CLAIMS

~~What is claimed as new and desired to be protected by Letters Patent of the United States is:~~

1. A device for use with an electrostatic chuck having a top surface and a bottom surface, the top surface being separated from the bottom surface by a width, the electrostatic chuck additionally having a hole therein, the hole having a first width at the top surface and having a second width at the bottom surface, the first width being less than the second width, the top surface being capable of having a wafer disposed thereon, said device comprising:

a pin having a pin width less than the first width;

a shaft having a pin-holding portion supporting a lower end of the pin, an end portion and a central portion disposed between said pin-holding portion and said end portion, said central portion comprising a first bearing portion;

~~a neck portion;~~ and

an outer housing portion having a first end and a second end and comprising a second bearing portion,

wherein said shaft is disposed within said outer housing portion and is moveable relative to said outer housing portion~~,~~ between a first position and a second position,

wherein the outer housing portion surrounds the first bearing portion and the second bearing portion surrounds the shaft so as to limit lateral movement of the shaft when the shaft is moved relative to the outer housing portion,

wherein said second bearing portion is stationary,

wherein said first bearing portion is movable relative to said second bearing portion, and

wherein the outer housing portion includes a lip portion wherein the first bearing portion separates from the lip portion when the shaft is moved into the second position;

wherein the first bearing portion includes an annular space which is configured to be filled with lubricant so as to reduce friction between the first bearing portion and the outer housing portion when the shaft is moved between the first and second positions.

~~wherein said neck portion is disposed at said first end,~~

~~wherein said second bearing portion is stationary relative to said neck portion, and~~

~~wherein first bearing portion is movable relative to said second bearing portion.~~

2. The device of claim 1,

wherein said pin comprises a first pin end and a second pin end,

wherein said first pin end is separated from said second pin end by a pin length,

wherein said second pin end comprises a male geometry,

wherein said pin-holding portion comprises a channel portion having an open end and a pin-holding bottom separated from said open end by a pin-holding length,

wherein said pin-holding bottom comprises a female geometry, and

wherein said pin is disposed in said pin-holding portion such that the second pin end rests on said pin-holding bottom.

3. The device of claim 2,

wherein said second pin end comprises a semi-spherical convex male geometry

wherein said pin-holding bottom comprises a semi-spherical concave female geometry.

4. The device of claim 2, further comprising a radial force-providing device disposed to surround said pin and disposed within said pin-holding portion, said radial force-providing device operable to provide a radial force between said pin-holding portion and said pin so as to center the pin within the pin-holding portion.

5. The device of claim 1,

wherein said pin comprises a first pin end and a second pin end,

wherein said first pin end is separated from said second pin end by a pin length,

~~wherein said shaft is moveable between a first position and a second position,~~

wherein when said shaft is disposed in the first position, the first pin end is disposed between the top surface and said second pin end and the first bearing portion is disposed a first bearing separation distance from said second bearing portion,

wherein when said shaft is disposed in the second position, the top surface is disposed between said first pin end and said second pin end, and the first bearing portion is disposed a second bearing separation distance from said second bearing portion, and

wherein the first bearing separation distance is greater than the second bearing

separation distance.

6. The device of claim 1, further comprising a housing neck including a shaft guiding portion, a cap portion, and an inner portion having a cavity therein, wherein the cap portion is connected to the outer housing portion, the central portion of the shaft including a tapered portion wherein the tapered portion fits into the cavity when the shaft is moved into the second position.

7. The device of claim 1, wherein the second bearing portion includes an annular space which is configured to be filled with lubricant so as to reduce friction between the second bearing portion and the shaft when the shaft is moved between the first and second positions.

8. The device of claim 6, further including a bellows portion wherein an upper end of the bellows portion is connected to an inner portion of the housing neck and a lower end of the bellows portion is connected to the first bearing portion.

9. A device for use with an electrostatic chuck having a top surface and a bottom surface, the top surface being separated from the bottom surface by a width, the electrostatic chuck additionally having a hole therein, the hole having a first width at the top surface and having a second width at the bottom surface, the first width being less than the second width, the top surface being capable of having a wafer disposed thereon, said device comprising:

a pin having a pin width less than the first width;

a shaft having a pin-holding portion supporting a lower end of the pin, an end portion and a central portion disposed between said pin-holding portion and said end portion, said central portion comprising a first bearing portion; and

an outer housing portion having a first end and a second end and comprising a second bearing portion,

wherein said shaft is disposed within said outer housing portion and is moveable relative to said outer housing portion between a first position and a second position,

wherein the outer housing portion surrounds the first bearing portion and the second bearing portion surrounds the shaft so as to limit lateral movement of the shaft when the shaft is moved relative to the outer housing portion,

wherein said second bearing portion is stationary,

wherein said first bearing portion is movable relative to said second bearing portion, and

wherein the outer housing portion includes a lip portion wherein the first bearing portion separates from the lip portion when the shaft is moved into the second position;

wherein the second bearing portion includes an annular space which is configured to be filled with lubricant so as to reduce friction between the second bearing portion and the shaft when the shaft is moved between the first and second positions.

10. A device for use with an electrostatic chuck having a top surface and a bottom surface, the top surface being separated from the bottom surface by a width, the electrostatic chuck additionally having a hole therein, the hole having a first width at the top surface and having a second width at the bottom surface, the first width being less than the second width, the top surface being capable of having a wafer disposed thereon, said device comprising:

a pin having a pin width less than the first width;

a shaft having a pin-holding portion supporting a lower end of the pin, an end portion and a central portion disposed between said pin-holding portion and said end portion, said central portion comprising a first bearing portion; and

an outer housing portion having a first end and a second end and comprising a second bearing portion,

wherein said shaft is disposed within said outer housing portion and is moveable relative to said outer housing portion between a first position and a second position,

wherein the outer housing portion surrounds the first bearing portion and the second bearing portion surrounds the shaft so as to limit lateral movement of the shaft when the shaft is moved relative to the outer housing portion,

wherein said second bearing portion is stationary,

wherein said first bearing portion is movable relative to said second bearing portion, and

wherein the outer housing portion includes a lip portion wherein the first bearing portion separates from the lip portion when the shaft is moved into the second position; and

a housing neck including a shaft guiding portion, a cap portion, and an inner portion having a cavity therein, wherein the cap portion is connected to the outer housing portion, the central portion of the shaft including a tapered portion wherein the tapered portion fits into the cavity when the shaft is moved into the second position; and

a bellows portion wherein an upper end of the bellows portion is connected to an inner portion of the housing neck and a lower end of the bellows portion is connected to the first bearing portion.