

[0247] Figure 8 is a cross-section through the c centre or mid-line of the connector of Figure 1.

[0248] Figure 9 is another cross-section of the connector of Figure 1, axially rotated relative to Figure 8.

[0249] Figure 10 is yet another cross-section of the connector of Figure 1, axially rotated relative to Figures 8 and 9.

[0250] Figure 11 is a perspective view of an alternative embodiment connector to that of Figure 1.

[0251] Figures 12, 13, 14, and 16 are different views of the second end of the connector of Figure 11.

[0252] Figures 15 and 17 illustrate the same views as Figures 14 and 16, yet with respect to the connector of Figures 1A and 2A

[0253] Figure 18 is a cross-section through the connector of Figure 11 showing internal features.

[0254] Figure 19 is another sectional view through the connector of Figure 11.

[0255] Figure 20 is a sectional view through the connector of Figure 1A and 2A±B.

[0256] Figures 21-23 illustrate a sequence in which the connector of Figures 11, 12, 13, 14, 16 and 19 is connected or engaged with another connector (being the connector illustrated by Figures 28-29).

[0257] Figure 24 shows a perspective view of the engagement made by the connectors shown in Figures 21-23.

[0258] Figure 25 shows a cross-section of the inter-connecting features of the engagement when made shown by Figures 21-23.

[0259] Figures 26-27 show a known connector having male connecting features in the form of a pair of locking fingers, such a connector able to be brought into engagement with the connector of Figure 1 in a similar manner to that shown by Figures 21-23.

[0260] Figure 28 is a cross-section through the left-hand end connector of the connector arrangements shown in Figures 21-23.

[0261] Figure 28A shows a perspective view of a connector.

[0262] Figure 28B1 shows a side view of the connector of Figure 28A.

[0263] Figure 28B2 shows a top view of the connector of Figure 28A.

[0264] Figure 28C shows a lanyard connected to the connector of Figures 28A - 28B2.

located within the second end 52 of the another connector 200. For example, see item 160 in Figure 29B.

[0337] In a sixth sealing mode, the connector 1 is configured to provide a body of the second end, for sealing upon a sixth sealing surface of another connector 200, the sixth sealing surface defined by one or both of:

- a lateral face or ledge of a shoulder extending radially outwardly from one or more male connection features, in particular a radially outwardly extensive face or ledge extending radially outwardly from one or more locking fingers located within the second end 52 of another connector 200, for example see item 150 in Figure 29A, or

- a lateral face or a base extending as a floor between an outward periphery of a shoulder extending radially outwardly from one or more male connection features of another connector 200, such a lateral face or base extending as a floor being located within a second end of another connector 200, for example see item 130 in Figure 29A.

[0338] The connector 1 as described herein has particular application to being an upstream connector component attached to the terminal end of a breathing conduit which is to supply gas to a patient interface. The connector 1 is capable of operating to be both a female and a male type connector, thereby improving the useability and ability to connect to other types of connectors (where those other connectors provide for male connection features or female connection features).

[0339] The connector 1 may have particular application as a connector for a breathing conduit providing a supply of gas from a source. The 'another connector' described above, may be, but without limitation, be a downstream patient interface end connector for a breathing conduit which provides the supplied gas to a patient interface (such as, but not limited to full face masks, nasal cannula, oro-nasal masks, nasal masks – and whether each of these are of a sealing or non-sealing type).

[0340] Figures 21-25 show a connection made by a connector 200 with the connector 1.

[0341] Also disclosed is another connector (as referred to above) or second connector, configured to be engaged or engagable with the connector. The another connector may be bought into mating and/or connection and seal with at least one of the following surfaces of the connector 1:

- at least an external surface 10 of the body 4.

