the perpendicular axes passing through the centers of the lower and upper spherical segments 34 and 36, as well as the corresponding offset of the centers of the lower socket surface 32 relative to the cylindrical portion 38 of cavity 28, such relative rotation will result in the plane of the bottom flange 24 of base 18 being disposed in a multitude of angular relationships relative to the initial perpendicularity of the parallel perpendicular axes passing through the centers of the lower and upper spherical segments with respect to the bottom flange 24 when the co-engaged members are in the position shown in FIG. 4.

Such relative rotation of the base 18 about the axis of the pedestal member 22, for example, causes the plane of the bottom flange 24 of the base to move from a position of being precisely transverse to the axis of said pedestal member 22, through a multitude of various angular dispositions with respect to said axis and finally, after 360° of rotation, returning to the precise transverse position with respect to the axis of pedestal member 22 as illustrated in FIG. 4, as viewed from any side of said assembly.

Referring to FIG. 5, for example, the illustration shown therein represents the relative position of the pedestal member 22 with respect to the base 18 after 90° of rotation about the axis of member 22 in either direction, while the illustration in FIG. 6 represents a movement of 180° of base 18 about the axis of pedestal member 22 in either direction. During all of such rotative movements, the exterior surfaces of the spherical segments 34 and 36 are in constant contact around the entire circumferences thereof with the mating surfaces of cavity 28 which engage the same respectively. Thus, there is no possibility of any tilting movement occurring between the plane of the bottom flange 24 of base 18, for example, and the axis of the pedestal member 22 after a desired position of rotative adjustment has been established between the base 18 and pedestal member 22.

Under the foregoing circumstances, it can be seen that when an access floor is to be installed, either the floor panels 10 and/or stringers are progressively positioned and assembled so as to establish the intersecting points of the corners of the panels to thereby determine the position of the center axis of the pedestal member 22 and cap 20 of the pedestal assemblies comprising the present invention. Suitable leveling mechanisms are utilized to determine precise perpendicular relationship of the pedestal members 22 of assemblies 14 with respect to the desired plane of the access floor. Following this, rotation of the base 18 about the axis of the pedestal member 22 will soon establish a complementary abutting relationship between the lower surface of bottom flange 24 of the base member and the particular area of supporting surface 16 which it is to abut and by which the pedestal assembly is to be supported. Before disposing said bottom flange 24 upon the supporting surface 16, a thin coating of plastic mastic material is applied to the surface 16 and this not only facilitates rotation of the base 18 but also secures it firmly in the desired operative position thereof when said mastic material sets.

In FIG. 2, it will be seen that when the adjustable connecting means between the pedestal member 22 and base 18 is placed in the base, a relatively simple expedient may be used to connect the upper end of the tubular member of pedestal member 22 to the cap 20, such as by forming a relatively simple but precise socket 46 so as to extend perpendicularly upward into the cap 20 from the lower end thereof and thereby dispose the same accurately in perpendicular relationship to the horizontal supporting surface at the upper part of caps 20 which

are engaged either by the exemplary stringers **12** or the corners of the floor panels **10** per se, or both, as desired. The upper end of the tubular member of pedestal member **22** may be press-fitted into the socket **46** to effect operative relationship between the two.

Referring to FIGS. 11 and 12, when it is not desired or essential that the axis of the pedestal member **22** be precisely perpendicular to the access floor formed by the floor panels **10**, the lower end of the tubular member of pedestal member **22** may be press-fitted into an appropriate socket **48** formed in the boss **26** on base **18**, for example, while the threaded stud **40** adjustably is received within the upper end of the tubular member of pedestal member **22**. Especially as shown in FIG. 12, the cap **20** is provided with the cavity **28** under such circumstances, including the cylindrical portion **38** and the hemispherical socket surface **32** therein, respectively to receive the spherical segment **36** of larger diameter and the smaller, hemispherical segment **34** which, in this embodiment, extend upwardly from the upper end of the threaded stud **40**.

