What is claimed is:

CLAIMS

1. An optical fiber connector assembly comprising:

a connector member having a housing and a fiber retainer member housed within at least a portion of the housing, the fiber retainer member defining: (i) at least a portion of a splice chamber, and (ii) at least a portion of at least first and second lumens that extend proximal to the splice chamber;

a ferrule at least partially disposed within the housing, the ferrule having a fiber stub that extends from a first end to a second end, at least a portion of the fiber stub positioned within the second lumen with the second end of the fiber stub proximal to the splice chamber;

an optical fiber including a bare fiber portion that terminates at an end portion, at least a portion of the bare fiber portion positioned within the first lumen with the end portion of the optical fiber proximal to: (i) the splice chamber and, (ii) the second end of the fiber stub;

wherein when first and second electrodes are positioned proximal to the splice chamber and electrical energy is applied across the first and second electrodes, the end portion of the optical fiber and the second end of the fiber stub heat and fuse together.

2. The assembly of claim 1, wherein the first and second electrodes are integral with the fiber retainer member and define at least a portion of the splice chamber.

3. The assembly of claim 1 further comprising a ferrule retainer member housed within the housing, the ferrule retainer member: (i) housing at least a portion of the ferrule and the fiber retainer member, and (ii) defining at least a portion of the splice chamber.

4. The assembly of claim 2, wherein the housing defines a first channel and a second channel;

wherein the first channel is configured to allow at least a portion of a first electrical contact to be inserted within at least a portion of the first channel and positioned proximal to the first electrode;

wherein the second channel is configured to allow at least a portion of a second electrical contact to be inserted within at least a portion of the second channel and positioned proximal to the second electrode; and

wherein when the first electrical contact is positioned proximal to the first electrode and the second electrical contact is positioned proximal to the second electrode, electrical energy applied to the first and second electrical contacts causes electrical energy to be applied

across the first and second electrodes, thereby heating and fusing the end portion of the optical fiber and the second end of the fiber stub together.

5. The assembly of claim 4, wherein the first and second electrical contacts are spring-loaded electrical contacts that are mounted with respect to a fusion splice device.

6. The assembly of claim 5, wherein the fusion splice device includes: (i) a first body member mounted with respect to a first cover member, the first body member configured to support at least a portion of the optical fiber with respect to the connector member, (ii) a second body member mounted with respect to a second cover member, the second body member configured to house the connector member with respect to the optical fiber, and (iii) an actuator member mounted with respect to one of the first and second body members, the actuator member configured to adjust the position of the first body member relative to the second body member, thereby allowing a user to position at least a portion of the bare fiber portion within the first lumen with the end portion of the optical fiber proximal to: (a) the splice chamber, and (b) the second end of the fiber stub.

7. The assembly of claim 6 further comprising a connector adapter member configured to receive and support the connector member relative to the second body member, the connector adapter member being selectively removable and replaceable with a differently-configured instance of the connector adapter member for receiving and supporting a differently-configured instance of the connector member.

8. The assembly of claim 6 further comprising a visual fault locator mounted with respect to the second body member and a photo-detector mounted with respect to the visual fault locator, the photo-detector configured to detect light from the visual fault locator in the splice chamber to facilitate the proper positioning of the end portion of the optical fiber proximal to the second end of the fiber stub.

9. The assembly of claim 6 further comprising an adjustment member mounted with respect to one of the first and second body members, the adjustment member configured to adjust the position of the first body member relative to the second body member;

wherein at least one of the adjustment member and the actuator member is associated with at least one shaft member, the at least one shaft member mounted with respect to the first and second body members; and

wherein: (i) at least one of the adjustment member and the actuator member, and (ii) the at least one shaft member, are configured to interoperate with the first and second body members to adjust the position of the first body member relative to the second body member.

10. The assembly of claim 6, wherein the first electrical contact is mounted with respect to the second cover member and the second electrical contact is mounted with respect to the second body member.

