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Turner

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(54) **LINE RETRIEVAL SYSTEM AND METHOD**

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B65H 59/00 (2006.01)

(52) **U.S. Cl.** ..... **254/134.3 FT**; 254/134.3 R

(58) **Field of Classification Search** ..... 254/134.3 FT, 254/134.3 R, 134.4, 134.5; 294/65.5
See application file for complete search history.

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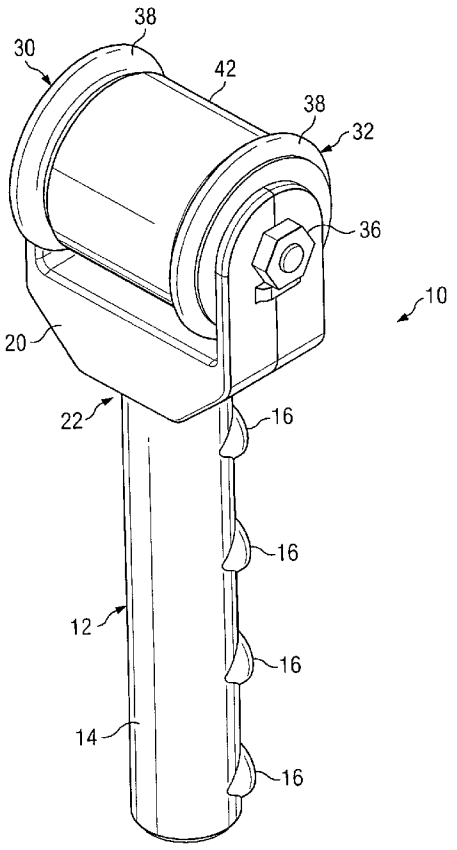
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(57) **ABSTRACT**

A line retrieval system comprises a retrieval device having a radially magnetized magnet adapted to be magnetically coupled to an object disposed on an opposite side of a structure for drawing the object in a desired direction relative to the structure.