When utilizing this embodiment of the invention, the cap **20** normally will be held stationary, especially while being disposed at the desired location of intersection of the corners of an assembly of floor panels **10**, while the threaded stud **40** and the tubular member connected therewith to comprise the composite pedestal member **22** is rotated about its axis, simultaneously rotating the base **18** with it until the lower surface of bottom flange **24** thereof is disposed in flat, complementary engagement with a certain portion of the supporting surface **16**, for example. The base **18** has a socket which receives the lower end of tubular member **22** with a press-fit. As in the preceding embodiment, the base member **18** is first disposed upon a thin layer of plastic mastic material not only to facilitate the rotation of the base **18** relative to surface **16** but also to ultimately secure the base **18** in fixed operative position upon the supporting surface **16**.

As can be visualized from FIG. 4 especially, the greater the dimension X between the parallel axes perpendicular to the spherical segments and the lesser the axial space or distance Y between the centers of the spheres, the greater will be the angular movement between the axis of the pedestal member **22** and the plane of the panel assembly forming a horizontal access floor produced by rotation between the member **22** and cavity **28**. Conversely, the lesser the dimension X and the greater the space or distance Y, the lesser will be the angular movement between the axis of pedestal member **22** and such plane of the horizontal access floor as a result of such rotation of member **22** relative to cavity **28**.

The vertical dimension between the lower surface of bottom flange **24** of base member **18** and the operative supporting surface on the upper portion of cap **20** on each pedestal assembly **14** may accurately and quickly be established by relatively simple means including a desirable feature of the present invention, details of the same best being illustrated in FIGS. 2 and 8–10 with respect to the first-described embodiment and in FIG. 11 with respect to the second-described embodiment. Referring to FIG. 2, it will be seen that a nut **50**, illustrated in exemplary manner as a hexagonal nut, has convention chamfers **52** at the intersections of the side walls of the nut adjacent both faces thereof.

Abutting one face of the nut **50** is a lock washer **54** which is best illustrated in plan view in FIG. 8 in association with the nut **50** which comprises a lock nut. The lock washer **54**, as will be seen from FIG. 8, is hexagonal in shape and alternate edge portions **56** thereof are bent at an angle to the plane of the lock washer **54**, said angle being diagrammatically illustrated in FIG. 9 by the symbol A. In actual practice, but without restriction thereto, said angle is approximately 55°. In FIG. **10**, it will be seen that the angle of the chamfer faces **52** relative to the plane of the adjacent end faces of the nut **50** is indicated by the symbol B.

Particularly by comparing these angles, it will be seen that the angle A is substantially greater than angle B. Further, the apex of the angles at which the bent edge portions **56** of the lock washer **54** are positioned with respect thereto are coincident with the corresponding edges of the alternate side walls of the hexagonal lock nut **50** as can be seen readily from FIG. 8, whereby when a desired position of rotatable adjustment of the lock nut **50** has been made upon the threaded stud **40**, the adjacent edges of alternate side faces of the lock nut **50** will be in direct engagement with the apexes of the angles between the bent edge portions **56** of the lock washer **54** and the surface of said lock washer which is engaged by lock nut **50**.

The surface of the lock washer **54** opposite that from which the alternate edge portions **56** are bent is provided with a circumferentially spaced series of positioning lugs **58** which are positioned radially with respect to the axis of said stud **40** so as to closely engage the outer surface of the abutting end of the tubular member of the composite pedestal member **42** which firmly abuts said lock washer **54** and thus aids in maintaining the lock washer in firm adjusted and locking position with respect to the lock nut **50** after a desired vertical dimension has been established between the threaded stud **40** and the companion tubular member of the composite pedestal member **22**.

