

A connector assembly

Technical Field

The present invention generally relates to a
5 connector assembly for connecting a shaft to a member and
to a connector that is utilised in the connector assembly.

Background

It is often desirable that a connector be provided to
10 connect a shaft to member. It is often desirable that the
connector be a detachable connector to facilitate
transport and storage. Known detachable connectors
comprise two engageable components, one component for
mounting on a shaft and the other for mounting on a
15 device. In one known form of connector, the component for
mounting on the shaft comprises an externally threaded
spigot which may be screwed into an internally threaded
socket on a second component for mounting on the device.

20 US patent no. 6,502,787 discloses an unmanned aerial
vehicle that includes an upper fuselage segment and a
lower fuselage segment. The unmanned aerial vehicle also
includes a guard assembly to which is mounted a rotor that
rotates within the rotor guard assembly between the
25 fuselage segments. Six legs extend from the rotor guard
assembly to support the aerial vehicle when stationary on
the ground.

The upper and lower fuselage segments are integrally
30 molded to the rotor guard assembly. The rotor guard
assembly includes a plurality of upper turning vanes and a
plurality of lower turning vanes that extend radially from
a generally cylindrical rotor guard hub to a generally
cylindrical rotor guard wall. The upper and lower turning

vanes are integrally formed with the rotor guard hub and the rotor guard wall.

5 A disadvantage with the unmanned aerial vehicle disclosed in 6,502,787 is that the rotor guard assembly is permanently fixed to the upper and lower fuselage. The unmanned aerial vehicle can not be easily disassembled and is therefore somewhat bulky to transport. Although the unmanned aerial vehicle is highly useful in military
10 operations where the vehicle can be fitted with a camera on it's lower fuselage for aerial surveillance, its bulk size makes it cumbersome to transport.

There is a need to provide a connector assembly for
15 detachably connecting a shaft to a member, which overcomes or at least ameliorates one or more of the disadvantages described above.

There is a need to provide a connector that can be
20 utilised in a connector assembly for detachably connecting a shaft to a member.

Summary of invention

According to a first aspect of the invention, there
25 is provided a connector for connecting a shaft to a member, the connector comprising:

a male connector provided with a male engagement element and a female connector comprising a female engagement opening for engaging the male engagement
30 element therein, the male or female connector being connectable to the member in use,

a receiver provided on at least one of the male or female connectors for receiving the shaft in use; and

a spring-biased lock mechanism provided on the male connector or the female connector for locking the male and female connectors together when the male engagement element engages the female engagement opening.

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According to a second aspect of the invention, there is provided a connector assembly comprising:

a member;

a shaft;

10 a connector mountable to the member, the connector comprising:

a male connector provided with a male engagement element;

15 a female connector comprising a female engagement opening for engaging the male engagement element therein;

a receiver provided on at least one of the male or female connectors for receiving the shaft in use; and

20 a spring-biased lock mechanism provided on the male connector or the female connector for locking the male and female connectors together when the male engagement element engages the female engagement opening.

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According to a third aspect of the invention, there is provided a connector system for an aerial vehicle of the type comprising a fuselage defining a longitudinal axis; a rotor guard assembly surrounding at least a
30 portion of the fuselage in a plane perpendicular to the longitudinal axis; and a shaft connecting the rotor guard assembly and the fuselage; the connector system comprising:

a connector mountable to the rotor guard assembly, the connector comprising:

a male connector provided with a male engagement element;

5 a female connector comprising a female engagement opening for engaging the male engagement element therein;

a receiver extending through at least one of the male or female connectors for receiving the shaft in use; and

10 a spring-biased lock mechanism provided on the male connector or the female connector for locking the male and female connectors together when the male engagement element engages the female engagement opening.

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Disclosure of embodiments

The receiver may be a receiver conduit extending through the male connector or the female connector. The receiver conduit may extend between the male connector and the female connector. Advantageously, the receiver conduit may at least partially dampen vibration emitted by the shaft in use.