3 Claims, 4 Drawing Sheets



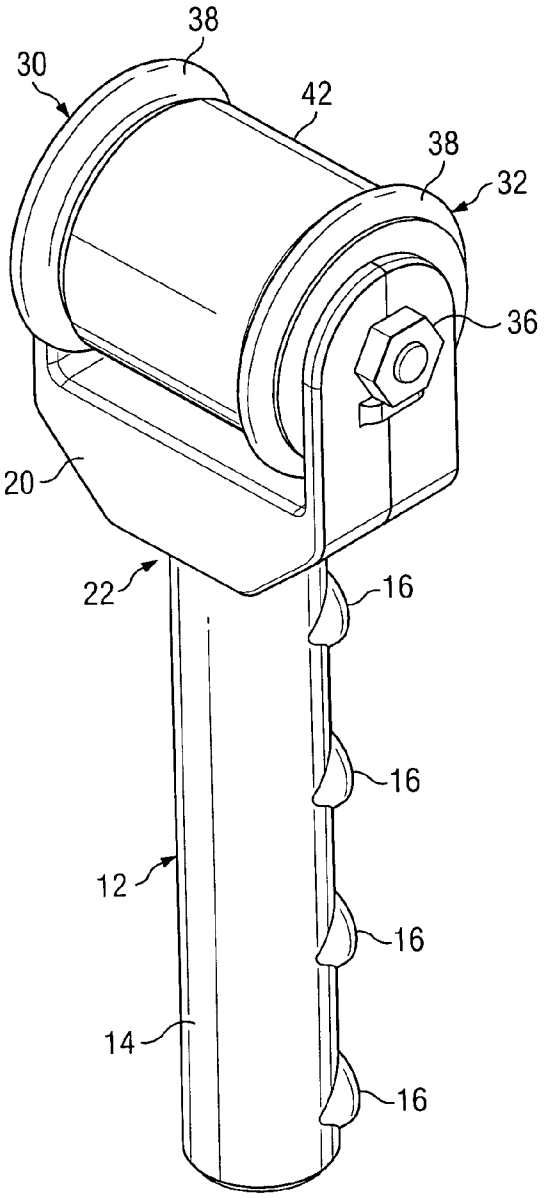

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FIG. 1

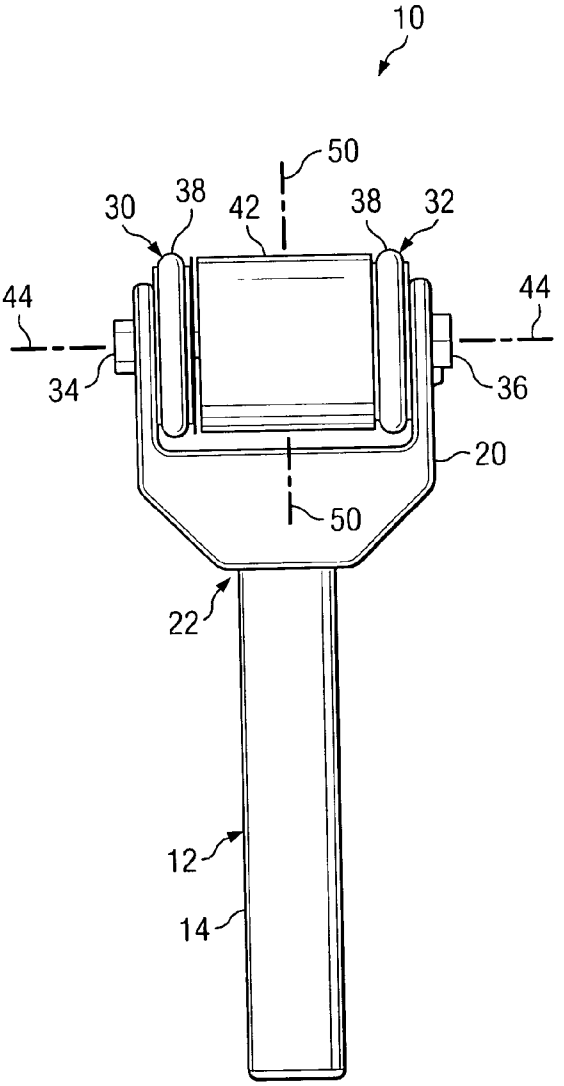

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FIG. 2A

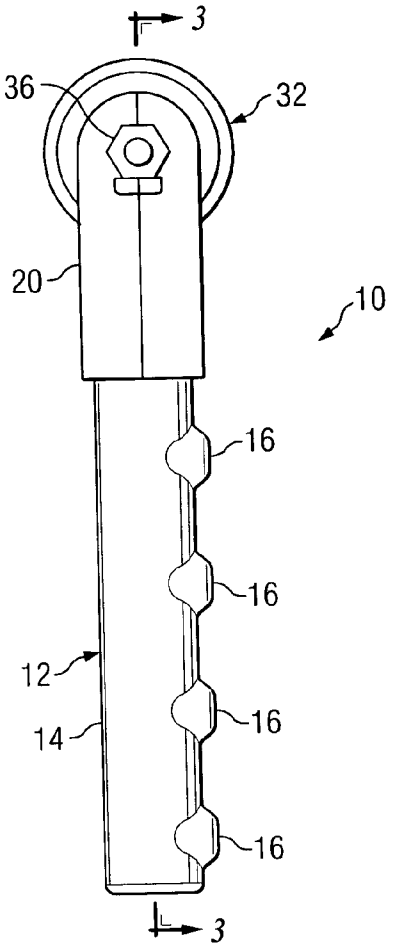


FIG. 2B

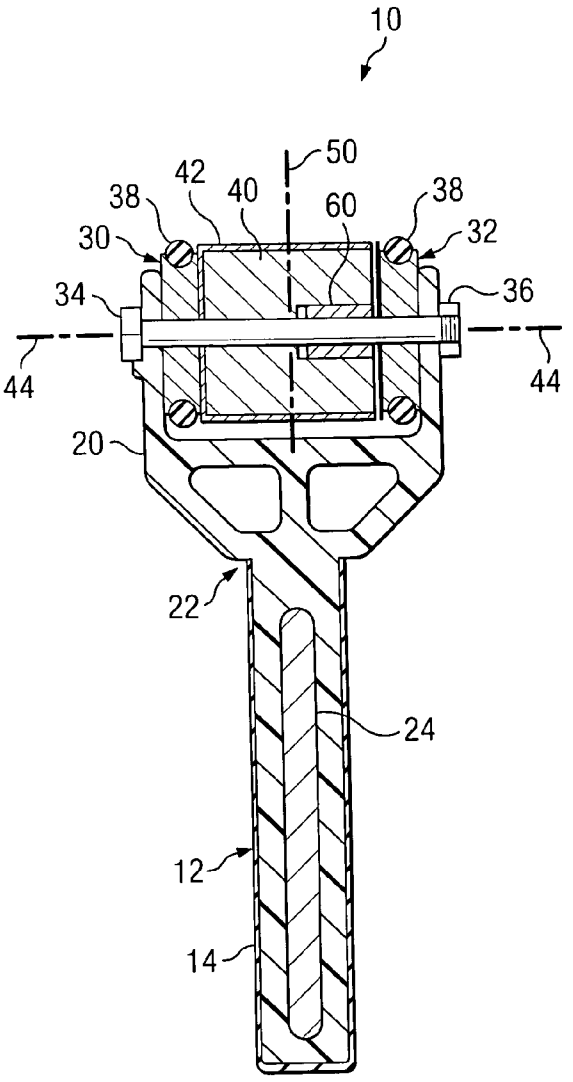


FIG. 3

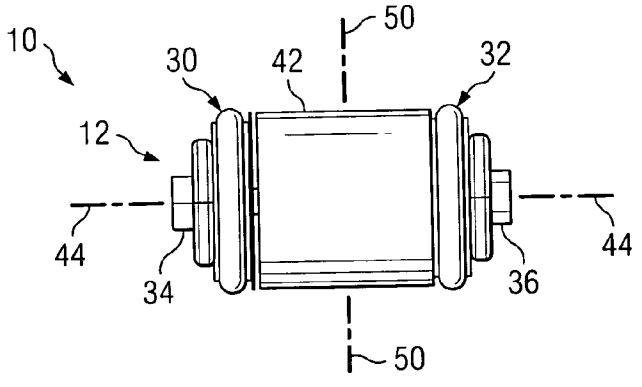


FIG. 2C

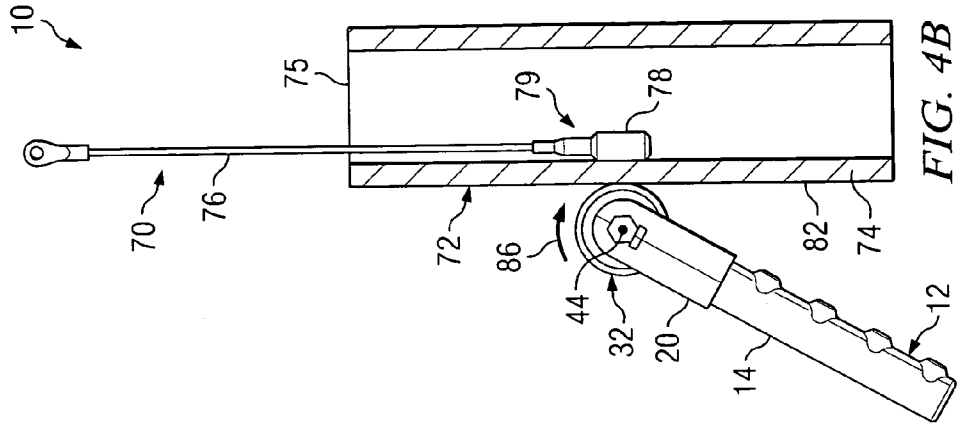