11. The assembly of claim 6, wherein after at least a portion of the bare fiber portion is positioned within the first lumen with the end portion of the optical fiber proximal to: (i) the splice chamber, and (ii) the second end of the fiber stub, and before electrical energy is applied across the first and second electrodes to heat and fuse the end portion of the optical fiber and the second end of the fiber stub together, a switch mounted with respect to the fusion splice device is configured and adapted to be activated by a user to retract the first body member away from the second body member a pre-defined distance via the actuator member to allow a pre-fusion electrical arc to then be applied to the first and second electrodes to clean the end portion of the optical fiber and the second end of the fiber stub.

12. The assembly of claim 11, wherein after the pre-fusion electrical arc was applied to the first and second electrodes and after a pre-determined delay, the fusion splice device is configured and adapted to: (i) begin applying electrical energy across the first and second electrodes for a pre-determined amount of time to cause the end portion of the optical fiber and the second end of the fiber stub to begin to heat and fuse together, and (ii) advance the first body member via the actuator member toward the second body member at a pre-determined rate and for a pre-determined distance as electrical energy is applied across the first and second electrodes to heat and fuse the end portion of the optical fiber and the second end of the fiber stub together.

13. The assembly of claim 1, wherein the housing and the fiber retainer member each include portions that define a first channel and a second channel;

wherein the first channel is configured to allow at least a portion of the first electrode to be inserted within at least a portion of the first channel and positioned proximal to the splice chamber;

wherein the second channel is configured to allow at least a portion of the second electrode to be inserted within at least a portion of the second channel and positioned proximal to the splice chamber; and

wherein the first and second electrodes are mounted with respect to a fusion splice device.

14. The assembly of claim 13, wherein the fusion splice device includes: (i) a first body member mounted with respect to a first cover member, the first body member configured to support at least a portion of the optical fiber with respect to the connector member, (ii) a second body member mounted with respect to a second cover member, the second body member configured to house the connector member with respect to the optical fiber, and (iii) an actuator member mounted with respect to one of the first and second body members, the actuator member configured to adjust the position of the first body member relative to the second body member, thereby allowing a user to position at least a portion of the bare fiber portion within the first lumen with the end portion of the optical fiber proximal to: (a) the splice chamber, and (b) the second end of the fiber stub.

15. The assembly of claim 14 further comprising a connector adapter member configured to receive and support the connector member relative to the second body member, the connector adapter member being selectively removable and replaceable with a differently-configured instance of the connector adapter member for receiving and supporting a differently-configured instance of the connector member.

16. The assembly of claim 14 further comprising a visual fault locator mounted with respect to the second body member and a photo-detector mounted with respect to at least one of the visual fault locator and the second body member, the photo-detector configured to detect light from the visual fault locator in the splice chamber to facilitate the proper positioning of the end portion of the optical fiber proximal to the second end of the fiber stub.

17. The assembly of claim 14 further comprising an adjustment member mounted with respect to one of the first and second body members, the adjustment member configured to adjust the position of the first body member relative to the second body member;

wherein at least one of the adjustment member and the actuator member is associated with at least one shaft member, the at least one shaft member mounted with respect to the first and second body members; and

wherein: (i) at least one of the adjustment member and the actuator member, and (ii) the at least one shaft member, are configured to interoperate with the first and second body members to adjust the position of the first body member relative to the second body member.

18. The assembly of claim 14, wherein the first electrode is mounted with respect to the second cover member and the second electrode is mounted with respect to the second body member.

19. The assembly of claim 14, wherein after at least a portion of the bare fiber portion is positioned within the first lumen with the end portion of the optical fiber proximal to: (i) the splice chamber, and (ii) the second end of the fiber stub, and before electrical energy is applied across the first and second electrodes to heat and fuse the end portion of the optical fiber and the second end of the fiber stub together, a switch mounted with respect to the fusion splice device is configured and adapted to be activated by a user to retract the first body member away from the second body member a pre-defined distance via the actuator member to allow a pre-fusion electrical arc to then be applied to the first and second electrodes to clean the end portion of the optical fiber and the second end of the fiber stub.

20. The assembly of claim 19, wherein after the pre-fusion electrical arc was applied to the first and second electrodes and after a pre-determined delay, the fusion splice device is configured and adapted to: (i) begin applying electrical energy across the first and second electrodes for a pre-determined amount of time to cause the end portion of the optical fiber and the second end of the fiber stub to begin to heat and fuse together, and (ii) advance the first body member via the actuator member toward the second body member at a pre-determined rate and for a pre-determined distance as electrical energy is applied across the first and second electrodes to heat and fuse the end portion of the optical fiber and the second end of the fiber stub together.

