SYSTEMS AND METHODS FOR ATTACHING BARRIER SHEET MATERIAL TO EXTENSIBLE POLE ASSEMBLIES

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ABSTRACT

A system for connecting sheet material to a pole extending between a first surface and a second surface comprises a foot member a foot member comprising a first attraction member and a second attraction member. The foot member is detachably attached to a first end of the pole. A second end of the pole is in contact with the first surface. The first and second attraction members are magnetically attracted to each other such that a first portion of the sheet material is detachably attached to the foot member. The foot member engages the second surface to hold the sheet material in a desired configuration relative to the first surface and the second surface.
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RELATED APPLICATIONS


[0005] The contents of all applications cited above are incorporated herein by reference.

TECHNICAL FIELD

[0006] The present invention relates to systems and methods of supporting sheet material to form a barrier and, in particular, to attachment systems and methods that facilitate the temporary connection of sheet material to an extensible pole assembly during erection of the barrier.

BACKGROUND

[0007] An extensible pole assembly typically comprises first and second extension members. One of the first and second extension members is slidably received by the other extension member. An extensible pole assembly may comprise more than two extension members, and one of the extension members is typically telescopically received within the other extension member.

[0008] An effective length of the extensible pole assembly is defined as the first and second extension members, and this effective length may be changed by sliding the extension members relative to each other. In use, the extensible pole assembly is typically in compression between two objects, and a locking system is used to lock the extension members together to fix the effective length of the extensible pole assembly between the two objects.

[0009] First and second foot assemblies are typically attached to the free ends of the first and second extension members, respectively. The foot assemblies define foot portions adapted to engage the shape and surface characteristics of object against which the foot assembly is forced.

[0010] Additionally, an advancing system may be arranged between one or both of the free ends of the extension members and the foot assembly associated therewith. If used, the advancing system allows the foot assembly to be displaced in short increments relative to the extension member associated therewith; the foot assembly is securely held in place after each advancement to ensure that the extensible pole assembly is kept in tension during operation of the advancing system.

[0011] Extensible pole assemblies are used during a variety of construction activities, such as maintaining a workpiece in place and/or displacing a workpiece. One use of the extension pole is to hold a portion of a barrier sheet in position relative to a structure to divide the structure into smaller areas. For example, the remodel of a structure may require the construction activities to overlap in time with normal use of the structure as a dwelling or work place. Construction activities can result in contamination of the air that can be a nuisance to people in the area of these activities. Accordingly, a barrier sheet may be installed within the structure to divide the structure into a construction area and a non-construction area. The barrier sheet will thus inhibit movement of contaminated air between the construction and non-construction areas.

[0012] To support the barrier sheet within a structure, one or more extensible pole assemblies are typically extended between the floor and the ceiling structure. The barrier sheet is held against the ceiling by the uppermost portions of the extensible pole assemblies.

[0013] The need thus exists for improved systems and methods for facilitating the use of general purpose extensible pole assemblies to support a barrier sheet.

SUMMARY

[0014] The present invention may be embodied as a system for connecting sheet material to a pole extending between a first surface and a second surface, comprising a foot member comprising a first attraction member and a second attraction member. The foot member is detachably attached to a first end of the pole. A second end of the pole is in contact with the first surface. The first and second attraction members are magnetically attracted to each other such that a first portion of the sheet material is detachably attached to the foot member. The foot member engages the second surface to hold the sheet material in a desired configuration relative to the first surface and the second surface.

[0015] The present invention may also be embodied as a method of supporting sheet material in a desired configuration relative to first and second surfaces comprising the following steps. A pole and a foot member are provided. A first attraction member is attached to the foot member. The foot member is detachably attached to a first end of the pole. The pole such that a second end of the pole is in contact with the first surface. A second attraction member is arranged such that magnetic attraction between the first and second attraction members detachably attaches a first portion of the sheet material to the foot member. The foot member is arranged with the second surface to hold the sheet material in the desired configuration relative to the first and second surfaces.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] FIG. 1 is a side elevation view depicting an example barrier system in which an attachment system of the present invention may be used;

[0017] FIG. 2A is a side elevation view of an example attachment system of the present invention;

[0018] FIG. 2B is a side elevation view of the example attachment system similar to that of FIG. 2A illustrating deformation of arm portions such that an angle between an upper surface of a flange portion is at an angle of other than 90 degrees relative to a longitudinal axis of the attachment system;

[0019] FIG. 3 is a top plan view of the example attachment system depicted in FIG. 1;

[0020] FIG. 4 is an exploded bottom perspective view of the example attachment system depicted in FIG. 1;
FIG. 5 is a section view taken along lines 5-5 in FIG. 3 illustrating engagement of the example attachment system depicted in FIG. 1 with an extensible pole assembly and sheet material;

FIG. 6 is a section view taken along lines 6-6 in FIG. 2; and

FIG. 7 is a section view similar to FIG. 5 illustrating disengagement of the example attachment system depicted in FIG. 1 from the sheet material.

