

TITLE OF THE INVENTION

RECONFIGURABLE FRAME SYSTEM FOR INTERIOR USE

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a frame system of horizontal beams and vertical hollow poles held together by clamping means to form a support system for demountable wall panels of different types in interior of buildings which can take loads and yet carry electrical and data cables along the horizontal beams and alongside the hollow vertical poles.

DESCRIPTION OF THE RELATED ART

Present day office furniture partition systems are modular in design. Such design makes use of modular components which connect to each other easily, allowing users to reconfigure the office space according to work requirements. Electrical and Data cables for office equipment are organized within the furniture partitions. Such furniture partitions not only

function as space dividers, but also have integrated shelves and overhead bins that attach in a modular way.

Current demountable wall systems provide concealment to electrical and data cables, provide outlets for electrical and data points, can acoustically insulate sound, provide openings for windows and doors, but do not integrate modularly with office furniture partition systems. They work effectively by providing erected rooms in the shortest possible time. The shelves and overhead bins of a furniture partition system may not necessarily fit a demountable wall system. Thus, wall systems suffer from a drawback of being only limited to decoration and space division. Wall systems have to adapt to different height ceilings and, by its nature, has to be customizable as well.

The interiors of a building will have a wall system and a furniture system, which will most likely not be compatible with one another, and thus, cannot work in tandem.

PROBLEM TO BE SOLVED BY THE INVENTION

In order to overcome the drawbacks described above, a re-configurable frame system for use in interior of buildings according to this invention comprises a first and second vertical hollow poles, each pole having four docking rails lengthwise; a first and second horizontal beams, each horizontal beam having a C-shaped end adapted to fit into the docking rail of the hollow pole; a first and second clamping means characterized in that a first vertical hollow pole is erected on a surface, a first C-shaped end of the first horizontal beam is fitted into a docking rail of the first vertical hollow pole at a selected height, and held in place by applying a first clamping means, a second C-shaped end of the first horizontal beam is fitted into a docking rail of a second vertical hollow pole at the same selected height, a first C-shaped end of a second horizontal beam is fitted into the same docking rail of the first vertical pole at a second height and the second C-shaped end of the second horizontal beam is fitted into the docking rail

of the second vertical hollow pole at the same second height, said second horizontal beam held in place by applying a second clamping means, both horizontal beams spaced apart from each other, thereby forming the support system.

Preferably the vertical hollow pole has radially curved inward sides lengthwise, the adjacent sides meeting to form a docking rail with the appearance of mushroom shaped protrusion along the length of the vertical hollow pole.

Preferably the horizontal beam have two C-shaped ends, each being adapted to fit into the mushroom shaped protrusion along the length of each rail of the hollow vertical pole.

Preferably a clamping means consisting of a beam clamp gripper and a beam clamp anchor to clamp each C-shaped end of the horizontal beam onto the mushroom shaped protrusion of the hollow pole, the beam clamp gripper having two or more threads for insertion of screws to close the beam clamp gripper and beam clamp anchor, pressing

securely against the C-shaped end of the horizontal beam which is adapted to fit the mushroom shaped protrusion of the vertical hollow pole.

Preferably when the beam clamp gripper presses the end of the horizontal beam against the beam clamp anchor, creating stress forces on the radially curved inward sides of the vertical hollow pole, and in turn, the radially curved inward sides of the vertical hollow pole reacts by pushing out the mushroom-shaped protrusions against the C-shaped end of the horizontal beam, the beam clamp anchor and beam clamp gripper, thereby holding the horizontal beam in place securely.

Preferably the beam clamp gripper have rows of projections spaced apart which fits through rows of holes identically spaced apart in the horizontal beam, onto rows of depressions on the inside of the beam clamp anchor, identically spaced apart for a secure grip and rigid alignment of the horizontal beam.

Preferably the re-configurable frame system allows wall panels

and other furniture to be mounted and de-mounted on the spaced apart horizontal beams and vertical hollow poles.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a first embodiment of the invention.

Fig. 2 is a exploded perspective view of the hollow pole, horizontal beam and clamping means, before assembly.

Fig. 3A is a cross sectional view of the first embodiment of hollow pole and Fig 3B is a cross sectional view of the second embodiment.

