Claims

What is claimed is:

1. An endoscopic system comprising:

an outer assembly, the outer assembly formed as an elongated body and having:

a proximal end;

a distal end;

a first outer pressure cavity provided through the outer assembly between the proximal and distal ends of the outer assembly;

a second outer pressure cavity provided through the outer assembly between the proximal and distal ends of the outer assembly;

a main cavity provided through the outer assembly between the proximal and distal ends of the outer assembly; and

an outer anchor assembly provided at the distal end of the outer assembly, the outer anchor assembly including:

a first expandable member connected to the first outer pressure cavity and configurable to expand radially outwards upon receiving a positive pressure from the first outer pressure cavity; and

a first outer pressure opening connected to the second outer pressure cavity, the first outer pressure opening provided adjacent to the first expandable member, the first outer pressure opening selectively configurable to transition between applying a negative pressure and applying a positive pressure; and

a main assembly, the main assembly formed as an elongated body and having at least a portion of its elongated body housed in the main cavity of the outer assembly, the main assembly having:

a proximal end;

a distal end;

a first main pressure cavity provided through the main assembly between the proximal and distal ends of the main assembly;

a second main pressure cavity provided through the main assembly between the proximal and distal ends of the main assembly;

a plurality of movement cavities provided through the main assembly between the proximal and distal ends of the main assembly in such a way that the plurality of movement cavities are spaced around a center line axis formed by the elongated body of the main assembly;

a navigation section formed at the distal end of the main assembly, the navigation section having:

an instrument;

a second expandable member connected to the first main pressure cavity and configurable to expand radially outwards upon receiving a positive pressure from the first main pressure cavity;

a bendable section having a plurality of subsections, including a most distal subsection at a distal end of the bendable section and a most proximal subsection at a proximal end of the bendable section, the plurality of subsections connected in a linear arrangement, each subsection pivotally moveable relative to an adjacent subsection, each subsection having a plurality of openings provided around its center;

an extendible section having a proximal end and a distal end; and

a first main pressure opening connected to the second main pressure cavity, the first main pressure opening selectively configurable to transition between applying a negative pressure and applying a positive pressure, the extendible section configured to extend and contract to change a distance between the proximal end and the distal end of the extendible section and to change a distance between the first main pressure opening and the distal end of the main assembly; and

a plurality of tendon members, each tendon member housed in one of the movement cavities, each tendon member having a length greater than a length of the outer assembly;

wherein each tendon member extends through one of the subsection openings of the most proximal subsection, wherein a distal end of each tendon member is in communication with a location of the most distal subsection that is aligned to the subsection opening of the most proximal subsection that received the tendon member, and wherein at least a distal end of the bendable section is configurable to bend when a force is applied to one of the tendon members.

2. The endoscopic system of claim 1, wherein the outer assembly further includes a second outer pressure opening, the second outer pressure opening provided adjacent to the first expandable member in such a way that the first expandable member is provided between the first outer pressure opening and the second outer pressure opening, the second outer pressure opening selectively configurable independently from the first outer pressure opening to transition between applying a negative pressure and applying a positive pressure.

3. The endoscopic system of claim 1, wherein the main assembly further includes a second main pressure opening, the second main pressure opening selectively configurable independently from the first main pressure opening to transition between applying a negative pressure and applying a positive pressure.

4. The endoscopic system of claim 1, further comprising:

a first pressure source for providing the positive pressure and/or the negative pressure to the first outer pressure opening via the second outer pressure cavity;

a second pressure source for providing at least the positive pressure to the first expandable member via the first outer pressure cavity;

a third pressure source for providing the positive pressure and/or the negative pressure to the first main pressure opening via the second main pressure cavity; and

a fourth pressure source for providing at least the positive pressure to the second expandable member via the first main pressure cavity.

5. The endoscopic system of claim 1, wherein the instrument includes an image capturing assembly.

6. The endoscopic system of claim 1,

wherein the outer assembly further includes a third expandable member configurable to expand radially outwards upon receiving a positive pressure; and

wherein the third expandable member is provided in such a way that the first outer pressure opening is provided between the first expandable member and the third expandable member.

7. The endoscopic system of claim 3,

wherein the navigation section further includes a fourth expandable member configurable to expand radially outwards upon receiving a positive pressure; and

wherein the fourth expandable member is provided in such a way that the second main pressure opening is provided between the second expandable member and the fourth expandable member.

8. The endoscopic system of claim 1, wherein the plurality of tendon members includes a first tendon member, wherein the most distal subsection of the bendable section includes a first opening provided between a center and of the most distal subsection and a side of the most distal subsection, wherein the first tendon member is provided through the first opening of the most distal subsection, wherein the distal end of the bendable section is configurable to bend in a first direction when a pushing force is applied to the first tendon member, and wherein the distal end of the bendable section is configurable to bend in a second direction opposite to the first direction when a pulling force is applied to the first tendon member.

