CLAIMS

1. A lifting device (32) for raising and lowering a contact member (16), the lifting device comprising:

an actuator (52, 54, 58) configured to move the contact member between a lowered position and a raised position, wherein in a first mode of operation of the lifting device (32), the actuator (52, 54, 58) moves the contact member (16) from the lowered position to the raised position without rotating the contact member (16) about a reference axis, and characterized in that:

wherein in a second mode of operation of the lifting device (32), the actuator (52, 54, 58) permits rotational motion of the contact member (16) about the reference axis from the raised position to a modified raised position, and

the actuator (52, 54, 58) restricts linear movement of the contact member (16) in a direction that is parallel to the reference axis.

2. The lifting device (32) according to Claim 1, wherein the actuator (52, 54, 58) includes a screw portion (52) and a nut portion (54), the nut portion (54) being fastened to the screw portion (52) in a threaded fashion.

3. The lifting device (32) according to Claim 2, wherein in the first mode of operation of the lifting device (32), the actuator (52, 54, 58) permits rotational motion of the screw portion (52) and linear motion of the nut portion (54).

4. The lifting device (32) according to Claim 2 or 3, wherein in the second mode of operation of the lifting device (32), the actuator (52, 54, 58) permits only rotational motion of the screw portion (52) and the nut portion (54) , or

in a third mode of operation of the lifting device (32), the actuator (52, 54, 58) is configured to rotate the screw portion (52) in a direction that is opposite of the rotational direction of the screw portion (52) in the first mode of operation of the lifting device, and wherein the actuator (52, 54, 58) is configured to move the nut (54) in a linearly downward direction.

5. The lifting device of any of claims 1 to 4, further comprising:

an engagement member (65) including a shaft (68) connected at a first end to a nut portion (54) of the actuator and having a bearing (66) rotatably mounted on a second end of the shaft (68), the second end of the shaft (68) being away from the first end and being disposed in a first channel (64) that permits in the first mode of operation of the lifting device (32), a movement of the shaft (68) along a length of the first channel (64) and restricts movement of the shaft (68) in a direction that is perpendicular to the length of the first channel (64).

6. The lifting device (32) according to Claim 5, wherein the contact member (16) is connected to the nut portion (54) of the actuator and a linear movement of the shaft (68) along the first channel (64) induces the linear movement of the contact member (16).

7. The lifting device (32) according to claim 5, further comprising:

a rotational member (80) that includes a second channel (84) designed to receive the shaft (68) from the first channel (64) when the contact member (16) is in the raised position.

8. The lifting device (31) of Claim 7, wherein the rotational member (80) permits only rotational movement of the shaft (68) about the reference axis, in the second mode of operation of the lifting device (32).

9. The lifting device (32) according to Claim 7 or Claim 8, wherein the rotational member (80) is substantially annular in structure and is affixed to the nut portion (54) of the actuator by a ledge (74).

10. The lifting device (32) of Claim 1, further comprising:

an engagement member (92) including a first portion (94) and a second portion (96), the first portion (94) being engaged with and reciprocally movable with respect to the second portion (96), such that a length of a first channel (64) formed by the first and second portions is adjustable.

11. The lifting device (32) of Claim 10, further comprising:

a rack (100) attached to the first portion (94) of the engagement member (92), and

a pinion (102) attached to the second portion (96) of the engagement member (92), wherein a rotational motion of the pinion (102) induces a linear motion of the rack (100).

12. The lifting device (32) according to Claim 5, wherein the reference axis is substantially parallel to the length of the first channel (64).

13. A transportation vehicle (10) comprising:

a body portion (12); and

a lifting device (32) according to any of claims 1, 5-11, and 12 disposed on the body portion (12).

14. The transportation vehicle (10) of Claim 13, further comprising:

a motor (28) configured to rotate the body portion (12) of the transportation vehicle about the reference axis in a direction opposite to the direction of rotation of the contact member (16).

15. The transportation vehicle (10) of Claim 14, wherein rotating the body portion (12) of the transportation vehicle in the direction opposite to the direction of rotation of the contact member (16) does not change an absolute orientation of the contact member (16) with respect to the body portion (12) of the transportation vehicle.