Fig. 4 is a exploded view of the clamping means made up of beam clamp gripper and beam clamp anchor, the beam clamp gripper and beam clamp anchor shown from the exterior and interior.

Fig. 5 is a cross sectional view of the clamping means when clamped to the mushroom shaped protrusion of the hollow pole, taken along A – A' of Fig. 1.

Fig. 6 is a perspective view of a second embodiment of the invention.

Fig. 7 is a cross section view of the horizontal beam along B – B' of Fig. 2

DESCRIPTION OF THE PREFERRED EMBODIMENTS

An embodiment of the present invention will now be described with reference to the accompanying drawings.

Figs. 1, 2, 3A, 4 – 5 show a reconfigurable frame system according to a first embodiment of the present invention.

The reconfigurable frame system comprises two or more horizontal beams with two or more hollow vertical poles.

Referring to Fig. 3A, the hollow pole has four radially curved inward sides (21), each side meeting the other two adjacent sides to form a mushroom shaped protrusion (25), for docking with the C-shaped end of a horizontal beam.

Referring to Fig. 5, the horizontal beam (10) has two C-shaped ends, each end (12) being adapted to fit into the mushroom shaped protrusion (25) of the hollow vertical pole. Other horizontal beams and hollow vertical poles can be added to erect a reconfigurable frame system and likewise, horizontal beams and vertical hollow poles can be

dismantled, in accordance to requirements of users. Panel walls and furniture partitions which are able to carry shelves, racks, cabinets and the like are then installed onto the frame system. Electrical and data cables can be laid along the radially curved sides of the vertical hollow poles and along the sides of the horizontal beams.

Both the first and second C-shaped ends of the horizontal beam are joined to the mushroom shaped protrusion of the first and second hollow pole and held in place by clamping means.

Referring to Fig. 4, the clamping means consists of a beam clamp gripper (31) and a beam clamp anchor (32).

The set up of the re-configurable frame system using the first embodiment is now described, by referring to the drawings.

Referring to Fig. 1, a first hollow vertical pole (20) with four radially curved inward sides (21, 22, 23), each side meeting the adjacent side to form a docking rail in the form of a mushroom shaped protrusion (25, 26, 27) is erected vertically. A first horizontal beam (10) is then

raised to the desired height. The first C-shaped end (12) of the first horizontal beam (10) is then fitted into one of a four mushroom shaped protrusion (25) of the hollow vertical pole, as shown in Fig. 5. Fig. 5 is a cross section view of Fig. 1 taken across A – A'.

Fig. 2 shows the horizontal beam (10) with several rows of holes (11) spaced apart, on its sides near the end of each beam. These holes (11) would match the positions of the several rows of projections (35) on the beam clamp gripper (31), as shown in Fig. 4. These holes (11) would allow the rows of projections (35) on the beam clamp gripper (31), to go through them onto the identically located depressions (36) in the beam clamp anchor (32). The holes include threads for screws (34) to allow screws (33) to be fastened through the beam clamp gripper (31), through the horizontal beam and then into the beam clamp anchor (32).

The beam clamp gripper (31) is then placed against the side of the first C-shaped end (12) of the horizontal beam (10). A beam clamp anchor (32) is then placed on the opposite side of the first C-shaped

end of the horizontal beam. The rows of projections in the beam clamp gripper (35) would go through the holes (11) in the horizontal beam onto the depressions (36) in the beam clamp anchor (32), holding the beam clamp anchor and gripper in place. Screws (33) can then be inserted and fastened into the beam clamp gripper (31) through the horizontal beam ending at the depressions in beam clamp anchor (32). When the screws (33) are tightened, the beam clamp anchor (32) and beam clamp gripper (31) pulls the C-shaped end (12) of the horizontal beam tightly against the mushroom shaped protrusion (25) of the vertical hollow pole.