CLAIMS

1. A connector to be provided at a terminal end of a breathing conduit, the connector comprising:
 - a body, the body comprising a first end and a second end, the body internally defining a lumen for the passage of gas therethrough between each of the first and second ends,
 - the first end, in use, being engaged or engageable with the terminal end of the breathing conduit or a component to be associated with the terminal end of the breathing conduit, and
 - the second end, in use, to be engaged or engageable with another connector, and
 - wherein an internal surface of the body comprises one or more internal connection features configured for connection with said another connector which may be received internally therein, and
 - wherein an external surface of the body comprises one or more external alignment feature(s) configured for aligning said connector or another connector into an externally aligned connection therebetween,
 - wherein the internal connection feature(s) is/are oriented so as to be radially aligned with said one or more external alignment feature(s), and
 - wherein the external alignment feature(s) is/are configured to be reciprocally reciprocally keyed with another connector.
2. The connector of claim 1, wherein one or more external visual aid(s) is/are configured for, in use, providing an externally visible guide for alignment of said connector or another connector into an aligned connection therebetween.
3. The connector of claim 1 or claim 2, wherein the one or more internal connection features is/are surface feature(s) that extend radially inward from the surface of an internal side wall of the body.
4. The connector of any one of claims 1-3, wherein the one or more internal connection features comprise one or more tabs, optionally, the one or more tab(s) is/are a raised protrusion.
5. The connector of any one of claims 1-4, wherein the internal connection

features is/are oriented so as to be radially aligned with said one or more external ~~alignment features and/or said one or more external~~ visual aids.

6. The connector as claimed in any one of claims 1-5, wherein there is a pair of said internal connection features.

7. The connector of any one of claims 1-6, wherein the internal surface comprises one or more internal alignment features configured for aligning at least one connection feature of another connector to be received internally thereof into an aligned connection orientation therewith.

8. The connector of any one of claims 1-7, wherein said internal surface comprises one or more internal alignment features configured to, in use, rotatably orient a male connection feature of another connector into an aligned connection orientation for connection with the connector, or at least into connection with, said one or more internal connection features located on or about the internal surface of the body.

9. The connector of claims 7 or 8, wherein the internal alignment feature(s) is/are surface feature(s) that extend radially inward from the surface of an internal side wall of the body.

10. The connector of any one of claims 7-9, wherein the internal alignment feature(s) comprise one or more tab(s), optionally, the ~~one or more~~ tab(s) is/are a raised protrusion.

11. The connector of claim 10, wherein a tab comprises a pair of shoulders, sloping away from each other and away from an end of the tab(s) at the intersection of the shoulders, the end of the tab(s) located substantially more toward a terminal end of the second end of the connector than the shoulders.

12. The connector of any one of claims 7-11, wherein the internal alignment feature(s) is/are one or more ribs extending substantially in a longitudinal direction of said connector and along said internal surface, optionally being a surface of an internal side wall of the body.

13. The connector as claimed in any one of claims 1-12, wherein the first end is configured for engagement with the terminal end of the breathing conduit optionally, the first end comprises a sleeved portion to be attached to the terminal end of the breathing conduit and to form a pneumatic connection therewith.

14. The connector as claimed in claim 13, wherein at least a part of said sleeved portion is insertable into or to be located or housed within an interior surface or the lumen of the terminal end of the breathing conduit, or wherein at least a part of said sleeved portion is receivable upon or to be located or housed upon an exterior surface of the terminal end of the breathing conduit.

15. The connector as claimed in any one of claims 1-14, wherein the external alignment feature(s) and/or the external visual aid(s) comprises one or more external surface features extending radially outwardly from the outer surface of an external side wall of the body.

16. The connector of any one of claims 1-15, wherein the external alignment feature(s) comprise one or more tab(s), optionally the tab is a raised protrusion.

17. The connector of any one of claims 1-16, wherein the external alignment feature(s) is/are one or more ribs (or protrusions) extending substantially in a longitudinal direction with the connector and along said external surface, preferably being a surface of an external side wall of the body, and optionally wherein the at least one, or each rib or protrusion comprises a pair of shoulders, said shoulders sloping away from each other and away from an end of the rib or protrusion at the intersection of the shoulders, the end of each rib or protrusion located substantially more toward a terminal end of the second end of the connector than the shoulders, and optionally, wherein the at least one, or each rib or protrusion is substantially tongue shaped, and/or substantially triangular and/or substantially tapers toward an end.

