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tape, a cap, and a hinge connecting the attachment structure and the cap and allows the cap to rotate relative to the attachment structure so as to contact the second terminal end of the tape, the hinge having a rotational axis that is: (a) substantially perpendicular to at least one of the first and second lateral edges of the tape and (b) substantially parallel to a plane defined by the second terminal end when the tape is in the deployed state.

2. A deployable prop, as claimed in claim 1, wherein: the tape is a bistable tape.

3. A deployable prop, as claimed in claim 1, wherein: the foot member comprises a tape stabilizer for engaging the first terminal end of the tape and adapted to maintain the shape of the first terminal of the tape only when the tape is in a deployed state.

4. A deployable prop, as claimed in claim 1, wherein the cap has an interior side that engages the second terminal end of the tape, and wherein the interior side defines a groove that engages the second terminal end of the tape and is adapted to maintain the shape of the second terminal of the tape when at least the portion of the tape adjacent to the head member is in a deployed state.

5. A deployable prop, as claimed in claim 1, wherein wherein the partially cylindrical foot member surface has a foot member radius that is less than the inner radius of the tape in the undeployed state.

6. A deployable prop, as claimed in claim 1, wherein the partially cylindrical head member surface has a head member radius that is greater than the outer radius of the tape in the undeployed state.

7. A deployable prop, as claimed in claim 1, wherein: the tape is a bistable tape with one of the two stable states being the undeployed state characterized by the tape being disposed in an Archimedean spiral; and the head member includes a thumb tab that extends above an outermost winding of the tape when the tape is disposed in the Archimedean spiral and can be readily contacted by a user to lift the head member away from the outermost winding of the Archimedean spiral to initiate transition of the tape from the undeployed state to the deployed state.

8. A deployable prop, as claimed in claim 1, wherein: the head member comprises a thermoplastic elastomer.

9. A deployable prop, as claimed in claim 1, wherein: the head member comprises an adhesive tape with an adhesive interior side and a non-adhesive exterior side, the adhesive interior side located between the tape and the non-adhesive exterior side.

10. A deployable prop for use in supporting an object at a desired location adjacent to a vertically extending surface, comprising: a tape that extends from a first terminal end to a second terminal end and between a first lateral edge and a second lateral edge that is substantially parallel to the first lateral edge; wherein the tape has a deployed state and an undeployed state; wherein, when the tape is in the undeployed state, the first lateral edge is separated from the second lateral edge by a first lateral edge distance over a substantial length of the tape, the first terminal end is separated from the second terminal end by a first terminal end distance, and the tape follows an Archimedean spiral with the first terminal end of the tape defining an interior end of the Archimedean spiral and the second terminal end of the tape defining an exterior end of the Archimedean spiral; wherein, when the tape is in the deployed state, the first lateral edge is separated from the second lateral edge by a second lateral edge distance that is less than the first lateral edge distance over the substantial length of the tape, the first terminal end of the tape is separated from the second terminal end of the tape by a second terminal end distance that is greater than the first terminal end distance, the tape extends substantially linearly from the first terminal end to the second terminal end, and a transverse curve is established over the substantial length of the tape; and a combination of both of (a) a foot member operatively attached adjacent to the first terminal end of the tape, the foot member comprising a partially cylindrical foot member surface adapted to engage a ground surface, wherein the foot member comprises an adhesive tape with an adhesive interior side and a non-adhesive exterior side, the adhesive interior side located between the tape and the non-adhesive exterior side, and (b) a head member operatively attached adjacent to the second terminal end of the tape, the head member comprising a partially cylindrical head member surface that is disposed immediately adjacent to a portion of the tape that is

stored in the tape is automatically applied to transition the tape towards one of the two stable states. Since one of the two stable states of the tape is associated with the prop being in the undeployed state, this embodiment of the deployable prop avoids the need for any kind of restraining device to maintain the tape in the rolled or undeployed state, as would be required with a carpenter's tape that is not bistable.

