

Claims

1. An endoscope, comprising:
 - a shaft comprising:
 - a distal end; and
 - a proximal end comprising a rigid attachment segment configured to be removably coupled to an adapter or instrument, a first surface of the rigid attachment segment comprising a first groove and a first section adjacent the first groove, wherein:
 - the first groove is configured to be engaged by a protrusion of the adapter or the instrument,
 - the first section protrudes relative to the first groove, and
 - the first section comprises a first recessed indentation configured to secure a spring-loaded ball of the adapter or the instrument; and
 - a housing coupled to the shaft.
2. The endoscope of claim 1, wherein:
 - the first surface of the rigid attachment segment comprises a first plurality of grooves and a first plurality of sections alternating along a longitudinal length of the rigid attachment segment, the first plurality of grooves including the first groove, and the first plurality of sections including the first section;
 - each of the first plurality of sections protrudes relative to the first plurality of grooves, and comprises a recessed indentation; and
 - the first plurality of sections and the first plurality of grooves are configured such that the instrument or the adapter can be coupled to the endoscope in a plurality of lengthwise positions.
3. The endoscope of claim 2, wherein:
 - the rigid attachment segment has at least two different surfaces running along the longitudinal length of the rigid attachment segment, the at least two different surfaces including the first surface and a second surface;

the second surface comprises a second plurality of grooves and a second plurality of sections alternating along the longitudinal length of the rigid attachment segment;

each of the second plurality of sections protrudes relative to the second plurality of grooves, and comprises a recessed indentation; and

the second plurality of sections and the second plurality of grooves are configured such that the instrument or the adapter can be coupled to the endoscope in a plurality of lengthwise positions.

4. The endoscope of claim 1, further comprising: a rotatable joint attached to the rigid attachment segment and configured to enable longitudinal rotation of the rigid attachment segment relative to the housing.

5. The endoscope of claim 1, wherein:

the rigid attachment segment has at least two different surfaces running along a longitudinal length of the rigid attachment segment, the at least two different surfaces including the first surface and a second surface; and

the second surface comprises a second groove and a second section adjacent the second groove, the second section protruding relative to the second groove, and comprising a second recessed indentation.

6. The endoscope of claim 1, further comprising: a rotatable control positioned at a proximal end of the endoscope, the rotatable control configured to be rotated to digitally adjust an orientation of an image captured by the endoscope.

7. The endoscope of claim 1, wherein the rigid attachment segment comprises a hinged joint between two portions of the rigid attachment segment, the hinged joint configured to enable pivoting or rotation of at least one of the two portions about at least one plane.

8. The endoscope of claim 1, further comprising: a hinged joint between the rigid attachment segment and the housing, the hinged joint configured to enable pivoting or rotation of the rigid attachment segment.

9. The endoscope of claim 1, further comprising: a cannula integrated into the shaft, the cannula comprising a suction or irrigation port.

10. The endoscope of claim 1, further comprising: a rotatable joint attached to the rigid attachment segment and configured to enable longitudinal rotation of the rigid attachment segment.

11. An endoscope assembly, comprising:

an endoscope, comprising:

a shaft comprising:

a distal end; and

a proximal end comprising a rigid attachment segment configured to be removably coupled to an adapter or instrument, a first surface of the rigid attachment segment comprising a first groove and a first section adjacent the first groove, wherein:

the first groove is configured to be engaged by a protrusion of the adapter or the instrument,

the first section protrudes relative to the first groove, and

the first section comprises a first recessed indentation configured to secure a spring-loaded ball of the adapter or the instrument; and

a housing coupled to the shaft; and

the adapter or the instrument.

12. The endoscope assembly of claim 11, wherein:

the first surface of the rigid attachment segment comprises a first plurality of grooves and a first plurality of sections alternating along a longitudinal length of the rigid attachment segment;

each of the first plurality of sections protrudes relative to the first plurality of grooves, and comprises a recessed indentation; and

the first plurality of sections and the first plurality of grooves are configured such that the instrument or the adapter can be coupled to the endoscope in a plurality of lengthwise positions.

13. The endoscope assembly of claim 11, comprising: the adapter, the adapter including: a first channel configured to be removably coupled to the rigid attachment segment, and a second channel configured to be removably coupled to an instrument.

14. The endoscope assembly of claim 13, wherein an interior surface of the first channel comprises the protrusion configured to engage the first groove, and the spring-loaded ball configured to engage the first recessed indentation of the first section.

15. The endoscope assembly of claim 14, wherein: the interior surface of the first channel further comprises another protrusion and another spring-loaded ball; the first surface of the rigid attachment segment further comprises a second groove and a second section adjacent the second groove; the second groove is configured to be engaged by the other protrusion; and the second section comprises a second recessed indentation configured to secure the other spring-loaded ball.

16. The endoscope assembly of claim 13, wherein: the adapter is an H-channel adapter, one of the first channel and the second channel is a top open channel of the H-channel adapter, and one of the first channel and the second channel is a lower open channel of the H-channel adapter.

17. The endoscope assembly of claim 11, comprising: the instrument, the instrument comprising a channel configured to be removably coupled to the rigid attachment segment.

18. The endoscope assembly of claim 17, wherein an interior surface of the channel comprises the protrusion configured to engage the first groove, and the spring-loaded ball configured to engage the first recessed indentation of the first section.

19. The endoscope assembly of claim 11, further comprising: a rotatable control positioned at a proximal end of the endoscope, the rotatable control configured to be rotated to digitally adjust an orientation of an image captured by the endoscope.

20. The endoscope assembly of claim 11, comprising: the adapter, the adapter including:
a first channel configured to be removably coupled to the rigid attachment segment,
and

a second channel comprising a plurality of clips configured to be removably coupled to an instrument.