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(54) **FLEXIBLE MODULAR LIQUID DAM ASSEMBLY HAVING A MAGNETIC CONNECTION SYSTEM**

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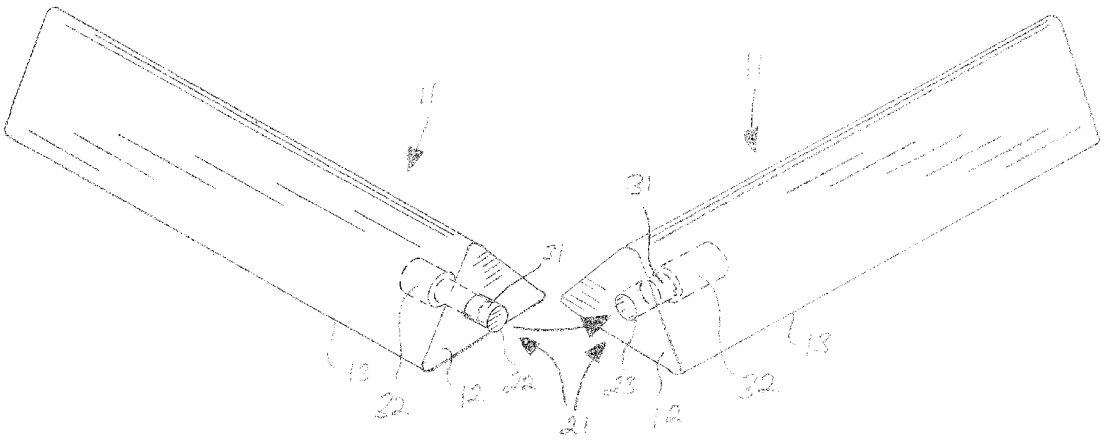
(57) **ABSTRACT**

A modular liquid dam comprising a plurality of individual elongated members or segments that can be assembled in an end-to-end relationship to form a temporary retainer or diverter on a substrate surface. The dam members are provided with a magnetic connection system having a magnet disposed within or exposed on the end of at least one adjacent dam member, the other adjacent dam member having a second magnet or metal member disposed within or exposed on its end, such that when the two dam members are abutted, the magnetic connection system maintains the dam members in abutting relationship. Structural mating members providing a mechanical or frictional fit may also be provided in the ends of the dam members to further enhance the connection in conjunction with the magnetic connection mechanism.