Advantageously, the spring biased lock mechanism may at least partially dampen vibration emitted by the shaft in use. In one embodiment, the spring-biased lock mechanism may comprise a spring-biased ball bearing provided on one of the male or female connectors and a receiving hole provided on the other of the male or female connectors for receiving at least part of the ball bearing therein. The ball bearing may be provided within a cylinder comprising a retaining lip at one end for retaining the ball bearing at least partly within the cylinder. The cylinder may comprise a spring at an end

opposite to the retaining lip for biasing the ball bearing toward the retaining lip. The cylinder may be provided on the male connector or the female connector and a slot may be provided directly below the cylinder for permitting
5 removal of the cylinder from the male connector or the female connector.

The female connector may comprise a guide for guiding the male engagement element toward the female engagement
10 opening. The guide may comprise a primary ramp at a first angle for moving the male engagement element upwardly towards the female engagement opening. A second ramp may also be provided having a second angle that is less than the first angle and may be disposed between the primary
15 ramp and the female engagement opening.

The male connector may comprise a mounting surface for mounting to a corresponding mounting surface of the member. The male connector mounting surface may be concave
20 for mounting to a convex mounting surface of the member. A dampening material may be provided between the mounting surface of the male connector and the mounting surface of the member for dampening vibrations imparted by the shaft when connected thereto.

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The male engagement element may comprises a pair of projecting arms for locking engagement with the female engagement opening. The pair of projecting arms may be in a substantially dovetail shape.

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In one embodiment, at least part of the receiver extends between the pair of projecting arms. Furthermore, in another embodiment, at least part of the receiver may extends above the female engagement opening.

Brief Description Of Drawings

The accompanying drawings which are incorporated into and constitute apart of the description of a disclosed embodiment of a connector and an attachment system that utilises the disclosed connector, illustrates a disclosed embodiment and serves to explain the principles of the disclosed embodiment. It is to be understood, however, that the drawings are designed for purposes of illustration only, and not as a definition of the limits of the invention.

Fig. 1 shows a perspective view of a connector comprising male and female connectors in attachment;

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Fig. 2 shows the connector of Fig. 1 in which the male connector and the female connector are detached;

Fig. 3 shows a cross sectional view of the locking mechanism of the connector of Fig. 1 in a plane perpendicular to the arrow shown by dashed line A-A of Fig. 1;

Fig. 4 shows a top view of the male connector;

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Fig. 5 shows a side view of the male connector;

Fig. 5A shows a front perspective view of the male connector with the solid dark lines showing the visible features of the male connector and the lighter lines showing the features not visible;

Fig. 6 shows a front view of the male connector;

Fig. 7 shows a top view of the female connector;

Fig. 8 shows a side view of the female connector;

5 Fig. 9 shows a rear view of the female connector;

Fig. 10 shows a front view of the female connector;

10 Fig. 10A shows a rear perspective view of the female connector with the solid dark lines showing the visible features of the female connector and the lighter lines showing the features not visible;

15 Fig. 11 shows a bottom view of the female connector;

Fig. 12 shows a rear perspective view of the female connector; and

20 Fig. 13 shows an attachment assembly for an aerial vehicle that incorporates three of the connectors of Fig. 1.

25 Fig. 14 shows one of the three shafts of the aerial vehicle of Fig. 13, clamped between the male and female connector of Fig. 1 while the male connector is mounted to the rotor guard assembly.

Detailed Description Of Disclosed Embodiment

The disclosed embodiment discloses a novel connector for connecting a shaft to a mounting member. The novel connector comprising a male connector provided with a male engagement element and a female connector comprising a female engagement opening for engaging the male engagement element therein. In the disclosed embodiment, the male connector is connectable to the mounting member in use. The connector of the disclosed embodiment also comprises a receiver extending through the male and female connectors for receiving the shaft in use. In the disclosed embodiment, the connector includes a spring-biased lock mechanism provided on the male connector and the female connector for locking the male and female connectors together when the male engagement member engages the female engagement opening.