In another embodiment of the deployable prop, the head member is attached to an end of the tape and includes a "deployment switch," i.e., a structure that when moved to a deploy position causes a portion of the tape adjacent to head member to transition from being rolled to being straight. In an embodiment that employs a bistable tape, this transition of the portion of tape adjacent to the head member from being rolled to being straight places the tape in or near an unstable state that causes the tape to self-deploy towards the stable state in which the tape is fully deployed, i.e., extends substantially linearly throughout the entire length of the tape.

In yet a further embodiment of the deployable prop, the head member includes a "cap" structure that operatively covers the end of the tape to which head member is attached, thereby preventing the end of the tape from being engaged by other structures (e.g., the object of interest or the structure adjacent to which the object is being supported by the prop) in a manner that could apply a force to the tape which could potentially compromise the structural integrity of the tape when the prop is in the deployed state. In yet a further embodiment, the head member includes a cap structure that prevents undesired contact with other structures and supports the end of the tape in a manner that prevents the end of the tape from being deformed, i.e., preventing the transverse curve associated with the end of the tape from being deformed and potentially compromising the integrity of the tape.

In another embodiment of the deployable prop, the foot member includes a structure with a partially cylindrical surface that allows the prop to be positioned at different angles to the ground surface. Further, in a specific embodiment, the cylindrical surface facilitates the placement of the prop in the undeployed state by having a radius that is slightly smaller than the radius of the innermost winding of the tape. As such, the tape can be readily wound around the foot member to place the prop in the undeployed state.

In yet a further embodiment of the deployable prop, the foot member supports the tape such that the neutral axis of the deployed tape intersects the centroid/center of mass of the foot member. This increases the strength of the prop, i.e., increases the mass that can be supported by the deployed prop.

Another embodiment of the deployable prop, the foot member includes a tape stabilizer that engages the interior side of the end of the tape to which the foot member is attached and serves to support the deployed tape in a manner that prevents rotation of the deployed tape about its long axis, which could compromise the integrity of the tape.

In a further embodiment of the deployable prop, the lateral edges of the tape are covered in a sheath of tape or elastomeric material that is capable of accommodating the change in shape of the tape between the undeployed and deployed states. The sheath prevents the small slivers of material that are shed by some tape materials (e.g., carbon fiber) from penetrating a user's hand. In some embodiments, the tape or elastomeric material sheaths the lateral edges of the tape and top and bottom surfaces of the tape that extend between the lateral edges of the tape. In another embodiment, the tape or elastomeric material covers the end edges of the tape. In this embodiment, the tape or elastomer covering the end edges also forms head and/or foot members of the deployable prop. In this embodiment, the tape or elastomer has sufficient frictional properties to engage at least certain ground surfaces and certain objects so that the object can be supported as desired location against or adjacent to a surface. In one embodiment, a liquid elastomer is applied to an end of the tape (e.g., by dipping) and allowed to cure to form the head or foot member of the prop. If needed or desired, multiple coatings of the elastomer can be applied to an end of the tape to build up the bulk of the head or foot member.

Also provided is a method of supporting an object of interest adjacent to or against a structural surface with a prop. The method includes providing a deployable prop that includes a carpenter's tape in a rolled or undeployed state, causing the carpenter's tape to deploy such that the tape extends linearly from the first terminal end of the tape to the second terminal end of the tape, positioning the first end of the tape so as to operatively engage a ground surface, and positioning the second end of the tape so as to operatively engage the object of interest

20 comprises a tape 22, a foot member 24, and a head member 26. The tape 22 is capable of being placed in a deployed state and an undeployed state. Characteristic of the deployed state is that the tape extends linearly between its terminal ends and has a transverse curve between its lateral edges over substantially the entire length of the deployed tape. Characteristic of the undeployed tape is that the tape is disposed in an Archimedean spiral that extends between its terminal ends and there is substantially no transverse curve between the lateral edges of the tape. It should be appreciated that the tape can be placed in other undeployed states. For instance, the tape can be disposed so as to follow a serpentine path. However, characteristics of any undeployed state is that the terminal ends of the tape are closer to one another in the undeployed state than in the deployed state. In operation, the deployable prop 20 is transitioned from the undeployed state to the deployed state, the foot member 24 is placed into contact with a ground surface 28, and the head member 26 is positioned to contact with the object 30 so as to support the object at a desired location adjacent to a vertically extending surface 32. It should be appreciated that the ground surface 28 and vertically extending surface 32 need not be perpendicular to one another and need not be planar surfaces.