18. The connector of any one of claims 1-17, wherein ~~provided substantially at or~~
~~or toward a base of a or each said~~ the external alignment feature(s) is/are a
~~stepped protrusion, the stepped protrusion being a more radially outwardly~~
~~extending projection than an adjacent portion of the external alignment feature~~

configured to be reciprocally keyed with one or more external alignment feature(s) of another connector.

19. The connector as claimed in any one of claim s 1-18, wherein ~~the stepped projection is configured to be co-located or co-locatable for keying with a reciprocally shaped recess or cut-out of at least a part of a sleeved portion of another connector when brought to bear into connection therewith during a connection between the connector and said another connector provided~~ substantially at or toward a base of a or each said external alignment feature is a stepped protrusion, the stepped protrusion being a more radially outwardly extending projection than an adjacent portion of the external alignment feature.

20. The connector as claimed in claim 19, wherein ~~provided substantially at or toward a base of a or each said external alignment feature is a recess or cut-out, the recess or cut-out configured for receiving a protrusion or projection of a reciprocally shaped portion of another connector~~ the stepped projection is configured to be co-located or co-locatable for keying with a reciprocally shaped recess or cut-out of at least a part of a sleeved portion of another connector when brought to bear into connection therewith during a connection between the connector and said another connector.

21. The connector as claimed in claim 20, wherein the recess or cut out acts as a keyway for a key which may be brought to bear upon it.

22. The connector as claimed in claim 21, wherein a shape or profile of the key or keyway may include one or more of: semi-circular, triangular, rectangular or other recti-linear or geometric shapes, elliptical, wedge shapes.

23. The connector as claimed in any one of claims 1-22, wherein provided substantially at or toward a base of a or each said external alignment feature is a recess or cut-out, the recess or cut-out configured for receiving a protrusion or projection of a reciprocally shaped portion of another connector.

2124. The connector of any one of claims 1-~~20~~23, wherein a radially extensive flange or lip projects from the external surface of the body.

2225. The connector as claimed in claim **2124**, wherein said flange or lip comprises one or both of:

one or more radially and/or longitudinally recessed or grooved regions, or
one or more radially and/or longitudinally extending projection regions.

2326. The connector as claimed in claim **2124** or claim **2225**, wherein a sheath, optionally being an overmoulded sheath, provides for a pneumatic engagement of an external surface of the body with a terminal end of a breathing tube, more optionally pneumatically engages the first end of the connector with the terminal end of a breathing tube.

2427. The connector as claimed of claim **2326**, wherein said sheath comprises one or both of:

one or more radially and/or longitudinally recessed or grooved regions, or
one or more radially and/or longitudinally extending projection regions.

2528. The connector as claimed in claim **2427**, wherein said recessed or grooved regions and/or said extending projection regions of said sheath are wholly or at least partially aligned with said recessed or grooved regions and/or said extending projection regions of said flange or lip.

2629. A connector to be provided at a terminal end of a breathing conduit, the connector comprising:

a body, the body comprising a first end and a second end, the body internally defining a lumen for the passage of gas therethrough between each of the first and second ends,

the first end, in use, being engaged or engageable with the terminal end of the breathing conduit or a component to be associated with the terminal end of the breathing ~~tube~~conduit, and

the second end, in use, to be engaged or engageable with another connector, and

wherein an internal surface of the body comprises one or more internal male connection features extending therein configured for connection with a female end or female part of another connector receivable of said male connection features, the male internal connection features comprising one or more (optionally a pair) of locking fingers, and

wherein the connector further comprises:

an outer wall surrounding of the one or more internal male connection features, an exterior surface of the outer wall being tapered, tapered in a direction substantially longitudinally with the connector, and
one or more external alignment feature(s) configured for aligning the outer wall of said connector, or said connector, or another connector into an externally aligned connection therebetween,

wherein said one or more internal male connection features is/are oriented so as to be radially aligned with said one or more external alignment features, and
wherein the external alignment feature(s) is/are configured to be reciprocally reciprocally keyed with another connector.