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FIG. 4B

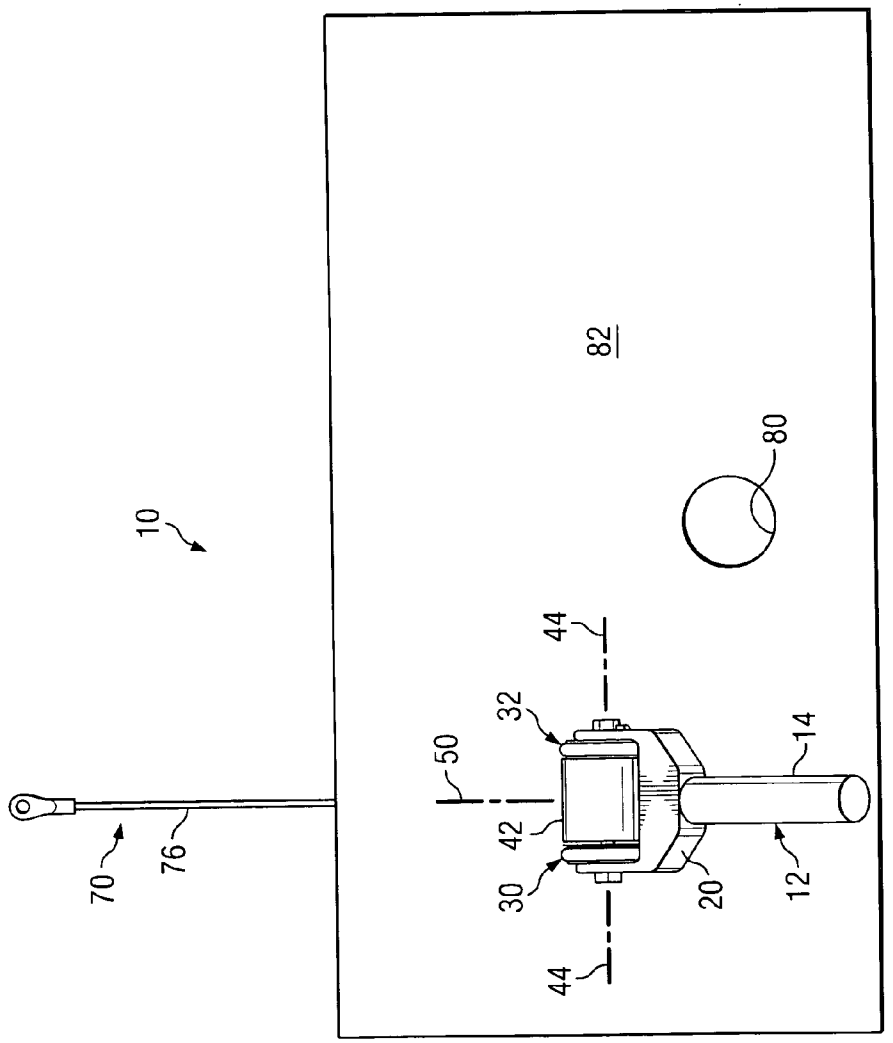

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FIG. 4A

FIG. 4C

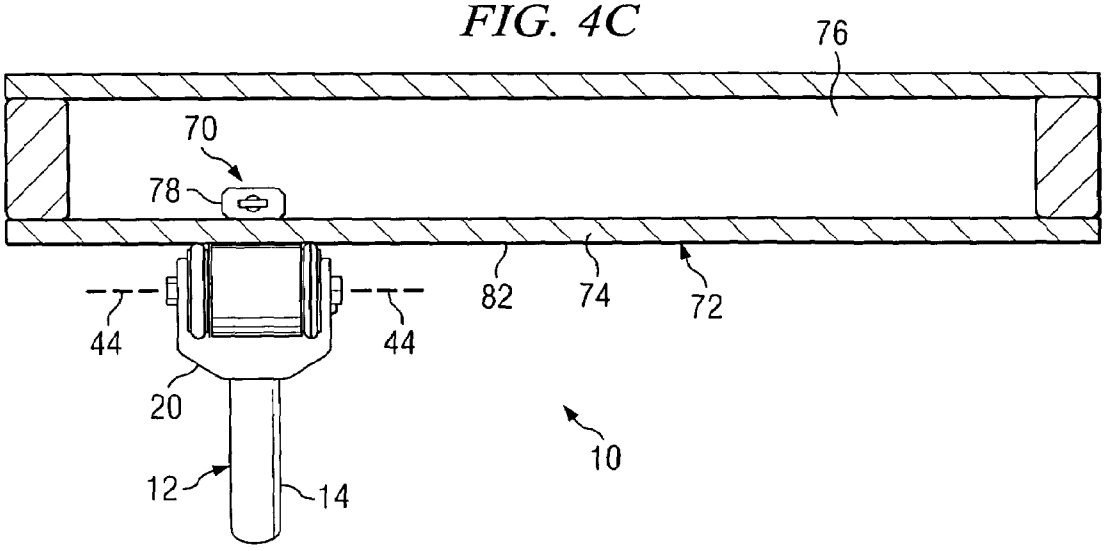
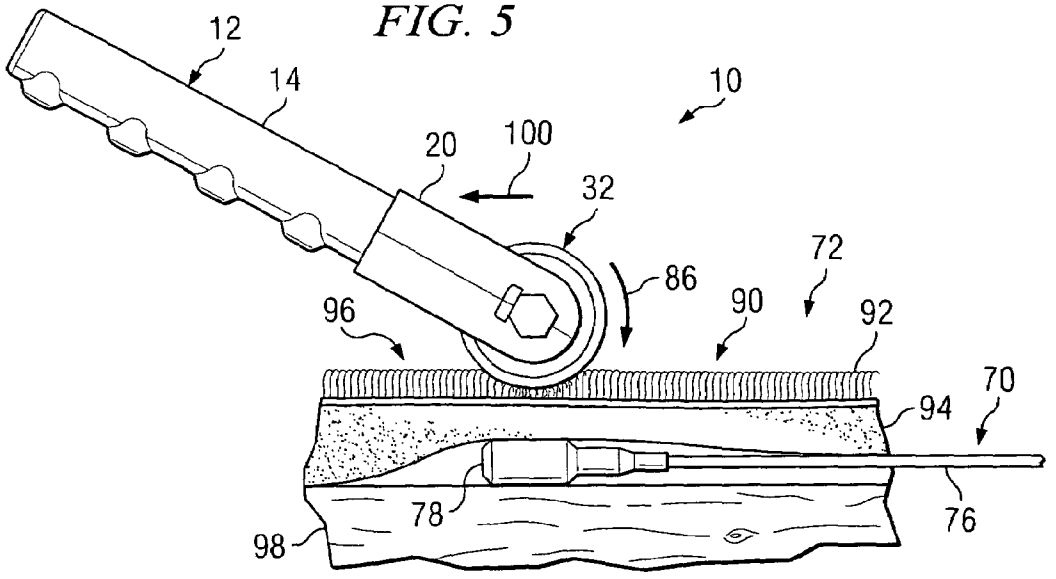

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FIG. 5


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96
90
92
70
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76
98

LINE RETRIEVAL SYSTEM AND METHOD

BACKGROUND OF THE INVENTION

In the past, the most commonly used method of locating and/or drawing a wire or line within a wall or behind any other type of structure involved cutting a small hole in a portion of the structure, inserting a hooked rod through the hole, and attempting to snare and retrieve the line through the hole. This method involves considerable guesswork and error and is not easy to do even for an experienced technician.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a diagram illustrating a perspective view of an embodiment of a line retrieval system in accordance with the present invention;

FIG. **2**A is a diagram illustrating a plan view of the line retrieval system illustrated in FIG. **1**;

FIG. **2**B is a diagram illustrating a side view of the line retrieval system illustrated in FIGS. **1** and **2**A;