DETAILED DESCRIPTION

Referring initially to FIGS. 5 and 7 of the drawing, depicted therein is an attachment system 20 for detachably attaching a sheet material 22 to an extensible pole member 24 forming part of an extensible pole assembly. FIG. 1 illustrates that a plurality of such attachment systems 20 may be used with a plurality of such extensible pole assembly members 24 to support the sheet material 22 relative to floor and ceiling surfaces 26 and 28. So supported, the sheet material 22 may be arranged to form a barrier system. The barrier system formed by the sheet material 22 is conventional and will not be described herein beyond what is necessary for a complete understanding of the construction and operation of the present invention.

FIG. 4 illustrates that the example attachment system 20 comprises a foot assembly 30 comprising a foot member 32, an optional pad member 34, and a first attachable member 36. FIG. 4 further illustrates that the example attachment system 20 further comprises a second attachable member 40 and an optional clip member 42. The first and second attachable members 36 and 40 and/or the optional clip member 42 form a retaining system that detachably attaches a second portion of the sheet material 22 to the foot member 32 as will be described in further detail below.

FIGS. 4, 5, and 7 illustrate that the example foot member 32 comprises a body portion 50 from which extends at least one arm portion 52 that supports a flange portion 54. The body portion 50 defines a connecting portion 56 and a longitudinal axis A of the attachment system 20. The example foot member 32 comprises four of the arm portions 52.

The example body portion 50 defines a first body cavity 60 and a second body cavity 62. The flange portion 54 defines a flange opening 64. As will be described in further detail below, the example first body cavity 60 is adapted to allow the connecting portion 56 to engage an end of the extensible pole member 24. The second body cavity 62 is sized and dimensioned to receive the first attachable member 36. The flange opening 64 is sized and dimensioned to allow the second attachable member 40 to pass through the flange opening 64.

As perhaps best shown in FIGS. 2, 5, and 7, the arm portions 52 are configured to space the flange portion 54 from the body portion 50 such that an upper surface 50a of the body portion 50 is spaced from an upper surface 54a of the flange portion 54 along the longitudinal axis A. The second body cavity 62 is formed in the upper surface 50a of the body portion 50 along the longitudinal axis A. In the example foot member 32, the first attachable member 36 is snugly received within the second body cavity 62 with an exposed surface 56a of the member 36 flush with the upper surface 50a of the body portion 50.

The example arm portions 52 are made of a resilient material. Accordingly, while the upper surface 50a of the body portion 50 is parallel to the upper surface 54a of the flange portion 54 when no asymmetrical forces are applied to the flange portion 54, the upper surface 54a of the flange portion 54 may be at an angle relative to the upper surface 50a of the body portion 50 when asymmetrical forces are applied to the flange portion 54. As shown in FIG. 2B, resilient arm portions 52 thus allow the foot member 32 to deflect or deform such that an angle between the upper surface 54a of the flange portion is at an angle other than 90 degrees relative to the longitudinal axis A. FIG. 2B further illustrates that the upper surface 50a forms a reference surface A2 of the body portion 50, and an angle between the reference surface A2 and a reference plane A1 associated with the flange portion 54.

The exact configuration of the connecting portion 56 is not critical to any particular implementation of an attachment system of the present invention. The example first body cavity 60 forms in the connecting portion is defined by a generally cylindrical inner side wall surface 50b and rounded inner end wall surface 50c of the body portion 50. The first body cavity 60 is thus designed to receive an end of the extensible pole member 24 such that, at least while the pole member 24 is in compression, the foot assembly 30 stays in place during the process of assembling a barrier system.

The example extensible pole member 24 comprises a shaft portion 70 that terminates at its upper end in a ball portion 72. The diameter of the inner side wall surface 50b of the first body cavity 60 is approximately the same as a diameter of the ball portion 72, and the inner end wall surface 50c of the first body cavity 60 is defined by a radius of curvature that is approximately the same as that of the ball portion 72. The first body cavity 60 thus allows the ball portion 72 to come into contact with the end wall surface 50c thereof as shown in FIGS. 5 and 7.

In many situations, the engagement of the shaft portion 70 and ball portion 72 of the extensible pole member 24 with the first body cavity 60 foot member 32 will be sufficient to allow a barrier system to be formed using the foot assembly 30. However, to form a more rigid connection between the foot assembly 30 and the extensible pole member 24, the optional clip member 42 may be used.