As illustrated in FIG. 10, it will be seen that when the lock nut **50** is rotated with respect to threaded stud **40**, moving the same from the so-called locked position illustrated in FIGS. 8 and 9, through an intermediate position as illustrated in FIG. 10 results in the difference between the angles A and B, respectively pertaining to the bent edge portions **56** of the lock washer **54** and the faces of the chamfers **52** on lock nut **50**, causing the lock washer **54** to be forced a limited distance away from the adjacent face of the lock nut **50**. Upon restoring the side faces of the lock nut **50** into parallel engagement with the apexes of the angles A, said washer will again firmly abut the adjacent end face of the lock nut **50** and maintain such rotated position of the lock nut relative to the threaded stud **40**. This is due to the fact that the lock washer **54** is maintained against relative rotation with respect to the threaded stud **40** through suitable keying means preferably comprising a longitudinally extending flat surface **60** being formed on the threads of stud **40** and having a width substantially less than the diameter of said stud as clearly illustrated in FIGS. 2 and 8 and the aperture **62** in lock washer **54** being complementary in shape to the cross-sectional shape of the flatted, threaded stud **40** as is best shown in FIG. 8.

The locking arrangement described above with respect to FIGS. 2 and 8–10 also is applicable to the embodiment of the invention illustrated in FIG. 11, in which embodiment the threaded stud **40** is disposed at the upper end of the tubular component of pedestal member **22** within the upper end of which the lower end of the threaded stud **40** is closely and slidably received. In this embodiment, the lock washer **54** abuts against the upper end of the tubular member of the composite pedestal member **22** and lock nut **50** engages the upper surface of the lock washer **54** to achieve desired vertical adjustment between the base and cap members **18** and **20** of the pedestal assembly **14** and maintain any desired vertical dimension between said base and cap member.

While the invention has been illustrated and described in its several preferred embodiments, it is to be understood that the invention is not to be limited to the precise details herein illustrated and described since the same may be carried out in other ways falling within the scope of the invention as claimed.

I claim:

1. A pedestal assembly to support edge portions of a floor panel comprising a base member having a lower sur-

face positionable flatly in engagement with a generally horizontal supporting surface, a cap member engageable by floor panels, and interconnecting means extending substantially vertically between said members and operatively engaging the same, in combination with adjustable means connecting one of said members to one end of said interconnecting means and comprising in combination, a pair of transverse segments of spheres connected to said interconnecting means in substantially parallel relationship to each other transversely to the axis of said interconnecting means and axially spaced apart therealong, the centers of said transverse segments being offset laterally, whereby axes passing through said centers perpendicularly to said segments are parallel to each other and spaced a predetermined distance apart, additional means extending between and connecting said transverse segments for simultaneous rotation about their respective axes and being parallel with the axes of said segments and said interconnecting means projecting axially from at least one of said spherical segments to the other member and socket means in said member having surfaces therein respectively complementary to the peripheries of said transverse segments of spheres and receiving the same for rotatable constant circumferential contact therewith, whereby when said connecting means is rotated about the axis thereof relative to said one member it moves in a compound manner through an infinite number of angular positions relative to said one member while moving from and to a perpendicular position relative to the plane of said one member to thereby position said cap member parallel to a plurality of horizontal floor panels supported thereby when said connecting means is in one of said number of positions relative to the plane of said one member.

2. The pedestal assembly according to claim **1** in which said socket is formed in said cap member and opens downwardly therefrom in use, and said pair of transverse segments of spheres being disposed on the uppermost portion of said interconnecting means for reception within said socket in said cap member.

3. The pedestal assembly according to claim **2**, in which one of said spherical segments on the upper end portion of said interconnecting means is substantially hemispherical and the innermost end of said socket in said cap member being complementary to said hemispherical shape for firm but slidable coengagement therewith.

4. The pedestal assembly according to claim **3** in which said other spherical segment is slidably engageable with the walls of said socket adjacent the lower end portion of said cap member when in use.

5. The pedestal assembly according to claim **1** in which said interconnecting means comprises a tubular pedestal member, a stud partially longitudinally received within one end of said tubular pedestal member, and means interengaging said tubular pedestal member and stud operable to effect longitudinal adjustment between the same to vary the overall length of the pedestal assembly, said spherical segments also being carried by the outermost end portion of said stud.