21. The assembly of claim 1 further comprising an anvil member housed within at least a portion of the housing, the anvil member defining at least a portion of the splice chamber;

wherein the anvil member includes first and second compression members, the first and second compression members configured to allow: (i) the first compression member to engage and position at least a portion of the bare fiber portion of the optical fiber within the first lumen, and (ii) the second compression member to engage and position at least a portion of the fiber stub within the second lumen.

22. The assembly of claim 21, wherein the housing includes a receiving opening configured to receive an insert member; and

wherein prior to positioning at least a portion of the bare fiber portion within the first lumen with the end portion of the optical fiber proximal to: (i) the splice chamber, and (ii) the second end of the fiber stub, the insert member is configured to be positioned within the receiving opening of the housing to engage the anvil member and move the anvil member to create a gap that opens up at least a portion of the first lumen so that at least a portion of the bare fiber portion may be positioned within the first lumen.

23. The assembly of claim 22, wherein the connector member further includes a resilient member positioned at least partially around the fiber retainer member and the anvil member; and

wherein after: (i) at least a portion of the bare fiber portion is positioned within the first lumen, and (ii) the insert member is removed from the receiving opening, the resilient member causes: (a) the first compression member to engage and position at least a portion of the bare fiber portion of the optical fiber within the first lumen, and (b) the second compression member to engage and position at least a portion of the fiber stub within the second lumen.

24. The assembly of claim 4 further comprising an anvil member housed within at least a portion of the housing, the anvil member defining at least a portion of the splice chamber;

wherein the anvil member includes first and second compression members, the first and second compression members configured to allow: (i) the first compression member to engage and position at least a portion of the bare fiber portion of the optical fiber within the first lumen, and (ii) the second compression member to engage and position at least a portion of the fiber stub within the second lumen;

wherein the anvil member further includes an engagement protuberance; and

wherein prior to positioning at least a portion of the bare fiber portion within the first lumen with the end portion of the optical fiber proximal to: (i) the splice chamber, and (ii) the second end of the fiber stub, a user would position the first and second electrical contacts within the first and second channels to engage the engagement protuberance and move the anvil member to create a gap that opens up at least a portion of the first lumen so that at least a portion of the bare fiber portion may be positioned within the first lumen.

25. The assembly of claim 24, wherein the connector member further includes a resilient member positioned at least partially around the fiber retainer member and the anvil member; and

wherein after: (i) at least a portion of the bare fiber portion is positioned within the first lumen, and (ii) the first and second electrical contacts are removed from the first and second channels, the resilient member causes: (a) the first compression member to engage and position at least a portion of the bare fiber portion of the optical fiber within the first lumen, and (b) the second compression member to engage and position at least a portion of the fiber stub within the second lumen.

26. The assembly of claim 13 further comprising an anvil member housed within at least a portion of the housing, the anvil member defining at least a portion of the splice chamber;

wherein the anvil member includes first and second compression members, the first and second compression members configured to allow: (i) the first compression member to engage and position at least a portion of the bare fiber portion of the optical fiber within the first lumen, and (ii) the second compression member to engage and position at least a portion of the fiber stub within the second lumen;

wherein prior to positioning at least a portion of the bare fiber portion within the first lumen with the end portion of the optical fiber proximal to: (i) the splice chamber, and (ii) the second end of the fiber stub, a user would position the first and second electrodes within the first and second channels to engage the anvil member and move the anvil member to create a gap that opens up at least a portion of the first lumen so that at least a portion of the bare fiber portion may be positioned within the first lumen.

27. The assembly of claim 26, wherein the connector member further includes a resilient member positioned at least partially around the fiber retainer member and the anvil member; and

wherein after: (i) at least a portion of the bare fiber portion is positioned within the first lumen, and (ii) the first and second electrodes are removed from the first and second channels, the resilient member causes: (a) the first compression member to engage and position at least a portion of the bare fiber portion of the optical fiber within the first lumen, and (b) the second compression member to engage and position at least a portion of the fiber stub within the second lumen.