FIG. **2**C is a diagram illustrating a top view of the line retrieval system illustrated in FIGS. **1**, **2**A and **2**B;

FIG. **3** is a diagram illustrating a section view of the line retrieval system illustrated in FIGS. **1** and **2**A-**2**C taken along the line **3**-**3** of FIG. **2**B;

FIG. **4**A is a diagram illustrating a plan view of the line retrieval system illustrated in FIGS. **1**-**3** relative to an enclosure;

FIG. **4**B is a diagram illustrating a side view of the line retrieval system illustrated in FIG. **4**A relative to an enclosure;

FIG. **4**C is a diagram illustrating a top view of the line retrieval system illustrated in FIG. **4**A relative to an enclosure; and

FIG. **5** is a diagram illustrating a plan view of the line retrieval system illustrated in FIGS. **1**-**3** relative to floor covering.

DETAILED DESCRIPTION OF THE DRAWINGS

FIGS. **1** through **5** are diagrams illustrating a line retrieval system **10** in accordance with one embodiment of the present invention. As best illustrated in FIGS. **1**-**3**, system **10** comprises a line retrieval device **12** having a handle **14** to enable grasping and/or manipulating thereof by a user of device **12**. In the embodiment illustrated in FIGS. **1**-**3**, handle **14** is configured having protrusions **16** to facilitate gripping and/or handling of retrieval device **12**. However, it should be understood that retrieval device **12** may be configured without protrusions **16**.

In the embodiment illustrated in FIGS. **1**-**3**, retrieval device **12** comprises a yoke **20** disposed at an end **22** of handle **14**. As best illustrated in FIG. **3**, handle **14** and yoke **20** are preferably configured as being integral with one another (e.g., formed as a single and/or unitary member). However, it should be understood that retrieval device **12** may be otherwise configured (e.g., yoke **20** configured being couplable to end **22** of handle **14** using fasteners, threaded engagement, etc.). In the embodiment illustrated in FIGS. **1**-**3**, retrieval device **12** is configured from a lightweight plastic or polymer material having a weighted insert **24** disposed within handle **14**. However, it should be understood that retrieval device **12** may be otherwise configured.

In the embodiment illustrated in FIGS. **1**-**3**, retrieval device **12** comprises rollers **30** and **32** rotatable coupled to yoke **20** via a bolt **34** and nut **36** arrangement. However, it should be understood that rollers **30** and **32** may be otherwise rotatably coupled to yoke **20**. Further, in the embodiment illustrated FIGS. **1**-**3**, two rollers **30** and **32** are illustrated. However, it should be understood that retrieval device **12** may be configured having a greater or lesser quantity of rollers. In the embodiment illustrated in FIGS. **1**-**3**, rollers **30** and **32** each comprise an elastomer member **38** to facilitate a desired level of friction between rollers **30** and **32** and a surface against which rollers **30** and **32** are placed to facilitate rotational movement of rollers **30** and **32** and to, preferably, avoid sliding of rollers **30** and **32** along such surface, thereby avoiding or preventing possible damage to such surface. However, it should be understood that rollers **30** and **32** may be otherwise configured.