~~27.—The connector of claim 26, wherein the outer wall of the connector further comprises~~

~~one or more external alignment feature(s) configured for aligning the outer wall of said connector, or said connector, or another connector into an externally aligned connection therebetween,~~

~~wherein said one or more internal male connection features is/are oriented so as to be radially aligned with said one or more external alignment features, and~~
~~wherein the external alignment feature(s) is/are configured to be reciprocally keyed with another connector.~~

~~28~~30. A connector to be provided at a terminal end of a breathing conduit, the connector comprising:

a body, the body comprising a first end and a second end, the body internally defining a lumen for the passage of gas therethrough between each of the first and second ends,

the first end, in use, being engaged or engageable with the terminal end of the breathing conduit or a component to be associated with the terminal end of the breathing ~~tube~~conduit, and

the second end, in use, to be engaged or engageable with another connector, and

wherein an internal surface of the body comprises one or more internal male connection features extending therein configured for connection with a female end or female part of another connector receivable of said male connection features, the male internal connection features comprising one or more (optionally a pair) of locking fingers, and

wherein the connector further comprises an outer wall surrounding of the one or more internal male connection features, the outer or at least an exterior surface of the outer wall, comprising:

one or more external alignment feature(s) configured for aligning the outer wall of said connector, or said connector, or another connector into an externally aligned connection therebetween, ~~and/or one or more external visual aid(s) is/are configured for, in use, providing an externally visible guide for alignment of said connector or another connector into an aligned connection therebetween.~~ wherein said one or more internal male connection features is/are oriented so as to be radially aligned with said one or more external alignment features

wherein the external alignment feature(s) is/are configured to be reciprocally keyed with another connector.

~~29. The connector as claimed in claim 27 or claim 28, wherein said one or more internal male connection features is/are oriented so as to be radially aligned with said one or more external alignment features and/or said one or more external visual aids.~~

31. The connector of claim 29 or claim 30, wherein the external alignment feature(s) is/are configured to be reciprocally keyed with one or more external alignment feature(s) of another connector.

32. The connector as claimed in any of claims 29-31, wherein the outer wall operates as a sleeve, for being brought into a sleeved connection with another connector.

33. The connector of claim 32, wherein the outer wall is a sleeve, configured for use as a 22mm male taper connector to another connector comprising a female connection facility.

34. The connector of claim 32, wherein the outer wall is a sleeve, configured for use as a 22mm female taper connector to another connector comprising a male connection facility.

~~3035.~~ The connector of ~~any one of claims 27-29~~ claim 29 or claim 30, wherein the external alignment feature(s) comprise one or more recess or cut-outs in a terminal

end face of the outer wall of the second end, said recess or cut-outs configured to be received by a substantially reciprocally shaped portion on a connector to which said outer wall is to be placed into contact, optionally, the reciprocally shaped portion is a protrusion or projection.

3136. The connector as claimed in ~~claim 27-30~~ any one of claims 29-35, wherein the external alignment features are configured to be co-located or co-locatable for keying with a reciprocally shaped projection of a sleeved portion of another connector when brought to bear into connection therewith during a connection between a terminal face of the second end of the connector and said another connector.

3237. The connector as claimed in claim ~~30 or claim 3135,~~ wherein the one or more more recess or cut-out is configured to act as a keyway to reciprocally locate with a reciprocally shaped protrusion or projection or key of a component brought into connection therewith.

38. The connector as claimed in claim 37, wherein a shape or profile of the key or keyway may include one or more of: semi-circular, triangular, rectangular or other recti-linear or geometric shapes, elliptical, wedge shapes.