The disclosed connector is capable of connecting a shaft to a mounting member in use. Advantageously the disclosed connector dampens vibration that may be emitted by the shaft in use.

Referring to Fig. 1 there is shown a perspective view of a novel connector 10 that comprises a male connector shown generally by arrow 12 and a female connector shown generally by arrow 14. The male connector 12 has a male body 13 and the female connector 14 has a female body 15. The connector 10 also comprises a receiver in the form of a receiver conduit shown generally by arrow 40, which extends through the male connector body 13 and the female connector body 15 for receiving a shaft in use as will be described further below.

From Fig. 2 and Fig. 3, it can be seen that the male body 15 has a top surface 32 from which projects a male engagement element in the form of dovetail projection member comprising dovetail arms (16a,16b). A male receiver conduit 22 extending between the dovetail arms (16a,16b) forms the lower half of the receiver conduit (40).

The male body 13 has a rear surface shown by arrow 41 and includes a spring biased lock mechanism in the form of cylinders (18a,18b) which extend from a top surface of the male body 13 down through to a platform 17 (refer to Fig. 3). The cylinders (18a,18b) are each provided with respective springs (34a,34b) for biasing respective ball bearings (20a,20b) toward the female body 15 in the direction shown by arrow 21 of Fig. 3. The cylinders (18a,18b) include upper lips (19a,19b) that are at the opposite end to the spring and which are sized allow the ball bearings (20a, 20b) to project partly from the upper lips (19a,19b) but also to be prevented from projecting from the cylinders (18a, 18b) as the spring (34a,34b) biases the ball bearings (20a,20b) in the direction of arrow 21.

In this embodiment, cylinder (18a,18b), ball (20a,20b) and spring (34a,34b) are commercially available plunger arrangements available as VLIER™ plungers from Barry Controls, a Hutchinson Group Company of Brighton, Massachusetts, United States of America. In the disclosed embodiment, the plunger has a DELRIN™ acetal resin body available from Du Pont of Wilmington, Delaware, United States of America. The ball is made of stainless steel ball.

The female body 15 has a front surface shown generally by arrow 43. As will be described further bellow, the female body 15 is provided with a pair of receiving holes (30a, 30b) that extend through the upper part of the female body 15 as shown in Fig. 2 and Fig. 3. The receiving holes (30a, 30b) are sized to respectively receive the exposed ball bearings (20a, 20b) that are biased by the springs (34a,34b) and thereby lockingly engage the male body 13 to the female body 15 as shown in Fig. 3.

Referring now to Figs. 4-7, the male connector 12 will be described in further detail. Referring in particular to Fig. 4, there is shown the male connector 12 without the cylinders (18a,18b) and with conduit 23 showing where the cylinders are (18a,18b) residing. Fig. 4 shows a front end 42 opposite rear end 41. It can be seen that the male receiver conduit extends from the front end 42 to the rear end 41. It can also be seen from Fig. 4 that the male connector 12 is substantially symmetrical about a longitudinal axis as shown by dashed arrow line 29. The male body 13 also includes guide member in the form of a male ramps (37a,37b) for respectively mating with female ramps (50a,50b) of the female body 15 as will be described further below. Fig. 5 shows a side view of the male connector 12 with the cylinders (18a,18b) and ball bearings (20a,20b) removed. Fig. 5 shows an outline of the male ramp 37b. It can also be seen from Fig. 5 that there is a stop in the form of a step 39b at the end of the male ramp 37b that is provided to restrict any forward movement of the female body 15 toward the male body 13 as the balls (18a,18b) are received by the receiving holes (30a,30b). A step 39a (not shown) is associated with the other ramp 37a.

As shown in Fig. 5, the disclosed embodiment has maintenance slots 26 on the male body 13, adjacent to and directly below the cylinders (18a,18b). The maintenance slot 26 allows the cylinder 18 to be ejected from the male body 13 by using an implement to wedge the cylinder from the male body 13. The maintenance slot 26 allows the VLIER™ plungers to be replaced if it is faulty.

To construct the maintenance slots (26), a hole 33 is driven through the body 13 from one end to the other. Hole 33 can be seen in Fig. 2.