28. The assembly of claim 13, wherein a cap member is mounted with respect to the connector member, the cap member configured to allow a user to rotate the retainer member so that the portions of the retainer member that define the first and second channels

are not aligned with the portions of the housing that define the first and second channels to thereby close off the splice chamber.

29. The assembly of claim 28, wherein the cap member includes at least one extending member that is configured to engage with at least one notch positioned along the retainer member, the engagement of which allows a user to rotate the retainer member axially.

30. An optical fiber connector assembly comprising:

a connector member having a housing and a fiber retainer member housed within at least a portion of the housing, the fiber retainer member defining: (i) at least a portion of a splice chamber, and (ii) at least a portion of at least first and second lumens that extend proximal to the splice chamber;

a ferrule at least partially disposed within the housing, the ferrule having a fiber stub that extends from a first end to a second end, at least a portion of the fiber stub positioned within the second lumen with the second end of the fiber stub proximal to the splice chamber;

an optical fiber including a bare fiber portion that terminates at an end portion, at least a portion of the bare fiber portion positioned within the first lumen with the end portion of the optical fiber proximal to: (i) the splice chamber and, (ii) the second end of the fiber stub;

an anvil member housed within at least a portion of the housing, the anvil member defining at least a portion of the splice chamber, the anvil member including first and second compression members, the first and second compression members configured to allow: (i) the first compression member to engage and position at least a portion of the bare fiber portion of the optical fiber within the first lumen, and (ii) the second compression member to engage and position at least a portion of the fiber stub within the second lumen;

wherein the housing and the fiber retainer member each include portions that define a first channel and a second channel;

wherein the first channel is configured to allow at least a portion of a first electrode to be inserted within at least a portion of the first channel and positioned proximal to the splice chamber, and the second channel is configured to allow at least a portion of a second electrode to be inserted within at least a portion of the second channel and positioned proximal to the splice chamber; and

wherein when first and second electrodes are positioned proximal to the splice chamber and electrical energy is applied across the first and second electrodes, the end portion of the optical fiber and the second end of the fiber stub heat and fuse together;

wherein prior to positioning at least a portion of the bare fiber portion within the first lumen with the end portion of the optical fiber proximal to: (i) the splice chamber, and (ii) the second end of the fiber stub, a user would position the first and second electrodes within the first and second channels to engage the anvil member and move the anvil member to create a gap that opens up at least a portion of the first lumen so that at least a portion of the bare fiber portion may be positioned within the first lumen.

31. A method for terminating optical fibers comprising:

providing a connector member having a housing and a fiber retainer member housed within at least a portion of the housing, the fiber retainer member defining: (i) at least a portion of a splice chamber, and (ii) at least a portion of at least first and second lumens that extend proximal to the splice chamber;

providing a ferrule at least partially disposed within the housing, the ferrule having a fiber stub that extends from a first end to a second end;

positioning at least a portion of the fiber stub within the second lumen with the second end of the fiber stub proximal to the splice chamber;

providing an optical fiber including a bare fiber portion that terminates at an end portion;

positioning at least a portion of the bare fiber portion within the first lumen with the end portion of the optical fiber proximal to: (i) the splice chamber and, (ii) the second end of the fiber stub;

positioning first and second electrodes proximal to the splice chamber;

applying electrical energy across the first and second electrodes to heat and fuse the end portion of the optical fiber and the second end of the fiber stub together.

What is claimed is:

1. An optical fiber connector assembly comprising:

a connector member having a housing and a fiber retainer member housed within at least a portion of the housing, the fiber retainer member defining: (i) at least a portion of a splice chamber, and (ii) at least a portion of at least first and second lumens that extend proximal to the splice chamber;

a ferrule at least partially disposed within the housing, the ferrule having a fiber stub that extends from a first end to a second end, at least a portion of the fiber stub positioned within the second lumen with the second end of the fiber stub proximal to the splice chamber;

an optical fiber including a bare fiber portion that terminates at an end portion, at least a portion of the bare fiber portion positioned within the first lumen with the end portion of the optical fiber proximal to: (i) the splice chamber and, (ii) the second end of the fiber stub;

an anvil member housed within at least a portion of the housing, the anvil member defining at least a portion of the splice chamber, the anvil member including first and second compression members, the first and second compression members configured to allow: (i) the first compression member to engage and position at least a portion of the bare fiber portion of the optical fiber within the first lumen, and (ii) the second compression member to engage and position at least a portion of the fiber stub within the second lumen;

wherein when first and second electrodes are positioned proximal to the splice chamber and electrical energy is applied across the first and second electrodes, the end portion of the optical fiber and the second end of the fiber stub heat and fuse together.