3339. The connector of any one of claims ~~1-25 or 27-321-28 or 29-38,~~ wherein the external alignment feature(s) of the connector is/are shaped or configured to:

- prevent connection of the internal connection features of the connector with another connector, when the external alignment feature(s) of the connector and an external alignment feature of another connector are in an unaligned orientation, and/or
- allow connection of the internal connection features of the connector with another connector, when the external alignment feature(s) of the connector and an external alignment feature of another connector are in an aligned orientation.

3440. The connector of any one of claims ~~26-3329-39,~~ wherein a diameter of an outer wall of the second end's ~~outer wall~~ is smallest at a terminal end of the second end, with the diameter increasing in a direction extending away from the terminal end of the second end towards the first end.

3541. The connector of any one of claims 26-3429-40, wherein said locking fingers comprise a recess on an outer surface of each said finger, said recess to ~~receiving~~ receive an internal connection feature, such as a raised protrusion that may extend in a radially inward direction toward said recess or a tab, of another connector configured for connection thereto, and optionally, wherein the recess is shaped for receipt of the internal connection feature of another connector.

3642. The connector as claimed in any one of claims 26-3529-41, wherein provided substantially at or toward a terminal face of the outer wall of the second end of the connector is a longitudinally extensive protrusion, the protrusion being a more longitudinally extending projection than an adjacent portion of the terminal face of the outer wall of the second end of the connector.

3743. The connector as claimed in claim 3642, wherein the protrusion is configured to be co-located or co-locatable for keying with a reciprocally shaped recess or cut-out of at least a part of a portion of another connector when brought to bear into connection therewith during a connection between the connector and said another connector.

3844. The connector as claimed in any one of claims 26-3729-43, wherein the body of the connector comprises an outwardly flared portion located at the first end of the connector.

3945. The connector as claimed in any one of claims 26-3829-44, wherein the internal surface of the second end of the body further comprises a protrusion configured for an engagement ~~(e.g. an interference fit)~~ with a commensurately shaped portion of another connector to be received by or within the internal surface bounded by the outer wall, preferably wherein said engagement is an interference fit.

4046. The connector as claimed in claim 3945, wherein the protrusion extends as a shoulder radially outwardly from one or both of:

the one or more locking fingers,

a base extending as a floor from the inner surface of the outer wall,

optionally the shoulder extends longitudinally in a direction toward an open end of the second end of the connector.

4147. The connector as claimed in claim 4046, wherein a space is defined between a radially outward surface of the shoulder and an inner surface of the outer wall, said space receivable of a terminal end of another connector, the terminal end of the the another connector received as an interference fit between the outward surface of the shoulder and the inner surface of the outer wall.

4248. The connector as claimed in claim 4046 or claim 4147, wherein the base defines a sealing surface upon which a terminal end or a face of a terminal end of another connector may become engaged therewith, optionally forming a pneumatic connection.

4349. The connector as claimed in any one of claims 26-4229-48, wherein a swivel-swivel-type connector component is, in use, connected with the body of the connector.

4450. The connector as claimed in claim 4349, wherein the swivel-type connector is is configured to connect with the terminal end of a conduit, and the swivel-type connector is configured to connect with the body of the connector.

4551. The connector as claimed in claim 4349 or 4450, wherein the swivel-type connector component connects to the conduit via a thread.

4652. The connector as claimed in any one of claims 43-4549-51, wherein the swivel-type connector comprises a surface or surfaces which forms a rotatable seal with the inner surface of the connector body.

4753. The connector as claimed in any one of claims 1-4652, wherein said another connector is configured to be engaged or engageable with the connector.

4854. A connector, wherein said connector is configured to be engaged or engageable with a second connector as claimed in any one of claims 1-4652.

4955. A breathing conduit assembly, comprising:

a breathing conduit, and
a connector of any one of claims 1-~~48~~54,
wherein the connector is coupled to, or associated with, or associated to the
breathing conduit.

~~50~~56. A connector assembly the connector assembly comprising:
a first connector of any one of claims 1-~~25~~28, and
a second connector of any one of claims ~~26-48~~29-54.