It can also be seen from Fig. 5, that a concave-shaped mounting surface 24 is provided below the front surface 41. The concave-shaped mounting surface 24 enables the connector 12 to be mounted to a corresponding convex shaped body surface when the connector 10 is mounted thereto. Preferably a vibrational dampening material (not shown) such as DP-400™ viscoelastic damping material available from Jastram Technologies Ltd. of St Catharines, Ontario, Canada, may be provided to dampen vibration that may be imparted to the connector 10 when connected to a shaft as will be explained further below. The vibrational dampening material is cut to the size of the surface 24 and stuck thereon. In the preferred embodiment, the thickness of the vibrational dampening material is 2 mm. In use, the thickness of the vibrational dampening material should be 1.5mm or more in order for it to adequately dampen vibrations.

Fig. 5A shows a front perspective view of the male connector 12 with the solid dark lines showing the visible features of the male connector 12 and the lighter lines

showing the features not visible when viewed from the front perspective view. A connector hole 36 is shown extending through the lower body 13 of the male connector 12 for mounting the male connector to a mounting surface.

5 Fig. 5A also shows that the surface 24 includes respective surface edge lips (24a,24b) between which the vibrational dampening material is provided in use.

Referring in particular in Fig. 6, there is shown a
10 front view of the male connector 12. It can be seen from Fig. 6 that the connector hole 36 extends from the front surface 42 to the rear surface 41 to allow the male body 13 to be mounted to a mounting member in use. A front view of the steps (39a,39b) of the male ramps (37a,37b)
15 are also shown.

Referring now to Figs. 7 to 12, the female connector 14 will now be described in further detail. Referring in particular to Fig. 7 and Fig.8, the female
20 body 15 has an attachment collar 38 that extends from the rear surface 45 of the female connector 14. The attachment collar 38 is made of steel. A hole (refer to Fig. 7) extends through the attachment collar 38 so that a flexible connector such as a rope can be looped through
25 the hole of the attachment collar 38. The rope is mounted to the mounting member (not shown) to retain the female connector 14 while detached from the male connector 12.

Referring to Fig. 8 and Fig. 9, it can be seen that
30 the rear surface 45 of the female body 15 also includes a lower front surface 45b that is adjacent to the rear end of a female engagement opening in the form of female opening 46 that extends through the female body 15 (refer to Fig. 9). From Fig. 9, it can be seen that side walls

(46a,46b) of the female body 15 surround the female opening 46 and correspond in shape to the dovetail arms (16a,16b) to allow a locking fit therebetween. The side walls (46a,46b) extend downwardly and respectively
5 terminate at a point shown by arrows (54a, 54b). A female receiver conduit 28 is provided above the female opening 46 and form the upper half of the receiver 40. Accordingly, the male receiver opening 22 and the female receiver conduit 28 form the receiver 40.

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Referring now in particular to Fig. 10 and Fig. 10A, there is shown a guide member in the form of guide surfaces shown by arrows (48a,48b) which are provided on the lower front surface (43b) of female body 15 for
15 guiding the front surface 42 of the dovetail arms (16a,16b) toward the female opening 46 (shown between dashed lines 46a and 46b in Fig. 11). The guide surfaces (48a,48b) include female ramps (50a, 50b) disposed between the guide surfaces (48a,48b) and front surfaces (52a,52b).
20 The female ramps (50a, 50b) are at an angle of about 45°. The female ramps (50a,50b) are at the same angle as the male ramps (37a,37b) for respectively guiding the dovetail arms (16a,16b) toward the opening 46 (which is shown between the dash line of Fig. 11) as the female ramps
25 (50a,50b) slide along the male ramps (37a,37b).