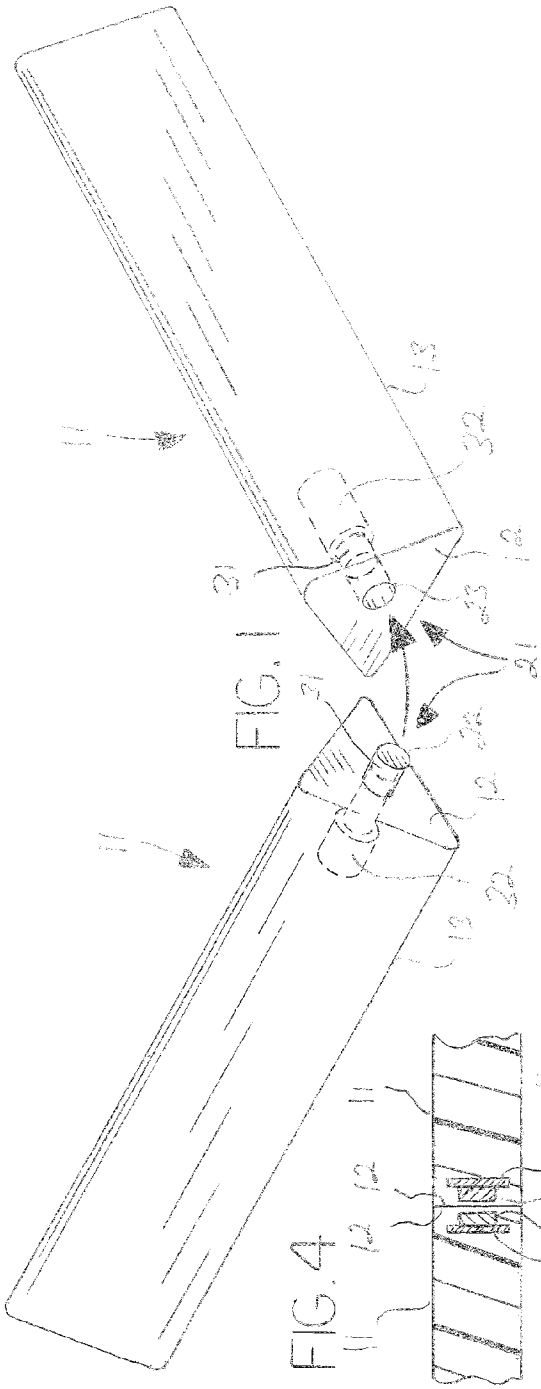


FIG. 1

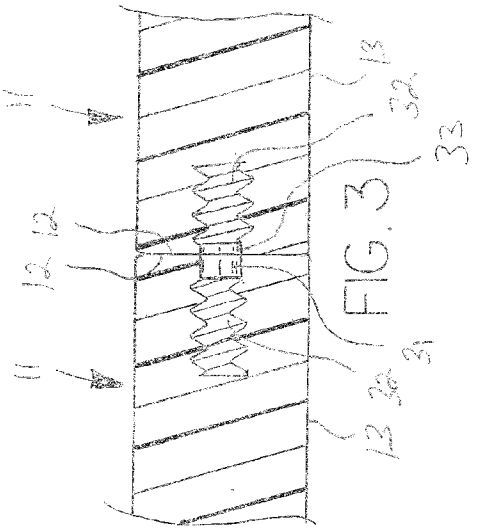


FIG. 3

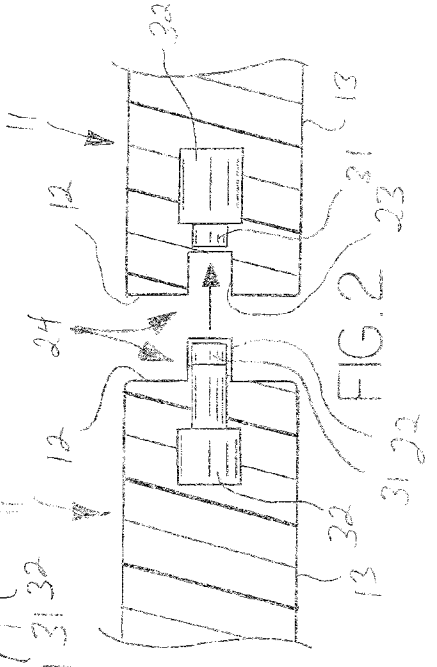


FIG. 2

FIG. 4

FLEXIBLE MODULAR LIQUID DAM ASSEMBLY HAVING A MAGNETIC CONNECTION SYSTEM

[0001] This application claims the benefit of United States Provisional Patent Application No. 61/872,201, filed Aug. 30, 2013.

BACKGROUND OF THE INVENTION

[0002] This invention relates generally to temporary liquid dams, dikes or barriers to retain or divert liquids on a surface, and more particularly to liquid dam assemblies of modular flexible components.

[0003] It is often desirable to retain or divert liquid flows of relatively small depth, such as a few inches, with liquid dams that can be quickly and easily installed as needed, such as for example when pipes burst, liquid containers leak or spills occur, especially indoors. It is well known to provide modular liquid dams that can be assembled as needed, the dams comprising elongated members formed of a generally soft or tacky polymer material (e.g., polyurethane or polyvinylchloride) such that the bottom of the dam members provide sufficient contact with the substrate surface to prevent passage of the liquid under the dam. It is preferred that the dam comprise a number of portable segments or members assembled end-to-end, as the modular nature of the dam allows for formation of many different configurations as required. The members are abutted to form an elongated barrier, and the members may be provided with joining mechanisms. Examples of such devices are shown in U.S. Pat. No. 4,031,676, U.S. Pat. No. 5,236,281, U.S. Pat. No. 5,454,195, U.S. Pat. No. 6,022,172, U.S. Pat. No. 6,588,979, and U.S. Pat. No. 8,454,269.