As perhaps best shown in FIG. 4, the example clip member 42 comprises a clip portion 80, a radial flange portion 82, and a longitudinal flange portion 84. A channel 86 extends through the clip portion 80 from a flange surface 82a on the radial flange portion 82 to a tip surface 80a on the clip portion 80. The clip portion 80 defines a cylindrical surface portion 80b and a tapered surface portion 80c. Guide surfaces 80d and 80e are formed on the clip portion 80 on either side of the channel 86.

A distance between the guide surfaces 80d and 80e is slightly smaller than a diameter of the shaft portion 70 of the extensible pole member 24, and a diameter of the channel 86 is substantially the same as a diameter of the shaft portion 70. Additionally, an outer diameter of the cylindrical surface portion 80b of the clip portion 80 is substantially the same as the diameter of the inner side wall surface 50b, while a diameter of the tapered surface portion 80c decreases away from the cylindrical surface portion 80b.

In use, the guide surfaces 80d and 80e are brought into contact with the shaft portion 70 of the extensible pole member 24. The application of deliberate manual pressure on the clip portion 80 towards the extensible pole assembly causes the clip portion 80 to deform slightly such that the guide surfaces 80d and 80e separate sufficiently to allow the
shaft portion 70 to enter the channel 86. At this point, the clip member 42 may be slid up such that first the tapered surface portion 80a and then the cylindrical surface portion 80b enters the first body cavity 60. At this point, the tip surface 80c on the clip member 42 engages the ball portion 72 of the extensible pole assembly as shown in FIGS. 5 and 7.

[0036] FIG. 6 shows that the clip member 42 snugly occupies the space that would otherwise exist between the inner side wall surface 50b and the surface of the shaft portion 70 of the extensible pole member 24. Friction between the clip member 42, pole shaft portion 70, and the inner side wall surface 50b thus inhibits movement of the foot member 32 relative to the extensible pole member 24. At this point, a longitudinal axis B of the extensible pole member 24 is substantially aligned with the longitudinal axis A of the foot member 32.

[0037] As depicted in FIGS. 2, 5, and 7, the pad member 34 may be attached to the upper surface 54a of the flange portion 54. The example pad member 34 is made of resilient compressible material and may reduce the likelihood of damage to the ceiling surface 28 by the foot assembly 30. The pad member may be glued or otherwise connected to the upper surface 54a; the example pad member 34 is secured to the flange portion 54 by projections 90 that extend into corresponding holes 92 (FIG. 4) in the flange portion 54.

[0038] As shown in FIGS. 5 and 7, the sheet material 22 is detachably attached to the foot assembly 30 by arranging a portion of the sheet material 22 above the flange opening 64 and then bringing the second attractive member 40 into proximity with the first attractive member 36. The members 36 and 40 attract each other such that, when they are brought into proximity with each other, the attraction force clamps the sheet material 22 between the attractive members 36 and 40 (FIG. 5) to attach the sheet material 22 to the end of the extensible pole assembly 24. However, deliberate application of manual force may be used to pull the second attractive member 40 away from the first attractive member 36 as shown in FIG. 7 to detach sheet material 22 from the end of the extensible pole assembly 24.

[0039] In the example system 20, one of the first and second attractive members 36 and 40 is a magnet and the other of the first and second attractive members 40 is a piece of metal that is magnetically attracted to the magnet. By making the first attractive member 36 a magnet and the second attractive member 36 a metal disc, any small piece of metal (e.g., nut, washer, plug) may be used as the second attractive member 36 should the original metal disk become lost.

[0040] The spacing of the upper surface 50a of the body portion 50 from the upper surface 54a of the flange portion 54 described above creates a cavity between the body upper surface 50a when the foot assembly 30 engages the ceiling surface 28. This cavity accommodates the second attractive member 36 depicted in FIGS. 4, 5, and 7 and many other sizes and shapes of second attractive members without allowing the second attractive member to come into contact with the ceiling surface 28.

[0041] If the extensible pole assembly 24 is not perfectly vertical, the longitudinal axis B of the pole 24 may be at an angle relative to the ceiling surface 28. To accommodate this angle and still allow the flange upper surface 54a to be parallel to the ceiling surface 28, the arm portions 52 can deform slightly as generally described above.

[0042] The scope of the present invention should be determined by the claims appended hereto and not the foregoing detailed description.

