CLAIMS

WHAT IS CLAIMED IS:

1. An upper electrode mechanism of a semiconductor processing apparatus comprising a radio frequency (RF) coil, a current sensor, and a current adjustment device, wherein:

the RF coil includes at least two parallelly-connected branches;

the current sensor is arranged on each of the branches and is configured to detect a branch current corresponding to the branch; and

the current adjustment device is arranged on the RF coil and is configured to adjust a branch current of each of the branches to cause branch currents of the branches to be equal,

wherein the current adjustment device includes a first connection bar, a second connection bar, and a mobile connection bar, wherein the first connection bar is connected to an RF source through a matcher, the second connection bar being respectively connected to the at least two parallelly-connected branches, the mobile connection bar being movably connected to the first connection bar and the second connection bar, a connection point of the mobile connection bar and the first connection bar moving along the first connection bar, and a connection point of the mobile connection bar and the second connection bar moving along the second connection bar.

2. The upper electrode mechanism according to claim 1, wherein the current adjustment device includes at least two adjustable capacitors, the at least two adjustable capacitors being arranged on the at least two parallelly-connected branches in a one-to-one correspondence.

3. The upper electrode mechanism according to claim 1, wherein two ends of the mobile connection bar is connected to the first connection bar and the second connection bar, respectively through a connection assembly;

the connection assembly includes a first washer, a second washer, an elastic member, and a screw, wherein a strip-shaped groove is formed on each of the first connection bar and the second connection bar, threaded holes cooperating with the screw are formed at the two ends of the mobile connection bar, and a through-hole for the screw to pass through is formed on each of the first washer and the second washer;

the first washer is attached to the first connection bar or the second connection bar, the elastic member is arranged between the first washer and the second washer, the screw passes through the through-hole of the second washer, the through-hole of the first washer, the stripe-shaped groove of the first connection bar or the second connection bar and is connected to the threaded hole of the mobile connection bar.

4. A semiconductor processing apparatus comprising a process chamber, the process chamber being provided with the upper electrode mechanism according to any one of claims 1 to 3.

5. A current control method of a radio frequency (RF) coil in a semiconductor processing apparatus, applied to the upper electrode mechanism according to any one of claims 1 to 3, comprising:

obtaining branch currents of the at least two parallelly-connected branches of the RF coil;

determining whether the branch currents are equal to each other; and

in response to the branch currents being not equal to each other, adjusting the current adjustment device arranged on the RF coil to cause the branch currents of the branches to be equal.

6. The method according to claim 5, wherein the adjusting the current adjustment device arranged on the RF coil to cause the branch currents of the branches to be equal includes:

adjusting one or more capacitance values of one or more adjustable capacitors among at least two adjustable capacitors to cause the branch currents of the branches to be equal, the at least two adjustable capacitors being arranged on the at least two parallelly-connected branches in a one-to-one correspondence.

7. The method according to claim 6, wherein the adjusting the current adjustment device arranged on the RF coil to cause the branch currents of the branches to be equal includes:

adjusting a position of the connection point of the mobile connection bar and the first connection bar and a position of the connection point of the mobile connection bar and the second connection bar to cause the branch currents of the branches to be equal.

8. The method according to claim 7, wherein the method is applied to the upper electrode mechanism according to claim 3, and the adjusting a position of the connection point of the mobile connection bar and the first connection bar and a position of the connection point of the mobile connection bar and the second connection bar includes:

rotating the screw to move the screw in a direction away from the mobile connection bar to reduce a compression amount of the elastic member located between the first washer and the second washer;

moving the two ends of the mobile connection bar along the first connection bar and the second connection bar to change the position of the connection point of the mobile connection bar and the first connection bar and the position of the connection point of the mobile connection bar and the second connection bar; and

rotating the screw to move the screw in a direction close to the mobile connection bar to increase the compression amount of the elastic member located between the first washer and the second washer to fix the mobile connection bar.