[0004] The efficacy of a modular liquid dam assembly depends significantly on the quality of the abutting connection between adjoining dam members. When the dam members comprise flat ends simply abutted together, it is often possible for liquid to pass between the dam members, especially since one dam member may shift relative to the other due to the force of the liquid or from outside influences. To address this various connection mechanisms have been developed. Some systems utilize mating members, such as a post member received within a socket member. Other systems utilize collars or other independent connectors that connect or encircle both adjoining ends. While such connection mechanisms may provide better security, they require extra time during assembly of the liquid dam, which may result in passage of liquid.

[0005] It is an object of this invention to provide a modular liquid dam assembly that provides a more secure connection mechanism for adjacent dam members which allows the dam members to be quickly and easily joined.

SUMMARY

[0006] In general the invention is a modular liquid dam assembly comprising a plurality of individual elongated members or segments that can be quickly and easily assembled in an end-to-end relationship to form a temporary retainer or diverter of varying configurations and dimensions on a substrate surface to retain or direct liquid flow on the substrate surface. The members are of sufficient weight and have a base or bottom surface, preferably planar, of sufficient width to preclude passage of liquid beneath the member when placed onto the substrate. The members are composed of a soft, compressible, flexible, non-rigid polymeric elastomer material, such as e.g., polyurethane, polyethylene or polyvinylchloride, having a density, flexibility and conformation characteristics that allow the bottom surface to conform to some degree with imperfections in the substrate in order to provide a better seal.

[0007] The adjacent dam members are provided with a magnetic connection mechanism or system comprising a magnet disposed within or exposed on the end of an adjacent dam member, the other adjacent dam member comprising a second magnet or a metal member disposed within or exposed on its end, such that when the two dam members are abutted, the magnetic connection maintains the dam members in abutting relationship. The ends of the dam members may be configured to include structural mating members providing a mechanical or frictional fit, such as a male/female combination of an extended post member received within a bore, to further enhance the connection in conjunction with the magnetic connection mechanism.

[0008] Alternatively presented, the invention is a modular dam assembly comprising a plurality of dam members adapted to be assembled in end-to-end relation and a magnetic connection system adapted to temporarily connect adjacent said dam members; each of said dam members having ends adapted to abut with the ends of adjacent said dam members in a manner that precludes passage of liquid between said dam members; wherein each of said dam members comprises a first magnet disposed on or adjacent one said end and a second magnet or a metal member disposed on or adjacent the other said end; wherein the combination of said first magnet member of one said dam member with said second magnet or metal member of an adjacent other said dam member define said magnetic connection system. In addition, the an assembly wherein said first magnet and either said second magnet or said metal member are covered by a thin layer of polymer, and/or wherein said magnets further comprise anchoring members, and/or wherein said metal members further comprise anchoring members. The assembly may further comprise a structural connection system adapted to temporarily connect adjacent said dam members in a mechanical interlocking manner.

[0009] Also presented is a method of assembling a modular dam assembly comprising the steps of providing a plurality of dam members; each of said dam members having ends adapted to abut with the ends of adjacent said dam members in a manner that precludes passage of liquid between said dam members; wherein each of said dam members comprises a first magnet disposed on or adjacent one said end and a second magnet or a metal member disposed on or adjacent the other said end; and wherein the combination of said first magnet member of one said dam member with said second magnet or metal member of an adjacent other said dam member connects said dam members; positioning two of said dam members in end-to-end abutting relation such that said first magnets of one said dam member magnetically connect with said second magnet or said metal member or an adjacent said dam member; and connecting additional dam members in like manner as required to complete said modular dam assembly. Additionally, wherein said step of providing a plurality of dam members comprises providing dam members comprising structural connection systems adapted to connect adjacent said dam members in mechanical interlocking manner; and wherein said step of positioning two of said dam members and said step of connecting additional dam members comprises interlocking adjacent said dam members.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. **1** is a perspective view of one embodiment of the invention showing a pair of dam members prior to abutment.

[0011] FIG. **2** is a partial longitudinal cross-sectional view of the dam members of the embodiment of FIG. **1**.

[0012] FIG. **3** is a partial longitudinal cross-sectional view of another embodiment showing a magnetic connection system comprising a magnet member and a metal member.