2. The assembly of claim 1, wherein the first and second electrodes are integral with the fiber retainer member and define at least a portion of the splice chamber.

3. The assembly of claim 1 further comprising a ferrule retainer member housed within the housing, the ferrule retainer member: (i) housing at least a portion of the ferrule and the fiber retainer member, and (ii) defining at least a portion of the splice chamber.

4. The assembly of claim 2, wherein the housing defines a first channel and a second channel;

wherein the first channel is configured to allow at least a portion of a first electrical contact to be inserted within at least a portion of the first channel and positioned proximal to the first electrode;

wherein the second channel is configured to allow at least a portion of a second electrical contact to be inserted within at least a portion of the second channel and positioned proximal to the second electrode; and

wherein when the first electrical contact is positioned proximal to the first electrode and the second electrical contact is positioned proximal to the second electrode, electrical energy applied to the first and second electrical contacts causes electrical energy to be applied across the first and second electrodes, thereby heating and fusing the end portion of the optical fiber and the second end of the fiber stub together.

5. The assembly of claim 1, wherein the housing includes a receiving opening configured to receive an insert member; and

wherein prior to positioning at least a portion of the bare fiber portion within the first lumen with the end portion of the optical fiber proximal to: (i) the splice chamber, and (ii) the second end of the fiber stub, the insert member is configured to be positioned within the receiving opening of the housing to engage the anvil member and move the anvil member to create a gap that opens up at least a portion of the first lumen so that at least a portion of the bare fiber portion may be positioned within the first lumen.

6. The assembly of claim 5, wherein the connector member further includes a resilient member positioned at least partially around the fiber retainer member and the anvil member; and

wherein after: (i) at least a portion of the bare fiber portion is positioned within the first lumen, and (ii) the insert member is removed from the receiving opening, the resilient member causes: (a) the first compression member to engage and position at least a portion of the bare fiber portion of the optical fiber within the first lumen, and (b) the second compression member to engage and position at least a portion of the fiber stub within the

second lumen.

7. The assembly of claim 4

wherein the anvil member further includes an engagement protuberance; and

wherein prior to positioning at least a portion of the bare fiber portion within the first lumen with the end portion of the optical fiber proximal to: (i) the splice chamber, and (ii) the second end of the fiber stub, a user would position the first and second electrical contacts within the first and second channels to engage the engagement protuberance and move the anvil member to create a gap that opens up at least a portion of the first lumen so that at least a portion of the bare fiber portion may be positioned within the first lumen.

8. The assembly of claim 7, wherein the connector member further includes a resilient member positioned at least partially around the fiber retainer member and the anvil member; and

wherein after: (i) at least a portion of the bare fiber portion is positioned within the first lumen, and (ii) the first and second electrical contacts are removed from the first and second channels, the resilient member causes: (a) the first compression member to engage and position at least a portion of the bare fiber portion of the optical fiber within the first lumen, and (b) the second compression member to engage and position at least a portion of the fiber stub within the second lumen.

9. The assembly of claim 1,

wherein the housing and the fiber retainer member each include portions that define a first channel and a second channel; wherein the first channel is configured to allow at least a portion of the first electrode to be inserted within at least a portion of the first channel and positioned proximal to the splice chamber;

wherein the second channel is configured to allow at least a portion of the second electrode to be inserted within at least a portion of the second channel and positioned proximal to the splice chamber;

wherein prior to positioning at least a portion of the bare fiber portion within the first lumen with the end portion of the optical fiber proximal to: (i) the splice chamber, and (ii) the second end of the fiber stub, a user would position the first and second electrodes within the first and second channels to engage the anvil member and move the anvil member to create a gap that opens up at least a portion of the first lumen so that at least a portion of the bare fiber portion may be positioned within the first lumen.