What is claimed is:
1. A system for connecting sheet material to a pole extending between a first surface and a second surface, comprising:
   a foot member comprising a first attraction member;
   a second attraction member; whereby the foot member is detachably attached to a first end of the pole;
   a second end of the pole is in contact with the first surface;
   the first and second attraction members are magnetically attracted to each other such that a first portion of the sheet material is detachably attached to the foot member; and
   the foot member engages the second surface to hold the sheet material in a desired configuration relative to the first surface and the second surface.
2. A system as recited in claim 1, in which the foot member comprises:
   a body portion;
   a flange portion adapted to engage the second surface; and
   at least one arm portion extending between the body portion and the flange portion; whereby the flange portion of the foot member engages the second surface through a portion of the sheet material; and
   the at least one arm portion deforms when the flange portion applies pressure to the second surface through the second portion of the sheet material.
3. A system as recited in claim 2, in which the foot member defines a plurality of arm portions, where at least one of the arm portions deforms when the flange portion applies pressure to the second surface through the first portion of the sheet material.
4. A system as recited in claim 2, in which:
   the flange portion of the foot member defines a flange upper surface;
   the body portion of the foot member defines a reference surface; and
   deformation of the at least one arm portion allows an angle between the upper surface and the body reference surface to change when the flange portion applies pressure to the second surface through the first portion of the sheet material.
5. A system as recited in claim 2, in which:
   the body portion and the flange portion are separated from each other by a space; and
   the at least one arm portion occupies a portion of the space separating the body portion and the flange portion.
6. A system as recited in claim 1, in which:
   the first attraction member is magnetically attractive; and
   the second attraction member is a magnet.
7. A system as recited in claim 1, in which:
   the foot member portion defines a body upper surface; and
   the first attraction member is sized and dimensioned to fit between the body upper surface and the second surface when the foot member engages the second surface.
8. A system as recited in claim 2, in which:
   the flange portion of the foot member defines a flange upper surface;
   the body portion of the foot member defines a body upper surface;
the second attraction member is arranged against the body upper surface; and
the body surface is offset from the flange upper surface such that the first attraction member lies substantially between the body upper surface and the second surface when the foot member engages the second surface.

9. A system as recited in claim 2, in which the first portion of the sheet material at least partly surrounds the second portion of the sheet material.

10. A system as recited in claim 1, further comprising:
a cavity is formed in the foot member;
a ball is mounted on the pole; and
a clip is secured to the pole; whereby
the cavity receives the ball and the clip to detachably attach the body portion of the foot member to the pole.

11. A method of supporting sheet material in a desired configuration relative to first and second surfaces:
providing a pole:
providing a foot member;
attaching a first attraction member to the foot member;
detachably attaching the foot member to a first end of the pole;
arranging the pole such that a second end of the pole is in contact with the first surface;
arranging a second attraction member such that magnetic attraction between the first and second attraction members detachably attaches a first portion of the sheet material to the foot member; and
engaging the foot member with the second surface to hold the sheet material in the desired configuration relative to the first and second surfaces.

12. A method as recited in claim 11, in which step of providing the foot member comprises the steps of:
providing a body portion;
providing a flange portion adapted to engage the second surface; and
extending at least one arm portion between the body portion and the flange portion;
engaging the flange portion of the foot member with the second surface through a second portion of the sheet material such that the at least one arm portion deforms.

13. A method as recited in claim 12, in which:
the step of providing the foot member comprises the step of providing a plurality of arm portions; and
the step of engaging the flange portion with the second surface comprises the step of deforming at least one of the arm portions.

14. A method as recited in claim 12, in which:
the flange portion of the foot member defines a flange upper surface;
the body portion of the foot member defines a reference surface; and
deflection of the at least one arm portion allows an angle between the upper surface and the body reference surface to change when the flange portion applies pressure to the second surface through the first portion of the sheet material.

15. A method as recited in claim 12, in which the step of providing the foot member comprises the steps of:
separating the body portion and the flange portion from each other by a space; and
forming the at least one arm portion such that the at least one arm portion occupies a portion of the space separating the body portion and the flange portion.

16. A method as recited in claim 11, in which:
the first attraction member is magnetically attractable; and
the second attraction member is a magnet.

17. A method as recited in claim 11, in which:
the foot member portion defines a body upper surface; and
the first attraction member is sized and dimensioned to fit between the body upper surface and the second surface when the foot member engages the second surface.

18. A method as recited in claim 12, in which:
the flange portion of the foot member defines a flange upper surface;
the body portion of the foot member defines a body upper surface;
the step of arranging the second attraction member comprises the step of arranging the second attraction member against the body upper surface, where the body surface is offset from the flange upper surface such that the first attraction member lies substantially between the body upper surface and the second surface when the foot member engages the second surface.

19. A method as recited in claim 12, in which the first portion of the sheet material at least partly surrounds the second portion of the sheet material.

20. A method as recited in claim 12, in which:
the step of providing the foot member comprises the step of forming a cavity in the foot member; and
the step of providing the pole comprises the steps of
mounting a ball on the pole; and
securing a clip is secured to the pole such that the cavity receives the ball and the clip to detachably attach the body portion of the foot member to the pole.