[0013] FIG. **4** is a partial longitudinal cross-sectional view of another embodiment showing a magnetic connection system wherein the magnet members are disposed in the planar ends of the dam members and covered by a thin layer of polymer material.

DETAILED DESCRIPTION

[0014] The invention in various representative embodiments will now be described with reference to the drawings. In general the embodiments present a modular liquid dam, dike or barrier assembly comprising a plurality of individual elongated dam members or segments **11** having ends **12** such that multiple dam members **11** can be assembled or abutted in an end-to-end relationship to form a temporary retainer or diverter to retain or direct liquid on a substrate surface. The configuration of the ends **12** may be generally flat and perpendicular to the longitudinal axis as shown FIG. **3**, or they may be curved or angled in corresponding manner, or they may be formed with interlocking or interfitting three-dimensional mating structures or configurations, as shown for example in FIGS. **1** and **2**.

[0015] The dam members **11** are of sufficient weight and have a base or bottom surface **13**, preferably planar, of sufficient width to preclude passage of liquid beneath the dam member **11** when placed onto the substrate. The dam members **11** are composed of a non-rigid polymer material, such as e.g., polyurethane or polyvinylchloride, having a density and flexibility that allows the bottom surface **13** to conform to some degree with imperfections in the substrate in order to provide a better seal. The upper configuration of the dam member **11** may vary, and may for example be triangular (as shown), rectangular, curved, etc. in cross-section. Dam members possessing the characteristics described above are known in the industry.

[0016] The dam members **11** are provided with a magnetic connection system or assembly **21**. The connection system **21** is a combination of members and may comprise a pair of magnets **31**, as shown in FIGS. **1** and **2**, or a single magnet **31** in combination with a metal member **33**, as shown in FIG. **3**. In a basic embodiment, each dam member **11** comprises first and second magnets **31** mounted one at each end **12**. The magnets **31** are oriented such that opposite polarities are directed outwardly. The magnets **31** may be embedded in the dam member end **12** such that the end of each magnet **31** is exposed, or the magnets **31** may be embedded a small distance inside the dam member end **12** such that a thin layer of polymer material covers each magnet **31** to protect the magnets **31**, the layer being of insufficient thickness to interfere with the magnetic properties of the magnets **31**. Preferably the magnets **31** are provided with anchoring members **32**, which may comprise any physical construct that increases retention of the magnet **31** within the dam member **11**. For example, the anchoring member **32** may comprise a shaft of increased diameter (as shown in FIGS. **1** and **2**), a plate member (as shown in FIG. **4**), a threaded rod (as shown in FIG. **3**), radially extending legs, etc., embedded within the body of the dam member **11** to prevent removal of the magnet **31** from the dam member **11**.

[0017] Alternatively, a first magnet **31** may be utilized in one dam member **11** and a metal member **33** may be utilized in the adjacent dam member **11**, the metal member **33** being composed of a material that is attracted by the magnet **31**. As before, anchoring members **32** are preferably provided to better secure the magnets **31** and metal members **32** within the dam members **11**.

[0018] The magnetic connection mechanism **21** should be chosen such that the connection is suitably strong to resist separation from the forces expected to be encountered during normal use, but not so strong that separation of the dam members **11** is not readily accomplished when the dam assembly is to be disassembled. For example, a magnet **31** with a diameter of approximately ¾ inches and pull strength of approximately 66 pounds has been shown to be suitable.

[0019] A structural connection or mating system **24** having members capable of interfitting or interlocking may be provided such that in addition to the magnetic connection system **21** a mechanical or friction fit is achieved between adjoining dam members **11** when assembled. For example, structural connection system **24** may comprise a male post member **22** received by a corresponding female socket member **23**, as shown in FIGS. **1** and **2**. The magnets **31** are then able to act in addition to the physical connection, one magnet **31** being mounted in the post member **22** and the other magnet **31** being mounted at the base of the socket member **23**, thus increasing the efficacy of the abutment. As before, a single magnet **31** in combination with a metal member **33** may also be utilized.