In the embodiment illustrated in FIGS. **1**-**3**, retrieval device **12** comprises a magnet **40** rotatably coupled to yoke **20** via bolt **34**. In the embodiment illustrated in FIGS. **1**-**3**, magnet **40** is configured having a cylindrical shape. However, it should be understood that magnet **40** may be otherwise geometrically configured. In the embodiment illustrated in FIGS. **1**-**3**, magnet **40** is disposed within a rotatable sleeve **42**. Sleeve **42** is configured as being rotatable to facilitate rotation thereof relative to a surface against which device **12** is placed in response to, for example, an imperfection, irregularity or other type of condition on such surface. Sleeve **42** further facilitates movement or rolling of device **12** over a surface against which device **12** is placed when such surface comprises a non-hard surface, such as a carpet, where, for example, rollers **30** and **32** may be prevented from adequately engaging such surface to enable rotational movement of rollers **30** and **32**. Sleeve **42** also protects magnet **40** disposed therein. Preferably, sleeve **42**, magnet **40** and rollers **30** and **32** are configured to rotate independently relative to each other about an axis **44** defined by bolt **44**. For example, by having at least rollers **30** and **32** independently rotatable, device **12** may be easily turned or otherwise maneuvered relative to a surface against which device **12** is placed. Further, in some embodiments of the present invention, sleeve **42** and, correspondingly, magnet **40**, are disposed set back a predetermined distance from an outer periphery or circumference of rollers **30** and **32** to facilitate independent rotation of sleeve **42** and/or magnet **40** relative to rollers **30** and **32** when device is placed against a surface. However, the dimensional and/or rotational characteristics of sleeve **42**, magnet **40** and rollers **30** and **32** may be otherwise configured.

In the embodiment illustrated in FIGS. **1**-**3**, magnet **40** is radially magnetized such that the poles of magnet **40** (e.g., an axis formed by the north and south poles of magnet **40** indicated generally by arrow **50**) are disposed substantially perpendicular to axis **44**. Thus, in the embodiment illustrated in FIGS. **1**-**3**, magnet **40** is radially magnetized to facilitate rotation of magnet about axis **44** in response to a magnetic field disposed proximate thereto. In the embodiment illustrated in FIGS. **1**-**3**, retrieval device **12** also comprises a clutch mechanism **60** coupled to magnet **40** to maintain unidirectional rotation of magnet **40** about axis **44**. However, it should be understood that other devices or methods may be used to maintain unidirectional rotation of magnet **40** relative to retrieval device **12**.

FIGS. **4**A-C are diagrams illustrating a plan view, side view, and top view, respectively, of system **10** in accordance with the present invention. In operation, retrieval device **12** is used to locate, draw and/or retrieve an object **70** located on an opposite side of a structure **72** relative to retrieval device **12**. For example, in the embodiment illustrated in FIGS. **4**A-**4**C, structure **72** comprises a wall **74** of an enclosure **75** (e.g., such as a wall of a structure having an open interior space). In the

embodiment illustrated in FIGS. **4**A-**4**C, object **70** comprises a line **76** which may comprise, or may be coupled to, a telephone line, optical or coaxial cable, electric wire, or other type of cable, wire, conduit or other structure of which retrieval is desired. Preferably, object **70** comprises a magnet **78** coupled to an end **79** of line **76** for magnetically coupling with magnet **40** (FIG. **3**) of device **12**. However, it should be understood that any type of object generally attracted to and/or otherwise affected by magnetic fields may be coupled to and/or otherwise form a part of object **70**. Further, as best illustrated in FIG. **4**A, a hole or other type of opening **80** may be formed in structure **72** (e.g., within wall **74** of enclosure **75**) to facilitate retrieval of object **70** therethrough.

In operation, a technician or other user disposes retrieval device **12** in close proximity to and/or in contact with a surface **82** of structure **72**. Magnet **40** (FIG. **3**) rotates about axis **44** relative to yoke **20** in the direction indicated by arrow **86** to magnetically couple to object **70** (e.g., magnet **78**). For example, as discussed above, magnet **40** is configured to rotate about axis **44** relative to yoke **20** to facilitate magnetic coupling of magnet **40** to magnet **78** regardless of which pole of magnet **78** is disposed facing towards retrieval device **12**. For example, because magnet **40** is rotatable about axis **44**, and because magnet **40** is radially magnetized, magnet **40** rotates relative to yoke **20** in response to a pole of magnet **78** disposed facing retrieval device **12**. Once magnet **40** is magnetically coupled to object **70** (e.g., magnet **78**), retrieval device **12** may be moved and/or otherwise rolled along surface **82** of structure **72** (e.g., via rollers **30** and **32**) toward opening **80**, thereby drawing object **70** toward opening **80** to facilitate retrieval of object **70** through opening **80**. Further, insert **24** facilitates vertical downward movement of device **12** relative to structure **72**. For example, after object **70** and magnet **40** are magnetically coupled, a user may release device **12** and feed object **70** downwardly within enclosure **75** such that as object **70** moves downwardly within enclosure **75**, insert **24** maintains generally vertical movement of device **12** relative to enclosure **75**.