Fig. 5 shows a cross section of the C-shaped end (12) of the horizontal beam (10) fitted into docking rail which is the mushroom-shaped protrusion (25) of the vertical hollow pole. The C-shaped end (12) is held firmly in place by the clamping means (30), which is the beam clamp anchor (32) screwed to the beam clamp gripper (31). Stress forces are therefore created on the radially curved inward sides (21, 22) of the hollow vertical pole. In turn, the radially curved

inward sides (21, 22) of the hollow vertical pole reacts by pushing out the mushroom shaped protrusion against the C-shaped end (12) of the horizontal beam, which then pushes against the beam clamp anchor (32) and beam clamp gripper (31), thereby creating a firm and strong frame.

The matching rows of projections (35) in the beam clamp gripper (32), having gone through the matching rows of holes (11) in the horizontal beam as shown in Fig. 2 would fit into the matching rows of depressions (36) in the inside of the beam clamp anchor (32). The fitting of projections, through the holes in the horizontal beam, into the depressions would reinforce the grip of the beam clamp anchor and beam clamp gripper on the horizontal beam and promote rigid alignment of said horizontal beam.

Similarly, the second end of the first horizontal beam is clamped with a second beam clamp anchor and second beam clamp gripper. The first horizontal beam is thus laid and clamped securely to the mushroom shaped protrusion of first hollow pole at the desired height, without

additional materials to promote frictional resistance. A second vertical hollow pole is then erected, spaced apart from the first vertical pole, for connection to the first horizontal beam. More horizontal beams can then be laid and clamped securely by more beam clamp grippers and beam clamp anchors to any desired height at any part of the hollow pole since the mushroom shaped protrusion runs the entire length of the hollow pole, creating the said frame.

As shown in Fig. 1, since the vertical hollow pole has four mushroom-shaped protrusions (25, 26, 27, 28) in the form of docking rails along its length, horizontal beams can be laid and clamped securely to the docking rails of the three other hollow vertical poles, if desired.

The inventor has found that more vertical poles can be added and more horizontal beams can be clamped securely to these hollow poles, eventually forming a frame system of vertical hollow poles and horizontal beams. Heavy loads of up to 100 kg can be placed on the framework. The inventor has also found that stresses of heavy loads

are evenly distributed to the horizontal beams and vertical hollow poles. Thus when the frame is laid, besides fitting lightweight panels onto the framework, heavy objects such as shelves, racks, cabinets and the like can now be fitted onto the panels with use of simple clamps.

The frame can be easily re-configured by dismantling any horizontal beam and vertical hollow pole and installing them at different locations and at different heights within the frame system.

The horizontal beams allows data and electrical cables to be laid along its recessed side. Similarly, the vertical hollow poles also allow data and electrical cables to be laid along its radially curved inward sides or recesses. When the framework of vertical hollow poles and horizontal beams are erected, data and electrical cables can be laid in at time of erection of the framework, within the framework, thus avoiding unsightly wires and cables. When there is a need to re-lay the data and electrical cables, it would be relatively easy to take out the cables. Thus, the frame system of vertical hollow poles and horizontal beams

can not only be easily erected, the framework can carry heavy loads and carry data and electrical cables.

Once the framework has been erected, and electrical and data cables laid inside, partition panels can be fitted onto the framework. Lastly, cabinets, racks, shelves and the like can be fitted onto the beams and poles.

Since the mushroom shaped hollow pole of this first embodiment has four protrusions, horizontal beams can be laid and clamped securely in four directions.

Fig. 3B and Fig. 6 shows the second embodiment. The hollow vertical pole (20) consisting of three radially curved inward sides (21, 22, 23), each side meeting the adjacent side to form mushroom shaped protrusions (25, 26, 27). This allows the fitting of horizontal beams of any desired height in three directions, as shown in Fig. 3B. The erection of the hollow vertical poles and fitting of horizontal beams is carried in the same manner as described for the erection of the frame

system using the first embodiment.

Having described preferred embodiments of the invention with reference to the accompanying drawings, it is to be understood that the invention is not limited to those precise embodiments, and that various changes and modifications may be effected therein by one skilled in the art without departing from the scope or spirit of the invention as defined in the appended claims.

Advantageous effects of the invention

A reconfigurable frame system consisting of one or more horizontal beams and two or more vertical hollow poles held together with the clamping means is strong enough to allow installation of cabinets, racks, shelves and the like onto the wall panels. The frame system is also stable. The frame system also allows the laying and carrying of electrical and data cables. The same frame system can be dismantled and re-assembled in a different location and electrical and data cables re-laid without much difficulty.