10. The assembly of claim 9, wherein the connector member further includes a resilient member positioned at least partially around the fiber retainer member and the anvil member; and

wherein after: (i) at least a portion of the bare fiber portion is positioned within the first lumen, and (ii) the first and second electrodes are removed from the first and second channels, the resilient member causes: (a) the first compression member to engage and position at least a portion of the bare fiber portion of the optical fiber within the first lumen, and (b) the second compression member to engage and position at least a portion of the fiber stub within the second lumen.

11. The assembly of claim 9, wherein a cap member is mounted with respect to the connector member, the cap member configured to allow a user to rotate the retainer member so that the portions of the retainer member that define the first and second channels are not aligned with the portions of the housing that define the first and second channels to thereby close off the splice chamber.

12. The assembly of claim 11, wherein the cap member includes at least one extending member that is configured to engage with at least one notch positioned along the retainer member, the engagement of which allows a user to rotate the retainer member axially.

13. An optical fiber connector assembly comprising:

a connector member having a housing and a fiber retainer member housed within at least a portion of the housing, the fiber retainer member defining: (i) at least a portion of a splice chamber, and (ii) at least a portion of at least first and second lumens that extend proximal to the splice chamber;

a ferrule at least partially disposed within the housing, the ferrule having a fiber stub that extends from a first end to a second end, at least a portion of the fiber stub positioned within the second lumen with the second end of the fiber stub proximal to the splice chamber;

an optical fiber including a bare fiber portion that terminates at an end portion, at least a portion of the bare fiber portion positioned within the first lumen with the end portion of the optical fiber proximal to: (i) the splice chamber and, (ii) the second end of the fiber stub;

an anvil member housed within at least a portion of the housing, the anvil member defining at least a portion of the splice chamber, the anvil member including first and second compression members, the first and second compression members configured to allow: (i) the first compression member to engage and position at least a portion of the bare fiber portion of the optical fiber within the first lumen, and (ii) the second compression member to engage and position at least a portion of the fiber stub within the second lumen;

wherein the housing and the fiber retainer member each include portions that define a first channel and a second channel;

wherein the first channel is configured to allow at least a portion of a first electrode to be inserted within at least a portion of the first channel and positioned proximal to the splice chamber, and the second channel is configured to allow at least a portion of a second electrode to be inserted within at least a portion of the second channel and positioned proximal to the splice chamber; and

wherein when first and second electrodes are positioned proximal to the splice chamber and electrical energy is applied across the first and second electrodes, the end portion of the optical fiber and the second end of the fiber stub heat and fuse together;

wherein prior to positioning at least a portion of the bare fiber portion within the first lumen with the end portion of the optical fiber proximal to: (i) the splice chamber, and (ii) the second end of the fiber stub, a user would position the first and second electrodes within the first and second channels to engage the anvil member and move the anvil member to create a gap that opens up at least a portion of the first lumen so that at least a portion of the bare fiber portion may be positioned within the first lumen.

14. A method for terminating optical fibers comprising:

providing a connector member having a housing and a fiber retainer member housed within at least a portion of the housing, the fiber retainer member defining: (i) at least a portion of a splice chamber, and (ii) at least a portion of at least first and second lumens that extend proximal to the splice chamber;

positioning an anvil member within at least a portion of the housing, the anvil member defining at least a portion of the splice chamber, the anvil member including first and second compression members;

providing a ferrule at least partially disposed within the housing, the ferrule having a fiber stub that extends from a first end to a second end;

positioning at least a portion of the fiber stub within the second lumen with the second end of the fiber stub proximal to the splice chamber, wherein the second compression member of the anvil member engages and positions at least a portion of the fiber stub within the second lumen;

providing an optical fiber including a bare fiber portion that terminates at an end portion;

positioning at least a portion of the bare fiber portion within the first lumen with the end portion of the optical fiber proximal to: (i) the splice chamber and, (ii) the second end of the fiber stub, wherein the first compression member of the anvil member engages and positions at least a portion of the bare fiber portion of the optical fiber within the first lumen;

positioning first and second electrodes proximal to the splice chamber;

applying electrical energy across the first and second electrodes to heat and fuse the end portion of the optical fiber and the second end of the fiber stub together.