[0020] In this manner a plurality of dam members **11** may be formed and stored until needed to retain or direct a liquid. When required, the dam members **11** are quickly assembled end-to-end to define the elongated liquid barrier. After the need for retention or diversion of the liquid has passed, the dam members **11** are quickly and easily disassembled.

[0021] The embodiments discussed above and the figures are meant to be illustrative and not limiting. It is contemplated that equivalents and substitutions for elements set forth above may be obvious to those of skill in the art, and therefore the true scope and definition of the invention is to be as set forth in the following claims.

We claim:

1. A modular dam assembly comprising a plurality of dam members adapted to be assembled in end-to-end relation and a magnetic connection system adapted to temporarily connect adjacent said dam members;

each of said dam members having ends adapted to abut with the ends of adjacent said dam members in a manner that precludes passage of liquid between said dam members;

wherein each of said dam members comprises a first magnet disposed on or adjacent one said end and a second magnet or a metal member disposed on or adjacent the other said end;

wherein the combination of said first magnet member of one said dam member with said second magnet or metal member of an adjacent other said dam member define said magnetic connection system.

2. The assembly of claim **1**, wherein said first magnet and either said second magnet or said metal member are covered by a thin layer of polymer.

3. The assembly of claim **1**, wherein said magnets further comprise anchoring members.

4. The assembly of claim **3**, wherein said metal members further comprise anchoring members.

5. The assembly of claim **1**, further comprising a structural connection system adapted to temporarily connect adjacent said dam members in a mechanical interlocking manner.

6. The assembly of claim **2**, further comprising a structural connection system adapted to temporarily connect adjacent said dam members in a mechanical interlocking manner.

7. The assembly of claim **3**, further comprising a structural connection system adapted to temporarily connect adjacent said dam members in a mechanical interlocking manner.

8. The assembly of claim **4**, further comprising a structural connection system adapted to temporarily connect adjacent said dam members in a mechanical interlocking manner.

9. The assembly of claim **5**, wherein said structural connection system comprises the combination of a post and socket.

10. The assembly of claim **3**, wherein said anchoring member comprises a shaft of increased diameter.

11. The assembly of claim **3**, wherein said anchoring member comprises a plate member.

12. The assembly of claim **3**, wherein said anchoring member comprises a threaded rod.

13. A modular dam assembly comprising a plurality of dam members adapted to be assembled in end-to-end relation;

each of said dam members having ends adapted to abut with the ends of adjacent said dam members in a manner that precludes passage of liquid between said dam members;

wherein each of said dam members comprises a first magnet disposed on or adjacent one said end and a second magnet or a metal member disposed on or adjacent the other said end;

wherein the combination of said first magnet member of one said dam member with said second magnet or metal member of an adjacent other said dam member connects said dam members.

14. The assembly of claim **13**, wherein said first magnet and either said second magnet or said metal member are covered by a thin layer of polymer.

15. The assembly of claim **13**, wherein said magnets further comprise anchoring members.

16. The assembly of claim **15**, wherein said metal members further comprise anchoring members.

17. The assembly of claim **13**, further comprising a structural connection system adapted to temporarily connect adjacent said dam members in a mechanical interlocking manner.

18. The assembly of claim **15**, further comprising a structural connection system adapted to temporarily connect adjacent said dam members in a mechanical interlocking manner.

19. A method of assembling a modular dam assembly comprising the steps of:

providing a plurality of dam members; each of said dam members having ends adapted to abut with the ends of adjacent said dam members in a manner that precludes passage of liquid between said dam members; wherein each of said dam members comprises a first magnet disposed on or adjacent one said end and a second magnet or a metal member disposed on or adjacent the other said end; and wherein the combination of said first magnet member of one said dam member with said second magnet or metal member of an adjacent other said dam member connects said dam members;

positioning two of said dam members in end-to-end abutting relation such that said first magnets of one said dam member magnetically connect with said second magnet or said metal member or an adjacent said dam member; and

connecting additional dam members in like manner as required to complete said modular dam assembly.

20. The method of claim **19**, wherein said step of providing a plurality of dam members comprises providing dam members comprising structural connection systems adapted to connect adjacent said dam members in mechanical interlocking manner; and

wherein said step of positioning two of said dam members and said step of connecting additional dam members comprises interlocking adjacent said dam members.

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