6. The pedestal assembly according to claim **5** in which said stud is provided with threads extending therealong from one end thereof, a positioning nut threadably received upon said threaded portion of said stud and one face of said nut being engageable with one end of said tubular pedestal member, and a locking member releasably engageable with said nut and operable to maintain a desired adjusted position of said nut with respect to said threaded stud.

7. The pedestal assembly according to claim **6** in which said locking member comprises a washer-like member, keying means respectively on said locking member and threaded stud and operable to prevent relative rotation therebetween, and detent means on said locking member engageable with at least one face of said nut releasably to maintain the same against rotation upon said threaded stud when an axial load is sustained by the cap member of said pedestal assembly.

8. The pedestal assembly according to claim **7**, in which said nut is chamfered on at least one face thereof at the intersections of the operable exterior faces thereof, said chamfer being respectively engageable with said detent means upon said washer-like locking member to cam said locking member away from said nut sufficiently to permit rotation of said nut when adjustment thereof upon said threaded stud is desired.

9. The pedestal assembly according to claim **7**, in which said keying means comprises a flattened area extending longitudinally along the threaded portion of said stud and of limited uniform width susbtantially less than the diameter of said stud and said locking member having a central opening therein complementary in shape to the cross-sectional shape of said flattened portion of said threaded stud, said opening in said locking member receiving said flattened portion of said threaded stud therein.

10. The pedestal assembly according to claim **7** in which said detent means on said locking member comprises a side edge thereof bent at an obtuse angle to the surface of said locking member engaged by said nut, the apex of said obtuse angle being engaged by one outer edge of a side wall of said nut when said locking member is disposed in locking engagement with said nut.

11. The pedestal assembly according to claim **10**, in which a plurality of alternate edges of said locking member are bent similarly at obtuse angles to the surface of said washer-like locking member engaged by said nut, thereby forming a plurality of locking detents to enhance the maintenance of said nut in a desired position of adjustment with respect to said threaded stud.

12. The pedestal assembly according to claim **1**, in which said socket is formed in said base member and said segments of spheres are disposed on the lower end portion of said interconnecting means for reception within said socket when said pedestal assembly is in use.

13. The pedestal assembly according to claim **12**, in which said base member is provided with a flat lower surface transverse to the axis of said socket and substantially wider than the diameter of said socket for engagement with a supporting surface to brace said pedestal assembly against tilting movement relative to said supporting surface.

14. The pedestal assembly according to claim **13**, in which said base member is provided with a boss on the upper portion thereof and said socket being formed in said boss and extending downward from the upper end thereof in use.

15. The pedestal assembly according to claim **14**, in which the upper portion of said socket is cylindrical and the bottom of said socket is substantially hemispherical, the axis of said cylindrical portion being substantially perpendicular to the flat lower surface of said base member and offset laterally a predetermined distance from the center of said hemispherical bottom of said socket.

16. The pedestal assembly according to claim **15**, in which the diameter of said cylindrical upper portion of said socket is no less than the diameter of said hemispherical bottom portion of said socket.

17. The pedestal assembly according to claim **16**, in which the end of said interconnecting means which is received within said socket comprises a stud having said segments of spheres formed thereon, the outermost segment of a sphere thereon being substantially complementary and in close slidable engagement with said hemispherical bottom portion of said socket.

18. The pedestal assembly according to claim **16**, in which said stud comprises a portion of said interconnecting means between said head and base members, said interconnecting means also including an additional member engageable with said stud and arranged to be adjustable longitudinally with respect thereto to vary the overall length of said pedestal assembly.

19. The pedestal assembly according to claim 18, in which said stud and additional member are interconnected by adjustable threaded means operable to resist compression loads exerted between said cap and base members and thereby maintain the outermost surfaces of said members at a predetermined distance from each other when in use.

20. The pedestal assembly according to claim 17, in which said stud and boss on said base member are provided with opposed wrench-engageable faces operable to effect rotation of said stud about the axis thereof relative to said base member.

21. The pedestal assembly according to claim 17, in which the axis of said stud is coaxial with the center of said hemispherical end of said stud and the axis of said other transverse segment of a sphere on said stud is laterally offset from said axis of said stud.

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