With reference to FIGS. 2A-2I, a second embodiment of a deployable prop 40 is described. The prop 40 includes a tape 42, a foot member 44, and a head member 46. In the illustrated embodiment, the tape 42 is a bistable "carpenter's" tape that has two stable states, a deployed state and an undeployed state. Characteristic of the deployed state is that the tape 42 extends substantially linearly from a first terminal end 48 to a second terminal end 50. In the illustrated embodiment, the length of the tape (i.e., distance from the first terminal end 48 to the second terminal end 50) is 5 ft. or about 1.52 m. A tape with greater or lesser length depending on the application and other physical characteristics of the prop is feasible. Also characteristic of the deployed state is that the tape 42 has a transverse curve between a first lateral edge 52 and a second lateral edge 54 that is present over substantially the entire length of the tape. The transverse curve in the illustrated embodiment is a circular curve that has an angular extent of about 265.degree.. The transverse curve can have a greater or lesser angular extent depending on the application and other physical characteristics of the prop is feasible. In the deployed state, the tape takes on the characteristics of a beam. Characteristic of the undeployed state is that the tape 42 is disposed in a roll (Archimedean spiral) in which the transverse curve present in the deployed state is no longer present. In the undeployed state, the width of the tape (i.e., the perpendicular distance between the first lateral edge 52 and the second lateral edge 54) is 2.5 inches or about 6.35 cm. A tape with greater or lesser width depending on the application and other physical characteristics of the prop is feasible. Characteristic of the bistable nature of the tape 42 is that, if the tape is in a state that is between the deployed and undeployed states, potential energy stored in the tape is applied and causes the tape to transition towards one of the two stable states. In the illustrated embodiment, the bistable carpenter's tape 42 is designed so that if a substantial portion of the tape is in the undeployed state and a small portion of tape adjacent the outermost terminal end of the tape is placed in a deployed tape, the tape transitions towards the deployed state. In the illustrated embodiment, the bistable carpenter's tape 42 is made from carbon fiber. However, bistable carpenter's tapes can also be made from fiberglass, Kevlar.TM. fiber, or other composite materials. Bistable tapes are well known in the art and can be obtained from various manufacturers with the desired physical characteristics (e.g., length, width, angular extent of transverse curve, and point/range over which the tape will transition towards one of the two stable states etc.). Among these manufacturers are RTL Materials Ltd., LoadPath, and Rocco, Inc.

With reference to FIGS. 2D and 2E, the foot member 44 comprises a ground engagement portion 58, an attachment tab 60, and a tape stabilizer portion 62. The ground engagement portion 58 has an outer surface 64 that has a partial-cylinder shape. The partial-cylinder shape, when in contact with flat ground, ensures that a portion of the ground engagement portion 58 is in contact with the ground over a substantial range of angles that the deployable prop might have relative to the ground. It should be appreciated that the ground does not necessarily need to be flat for the ground engagement portion 58 of the deployable prop to function. Further, it should also be appreciated that the "ground" need not be a horizontal surface but can be any surface that allows the deployable prop 40, when deployed, to hold an object against or adjacent to another surface. The ground engagement portion 58 is also preferably made of a thermoplastic elastomer that has a relatively high coefficient of friction that prevents slippage between the ground engagement portion 58 and the ground when the deployed prop is supporting an object adjacent to or against a surface. Materials with sufficient coefficients of friction other than a thermoplastic elastomer are also feasible.