In use, the male connector 12 is mounted to a mounting member. A shaft (not shown) may be placed within
30 the receiver conduit 22 of the male body 13. To connect the shaft to the mounting member using the connector 10, the female connector 14 is positioned so that the female body 15 front surface 43 is oppositely opposed to the front surface 42 of the male body 13. The female body 15

is moved toward the male body 13 so that as the front surface 43 of the female body 15 contacts with the front surface 42 of the male body 13, the rear surface of the dovetail arms (16a, 16b) are guided by the ramps (50a, 50b) into the opening 46. As the female body 15 is further moved towards the male body 13, the dovetail arms (16a, 16b) make contact with the side walls 46a, 46b of the opening 46. Additionally, the female receiver conduit 28 is sized so that it is able to slide along the top surface of the shaft that is provided within the male receiver conduit 22.

The top front surface 43 of the female body 15 makes contact with the ball bearings (20a,20b). Upon application of sufficient force (which in this embodiment is applied by hand), the bias force applied by the springs (34a,34b) is overcome and the ball bearings (20a,20b) are pressed downwardly in the opposite direction to arrow 21. Upon further movement of the female body 15 toward the male body 13, the receiver holes (30a,30b) respectively receive the ball bearings (20a, 20b) which are then forced back in the direction of arrow 21 by springs (34a,34b). The ball bearings (20a, 20b) within the receiver holes (30a,30b) lock the female body 15 to the male body (as shown in Fig. 3 and Fig. 1). Accordingly, the shaft is clamped between the male connector 12 and the female connector 14 as it resides in receiver conduit 40.

When the shaft 56 is to be disconnected, a force is applied to the female body 15 to move it away from the male body 13, which causes the bias force applied by the springs (34a,34b) to be overcome and the ball bearings (20a,20b) to be pressed downwardly in the opposite direction to arrow 21. The ball bearings (20a,20b) are

removed from receiver holes (30a,30b). The female body 15 moves out of locking engagement with the male body 13 and the dovetail arms (16a,16b) are removed from the opening 46.

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Advantageously, the male connector 12 and the female connector 14 can be engaged and disengaged in about three seconds.

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The connector 10 may be made from metal such as aluminum alloy 6061 or aluminum alloy 7074. The male and female connectors (12,14) may be fabricated by electric discharge machining (EDM) wire cutting process using an electric discharge machine. An exemplary electric
15 discharge machine and EDM wire cutting process is disclosed in US Patent No. 5,756,956, which is incorporated herein in its entirety.

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One or more connectors 10 can be used in a novel attachment system for an aerial vehicle of the type comprising a fuselage defining a longitudinal axis. The aerial vehicle also comprising a rotor guard assembly surrounding at least a portion of the fuselage in a plane perpendicular to the longitudinal axis. A shaft is also
25 provided to connect the rotor guard assembly and the fuselage.

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An embodiment of a novel attachment system is disclosed with reference to Fig. 13, which discloses an unmanned aerial vehicle 58. The aerial vehicle 58 is similar to the aerial vehicle disclosed in US Patent No. 6,502,787 and a full description of the unmanned aerial vehicle type and its modes of operation is disclosed in this patent. For the purposes of illustration the aerial

vehicle 58 is shown in Fig. 13 comprising a fuselage 62 defining a longitudinal axis represented by dashed lines and identified by arrow 64. The aerial vehicle 58 also comprises a rotor guard assembly 60 that surrounds the fuselage 62 in a plane perpendicular to the longitudinal axis represented by dashed lines and identified by arrow 66.

Unlike the aerial vehicle disclosed in US Patent No. 6,502,787, the aerial vehicle 58 is different in that the fuselage 62 is not integrally molded with the rotor guard assembly 60. The fuselage 62 is connected to the rotor guard assembly 60 by three shafts (68a,68b,68c). The three shafts (68a,68b,68c) are connected to the rotor guard assembly 60 by respective connectors (10a,10b,10c), each of which are the same connectors as described with reference to Figs. 1-13 above. The connectors (10a,10b,10c) are equally spaced at 120° around the circumference of the rotor guard assembly 60. The ends of the shafts (68a,68b,68c) are disposed within the receiver conduit 40 and clamped between the male connector 12 and female connector 14.