Embodiments of the present invention also provide enhanced magnetic coupling of retrieval device **12** with object **70**. For example, as described above, in some embodiments of the present invention, retrieval device **12** comprises a clutch mechanism **60** to maintain unidirectional rotation of magnet **40** about axis **44**. Referring to FIG. **4**B, clutch mechanism **60** maintains rotation of magnet **40** only in the direction indicated by arrow **86** about axis **44** such that, in response to rolling movement of retrieval device **12** relative to structure **72**, a pole of magnet **40** magnetically coupled to magnet **78** maintains a position generally perpendicular to surface **82** of structure **72**, thereby maintaining a greater magnetic coupling of magnet **40** to magnet **78**.

FIG. **5** is a diagram illustrating operation of system **10** where structure **72** comprises a floor covering **90** (e.g., a carpet **92** and carpet padding **94**). As described above, device **12** is disposed in close proximity to and/or in contact with a surface **96** of floor covering **90**. In the embodiment illustrated in FIG. **5**, object **70** (e.g., line **76** and magnet **78**) are disposed between floor covering **90** and an underlying structure **98**. In response to the magnetic field generated by magnet **78** (e.g., depending on the pole of magnet **78** facing device **12**), magnet **40** (FIG. **3**) rotates, as needed, relative to device **12** to rotatably couple to magnet **78** (e.g., to align a pole of magnet **40** attracted to a corresponding pole of magnet **78** facing device **12**). In the embodiment illustrated in FIG. **5**, device **12** may then be rolled along surface **96** of floor covering **90** (e.g., via rollers **30** and **32**) in the direction indicated generally by arrow **100** to draw object **70** in the direction **100** relative to floor covering **90**.

Further, as described above, clutch mechanism **60** (FIG. **3**) maintains unidirectional rotation of magnet **40** relative to device **12** in the direction indicated by **86** such that, in response to movement of device **12** in the direction **100**, magnet **40** is prevented from rotating in a direction opposite direction **86** which may otherwise result from rolling of device **12** in the direction **100**, thereby enhancing the magnetic coupling of magnet **40** to magnet **78**. Therefore, as a result of maintaining unidirectional rotation of magnet **40** relative to device **12**, a pole of magnet **40** magnetically attracted to a corresponding pole of magnet **78** is maintained in a substantially perpendicular relationship relative to surface **96** of structure **70** and in substantial axial alignment with the pole of magnet **78** facing magnet **40**. Accordingly, embodiments of the present invention maintain an enhanced magnetic coupling between magnet **40** and magnet **78** by maintaining magnet **40** in a position relative to magnet **78** where the magnetic forces coupling magnets **40** and **78** are greatest (e.g., directionally aligned with each other). Additionally, sleeve **42** enables easier and/or smoother movement of device **12** over and/or relative to structure **72** (e.g., floor covering **90**). For example, sleeve **42** is adapted to rotate relative to device **12**, thereby reducing an amount of friction between device **12** and structure **72** (e.g., floor covering **90**) that may be otherwise present resulting from contact between device **12** and structure **72** (e.g., resulting especially from different types or heights of carpet or other types of floor coverings).

What is claimed is:

1. A retrieval system, comprising:

a first magnet locatable on a first side of a structure, the first magnet being radially magnetized, the first magnet magnetically couplable to a second magnet disposed on a second side of the structure opposite the first side, the first and second magnets movable relative to the structure to move an object coupled to one of the first and second magnets relative to the structure.

2. The system of claim **1**, wherein the first magnet comprises a cylindrical magnet.

3. The system of claim **1**, wherein the first magnet is rotatably disposed within a sleeve.

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