CLAIMS

1. A reconfigurable frame system for interior use comprising of:-

two vertical hollow poles, each pole (20) having four docking rails (25, 26, 27, 28) lengthwise;

two horizontal beams, each horizontal beam (10) having a C-shaped end (12) adapted to fit into the docking rail (25, 26, 27, 28) of the hollow vertical pole (20); and

two clamping means (30)

characterized in that a first vertical hollow pole (20) is erected on a surface, a first C-shaped end (12) of a first horizontal beam (10) is fitted into a docking rail (25) of the first vertical hollow pole at a selected height, and held in place by applying a first clamping means (30), a second C-shaped end of the first horizontal beam is fitted into a docking rail of a second vertical hollow pole at the same selected height, a first C-shaped end of a second horizontal beam is fitted into the same docking rail (25) of the first vertical pole at a second height

and the second C-shaped end of the second horizontal beam fitted into the docking rail of the second vertical hollow pole at the same second height, said second horizontal beam held in place by applying a second clamping means, both horizontal beams spaced apart from each other, thereby forming the frame system.

2. A docking rail (25, 26, 27, 28)) of the vertical hollow pole as claimed in Claim 1 being a mushroom shaped protrusion along the length of the vertical pole, said mushroom shaped protrusions formed from the meeting of adjacent radially curved inward sides of the vertical hollow pole.

3. A horizontal beam (10) as claimed in Claim 1 which have two C-shaped ends, each end (12) being adapted to fit into the mushroom shaped protrusion of the hollow vertical pole.

4. A clamping means (30) as claimed in Claim 1 consisting of a beam clamp gripper (31) and a beam clamp anchor (32), the beam clamp gripper and beam clamp anchor each having two or more holes (34,

37) for insertion of screws to close the beam clamp gripper (31) and beam clamp anchor (32), thereby pressing the clamping means securely against the C-shaped end (12) of the horizontal beam which is adapted to fit into the mushroom shaped protrusion (25, 26, 27, 28) of the vertical hollow pole.

5. A clamping means (30) as claimed in Claim 4 wherein the beam clamp gripper (31) presses the C-shaped ends (12) of the horizontal beam against the beam clamp anchor (32), creating stress forces on the radially curved inward sides (21, 22, 23, 24) of the vertical hollow pole and in turn, the radially curved inward sides of the vertical hollow pole reacts by pushing the mushroom shaped protrusions against the C-shaped end (12) of the horizontal beam, the beam clamp anchor (32) and beam clamp gripper (31), thereby holding the horizontal beam in place securely.

6. A clamping means (30) as claimed in Claim 4 wherein the beam clamp gripper (31) has rows of projections (35) spaced apart and having identical matching positions to holes (11) in the horizontal beam and to

depressions (36) in the beam clamp anchor (32), for a more secure grip on the horizontal beam and to ensure more rigid alignment of the horizontal beam.

7. A frame system of horizontal beams and vertical hollow poles made by extruded or roll forming processes.

8. A vertical hollow pole as claimed in Claim 1 having four radially curved inward sides (21, 22, 23, 24), each side meeting the other adjacent side to form a mushroom shaped protrusion (25, 26, 27, 28) being docking rails along its length, thereby permitting fitting of horizontal beams, spaced apart, to any one or two or three or four docking rails for the installation of wall panels and other furniture.

9. A vertical hollow pole as claimed in Claim 1 having three radially curved inward sides (21, 22, 23), each side meeting the other adjacent side to form a mushroom shaped protrusion (25, 26, 27) being docking rails along its length, thereby permitting fitting of horizontal beams, spaced apart, to any one or two or three of the three docking rails for

the installation of wall panels and other furniture.

10. A re-configurable frame system for use in interior of buildings as claimed in Claim 1 wherein wall panels and other furniture can be mounted and de-mounted on the spaced apart horizontal beams and vertical hollow poles.

11. A system of horizontal beams and vertical hollow poles forming the frame system for use in interior of buildings as claimed in Claim 1 wherein electrical wires and data wires are laid within the recessed sides of the horizontal beam and the hollow vertical pole.