As each male connector 12 and female connector 14 can be engaged and disengaged in about three seconds, it will be appreciated that the rotor guard assembly 60 can be disassembled from the fuselage 58 by disengaging the three connectors (10a,10b,10c) in about 5 seconds. Likewise, the rotor guard assembly 60 can be assembled to the fuselage 58 by engaging the three connectors (10a,10b,10c) in about 5 seconds. The attachment system shown in Fig. 14 therefore allows the unmanned aerial vehicle 58 to be assembled and disassembled in a relatively short period of time and with minimal effort. This is a particular

advantage when the unmanned aerial vehicle 58 is to be transported. For example, the unmanned aerial vehicle 58 may be sized such that the fuselage 62 and the rotor guard assembly 60 can be fitted into a receptacle such as a backpack in the disassembled form. This is a particular advantage when the unmanned aerial vehicle is being used by military personnel involved in operations.

Referring to Fig. 14, there is shown a more detailed view of the shaft 68c that is clamped between the male connector 12 and female connector (14) of the connector 10b, while the male connector 12 is mounted to the rotor guard assembly 60.

Advantageously the connectors (10a,10b,10c) provide a secure connection for the shafts (60a,60b,60c) and because the shafts (60a,60b,60c) extends through the male and female bodies of the connectors (10a,10b,10c), vibration occurring in the longitudinal direction of the shaft (60a,60b,60c) axes is at least partially dampened. Some lateral vibration of the shaft (60a,60b,60c) axes may be imparted however advantageously, at least part of the vibration may be dampened by the springs (34a,34b), which may at least partly absorb the vibration. Additional vibration may also be limited by a dampener material provided adjacent to the surface 24 as described above.

The conduit 40 of the connectors (10a,10b,10c) reduces linear and rotational movement in the axial direction of the respective shafts (68a,68b,68c). Furthermore, because the connectors (10a,10b,10c) are spaced evenly around the rotor guard assembly 60, they also limit any linear and rotational movement imparted by the axes of shafts (68a,68b,68c).

It will also be appreciated that holes can be provided through the connectors (10a,10b,10c) to allow electrical wires to extend from the fuselage through to
5 the rotor guard plate.

It is important to note that the connector 10 as described with reference to Figs. 1-13 above could be used to connect shafts to other mounting bodies other than the
10 unmanned aerial vehicle 58 shown in Fig. 58. For example, one or more the connectors 10 could be used to connect a wing shaft to the fuselage of a detachable wing air vehicle or in other non-aviation applications.

15 In other embodiments, the male body 13 may not include the concave shaped lower surface 24 but may be flat. Additionally, in other embodiments, the guides 48 may not be provided. Furthermore, in other embodiments, the female body 15 may be mounted to a mounting member
20 while the male body 13 is moved toward the female body 15 for connection.

Additionally, in other embodiments the receiver conduit 40 may not be provided between the male and female
25 connectors (12,14) but may extend through the bodies of only the male connector (12) or the female connector (14). Still, in a further embodiment, the cylinders (18a,118b) and associated ball bearings (20a,20b) and springs (34a,34b) may be provided on the female body 15 while the
30 receiver holes (30a,30b) may be provided on the male body.

Accordingly, it will be apparent that various other modifications and adaptations of the invention will be apparent to the person skilled in the art after reading

the foregoing disclosure without departing from the spirit and scope of the invention and it is intended that all such modifications and adaptations come within the scope of the appended claims.

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Claims

1. A connector for connecting a shaft to a member, the connector comprising:

a male connector provided with a male engagement element and a female connector comprising a female engagement opening for engaging the male engagement element therein, the male or female connector being connectable to the member in use,

a receiver provided on at least one of the male or female connectors for receiving the shaft in use; and

a spring-biased lock mechanism provided on the male connector or the female connector for locking the male and female connectors together when the male engagement element engages the female engagement opening.

2. A connector as claimed in claim 1, wherein the receiver is a receiver conduit extending through the male connector or the female connector.

3. A connector as claimed in claim 2, wherein the receiver conduit extends between the male connector and the female connector.