~~51~~57. A connector assembly, the connector assembly comprising a first connector
and a second connector, the first connector for connection with the second
connector,

the first connector comprising:

a first connector body, the first connector body comprising a
first end and a second end, the first connector body internally defining
a lumen for the passage of gas therethrough between each of the first
and second ends,

the first end, in use, being engaged or engageable with a
terminal end of a breathing conduit or a component to be associated
with the terminal end of the breathing conduit, and

the second end, in use, to be engaged or engageable with the
second connector, and

wherein an internal surface of the first connector body
comprises one or more first internal connection features, and

wherein an external surface of the first connector body
comprises one or more first external alignment feature(s),

wherein the first internal connection features is/are oriented so as to
be radially aligned with said one or more first external alignment features;

the second connector comprising:

a second connector body, the second connector body
comprising a first end and a second end, the body internally defining
a lumen for the passage of gas therethrough between each of the first
and second ends,

the first end, in use, being engaged or engageable with the
terminal end of the breathing conduit or component to be associated
with the terminal end of the breathing ~~tube~~conduit, and

the second end, in use, to be engaged or engageable with the first connector, and

wherein an internal surface of the second connector body comprises one or more second internal connection features, and

an outer wall surrounding of the one or more second internal connection features, the outer wall or at least an exterior surface of the outer wall comprising one or more second external alignment feature(s);

wherein the second internal connection features is/are oriented so as to be radially aligned with said one or more second external alignment features, and

wherein the first external alignment feature(s) is/are configured to be reciprocally keyed with the second external alignment feature(s) of the second connector; and

wherein when the first external alignment feature(s) of the first connector and the second external alignment feature(s) of the second connector are in an aligned orientation, the first internal connection features of the first connector and the second internal connection features of the second connector are oriented for connection.

58. The connector assembly as claimed in claim 57, wherein the outer wall of the second connector operates as a sleeve, for being brought into a sleeved connection with the first connector.

59. The connector assembly of claim 58, wherein the outer wall of the second connector is a sleeve, configured for use as a 22mm male taper connector to another connector comprising a female connection facility.

60. The connector assembly of claim 58, wherein the outer wall of the second connector is a sleeve, configured for use as a 22mm female taper connector to another connector comprising a male connection facility.

61. The connector assembly as claimed in any of claims 57-60, wherein the first external alignment feature(s) comprise one or more recess or cut-out in a terminal end face of the outer wall of the second end, said recess or cut-out configured to be received by a substantially reciprocally shaped portion on the second connector to

which said outer wall is to be placed into contact, optionally, the reciprocally shaped portion is a protrusion or projection.

62. The connector assembly as claimed in any of claims 57-61, wherein the first external alignment features are configured to be co-located or co-locatable for keying with a reciprocally shaped projection of a sleeved portion of the second connector when brought to bear into connection therewith during a connection between a terminal face of the second end of the first connector and said second connector.

63. The connector assembly as claimed in claim 61, wherein the one or more recess or cut-out is configured to act as a keyway to reciprocally locate with a reciprocally shaped protrusion or projection or key of a component brought into connection therewith.

64. The connector assembly as claimed in claim 63, wherein the recess or cut out acts as a keyway for a key which may be brought to bear upon it.

65. The connector assembly of claim 63 or claim 64, wherein a shape or profile of the key or keyway may include one or more of: semi-circular, triangular, rectangular or other recti-linear or geometric shapes, elliptical, wedge shapes.

5266. The connector assembly as claimed in ~~claim 51~~ any of claims 57-65, wherein when the external alignment feature(s) of the first connector, and the external alignment feature(s) of the second connector are in an unaligned orientation, the internal connection features of the first connector, and the internal connection features of the second connector are prevented from connection.

5367. The connector assembly as claimed in ~~claim 51 or claim 52~~ any of claims 57-66, wherein the first connector is defined by the connector of any one of claims 1-2528.

5468. The connector assembly as claimed in any of claims ~~51-53~~57-67, wherein the second connector is defined by the connector of any one of claims ~~26-47~~29-53.