9. An endoscopic system comprising:

an outer assembly, the outer assembly formed as an elongated body and having:

a proximal end;

a distal end;

a first outer pressure cavity provided through the outer assembly between the proximal and distal ends of the outer assembly;

a second outer pressure cavity provided through the outer assembly between the proximal and distal ends of the outer assembly;

a main cavity provided through the outer assembly between the proximal and distal ends of the outer assembly; and

an outer anchor assembly provided at the distal end of the outer assembly, the outer anchor assembly including:

a first expandable member connected to the first outer pressure cavity and configurable to expand radially outwards upon receiving a positive pressure from the first outer pressure cavity; and

a first outer pressure opening connected to the second outer pressure cavity, the first outer pressure opening provided adjacent to the first expandable member, the first outer pressure opening selectively configurable to apply a negative pressure; and

a main assembly, the main assembly formed as an elongated body and having at least a portion of its elongated body housed in the main cavity of the outer assembly, the main assembly having:

a proximal end;

a distal end;

a first main pressure cavity provided through the main assembly between the proximal and distal ends of the main assembly;

a second main pressure cavity provided through the main assembly between the proximal and distal ends of the main assembly;

a plurality of movement cavities including at least a first movement cavity, a second movement cavity, and a third movement cavity, the plurality of movement cavities provided through the main assembly between the proximal and distal ends of the main assembly in such a way that the plurality of movement cavities are spaced around a center line axis formed by the elongated body of the main assembly;

a navigation section formed at the distal end of the main assembly, the navigation section having a serial arrangement of:

an instrument;

a second expandable member connected to the first main pressure cavity and configurable to expand radially outwards upon receiving a positive pressure from the first main pressure cavity;

a bendable section having a plurality of subsections, including a most distal subsection at a distal end of the bendable section and a most proximal subsection at a proximal end of the bendable section, the plurality of subsections connected in a linear arrangement, each subsection pivotally moveable relative to an adjacent subsection, each subsection having a plurality of openings provided around its center, wherein each of the most distal subsection and most proximal subsection include at least a first subsection opening aligned to the first movement cavity, a second subsection opening aligned to the second movement cavity, and a third subsection opening aligned to the third movement cavity;

an extendible section having a proximal end and a distal end; and

a first main pressure opening connected to the second main pressure cavity, the first main pressure opening selectively configurable to apply a negative pressure, the extendible section configured to extend and contract to change a distance between the proximal end and the distal end of the extendible section and to change a distance between the first main pressure opening and the distal end of the main assembly; and

a plurality of tendon members including a first tendon member, a second tendon member, and a third tendon member, at least a portion of each tendon member housed in one of the movement cavities, each tendon member having a length greater than a length of the outer assembly;

wherein the first tendon member is housed in the first movement cavity, wherein the first tendon member extends through the first subsection opening of the most proximal subsection, wherein a distal end of the first tendon member is in communication with a location of the most distal subsection that is

aligned to the first subsection opening and the first movement cavity, and wherein at least a distal end of the bendable section is configurable to bend in a first direction when a force is applied to the first tendon member;

wherein the second tendon member is housed in the second movement cavity, wherein the second tendon member extends through the second subsection opening of the most proximal subsection, wherein a distal end of the second tendon member is in communication with a location of the most distal subsection that is aligned to the second subsection opening and the second movement cavity, and wherein at least a distal end of the bendable section is configurable to bend in a second direction when a force is applied to the second tendon member, the second direction different from the first direction; and

wherein the third tendon member is housed in the third movement cavity, wherein the third tendon member extends through the third subsection opening of the most proximal subsection, wherein a distal end of the third tendon member is in communication with a location of the most distal subsection that is aligned to the third subsection opening and the third movement cavity, and wherein at least a distal end of the bendable section is configurable to bend in a third direction when a force is applied to the third tendon member, the third direction different from the first and second directions.

10. The endoscopic system of claim 9, wherein one or more of the following apply:

the first outer pressure opening is selectively configurable to transition between applying a negative pressure and a positive pressure; and/or

the outer assembly further includes a second outer pressure opening, the second outer pressure opening provided adjacent to the first expandable member in such a way that the first expandable member is provided between the first outer pressure opening and the second outer pressure opening, the second outer pressure opening selectively configurable independently from the first outer pressure opening to apply a negative pressure.

11. The endoscopic system of claim 9, wherein one or more of the following apply:

the first main pressure opening is selectively configurable to transition between applying a negative pressure and a positive pressure; and/or

the main assembly further includes a second main pressure opening, the second main pressure opening selectively configurable independently from the first main pressure opening to apply a negative pressure.

12. The endoscopic system of claim 10, further comprising:

a first pressure source for providing the positive pressure and/or the negative pressure to the first outer pressure opening via the second outer pressure cavity; and

a second pressure source for providing at least the positive pressure to the first expandable member via the first outer pressure cavity.

13. The endoscopic system of claim 11, further comprising:

a third pressure source for providing the positive pressure and/or the negative pressure to the first main pressure opening via the second main pressure cavity; and

a fourth pressure source for providing at least the positive pressure to the second expandable member via the first main pressure cavity.

14. The endoscopic system of claim 9,

wherein the outer assembly further includes a third expandable member configurable to expand radially outwards upon receiving a positive pressure; and

wherein the third expandable member is provided in such a way that the first outer pressure opening is provided between the first expandable member and the third expandable member.

15. The endoscopic system of claim 11,

wherein the navigation section further includes a fourth expandable member configurable to expand radially outwards upon receiving a positive pressure; and

wherein the fourth expandable member is provided in such a way that the second main pressure opening is provided between the second expandable member and the fourth expandable member.