4. A connector as claimed in any one of the preceding claims, wherein the spring-biased lock mechanism comprises a spring-biased ball bearing provided on one of the male or female connectors and a receiving hole provided on the other of the male or female connectors for receiving at least part of the ball bearing therein.

5. A connector as claimed in claim 4, wherein the ball bearing is provided within a cylinder comprising a retaining lip at one end for retaining the ball bearing at least partly within the cylinder.

6. A connector as claimed in claim 5, wherein the cylinder comprises a spring at an end opposite to the retaining lip for biasing the ball bearing toward the retaining lip.

7. A connector as claimed in claim 5 or claim 6, wherein the cylinder is provided on the male connector or the female connector and a slot is provided directly below the cylinder for permitting the cylinder to be removed from the male connector or the female connector.

8. A connector as claimed in any one of the preceding claims, wherein the female connector comprises a guide for guiding the male engagement element toward the female engagement opening.

9. A connector as claimed in claim 8, wherein the female connector comprises a female ramp guiding the male engagement element upwardly towards the female engagement opening.

10. A connector as claimed in claim 9, wherein the male connector comprises a male ramp to allow the female ramp of the female connector to slide thereon in use.

11. A connector as claimed in claim 10, wherein the male ramp includes a stop for preventing further movement of the male connector and the female connector towards each other.

12. A connector as claimed in any one of the preceding claims, wherein the male connector comprises a mounting

surface for mounting to a corresponding mounting surface of the member.

13. A connector as claimed in claim 12, wherein the male
5 connector mounting surface is concave for mounting to a convex mounting surface of the member.

14. A connector as claimed in claim 12 or claim 13,
wherein a dampening material is provided between the
10 mounting surface of the male connector and the mounting surface of the member for dampening vibrations imparted by the shaft when connected thereto.

15. A connector as claimed in any one of the preceding
15 claims, wherein the male engagement element comprises a pair of projecting arms for locking engagement with the female engagement opening.

16. A connector as claimed in 15, wherein the pair of
20 projecting arms are in a substantially dovetail shape.

17. A connector as claimed in 15 or claim 16, wherein at
least part of the receiver extends between the pair of
projecting arms.

25 18. A connector as claimed in any one of the preceding claims, wherein at least part of the receiver extends above the female engagement opening.

30 19. An connector assembly comprising:
a member;
a shaft;
a connector mountable to the member, the connector comprising:

a male connector provided with a male engagement element;

a female connector comprising a female engagement opening for engaging the male engagement element therein;

a receiver provided on at least one of the male or female connectors for receiving the shaft in use; and

a spring-biased lock mechanism provided on the male connector or the female connector for locking the male and female connectors together when the male engagement element engages the female engagement opening.

20. A connector system for an aerial vehicle of the type comprising a fuselage defining a longitudinal axis; a rotor guard assembly surrounding at least a portion of the fuselage in a plane perpendicular to the longitudinal axis; and a shaft connecting the rotor guard assembly and the fuselage; the connector system comprising:

a connector mountable to the rotor guard assembly, the connector comprising:

a male connector provided with a male engagement element;

a female connector comprising a female engagement opening for engaging the male engagement element therein;

a receiver extending through at least one of the male or female connectors for receiving the shaft in use; and

a spring-biased lock mechanism provided on the male connector or the female connector for locking the male and female connectors together when the male engagement element engages the female engagement opening.

21. A connector system as claimed in claim 16, wherein three connectors are equally spaced around the rotor guard assembly for connecting three shafts to the rotor guard assembly and the fuselage.

22. A connector, substantially as herein described with reference to the accompanying drawings.

23. A connector assembly, substantially as herein described with reference to the accompanying drawings.

24. A connector system for an aerial vehicle of the type comprising a fuselage defining a longitudinal axis; a rotor guard assembly surrounding at least a portion of the fuselage in a plane perpendicular to the longitudinal axis; and a shaft connecting the rotor guard assembly and the fuselage; the connector system substantially as herein described with reference to the accompanying drawings.