I ~~CLAIM~~claim:

1. A fastener assembly for use in a plasma processing chamber which avoids parasitic plasma formation when used to attach parts inside the plasma chamber, the fastener assembly comprising:

a bolt having a tubular body with an axially extending center through hole, a threaded outer surface, and a non-cylindrical tool engaging socket at the top of the through hole, the socket configured to engage a tool used to rotate the bolt during insertion of the bolt in a threaded hole;

a pin having a shaft extending a length greater than a length of the through hole, the pin being movable from a lower position at which an upper portion of the through hole is not filled to an upper position at which a top face of the pin is flush with a top face of the bolt; and a spring biasing the pin in the upper position, such that the pin is retractable from the upper position to the lower position when a tool is inserted in the tool engaging socket at the top of the through hole; wherein the pin includes a rim between the spring and an axial end of the bolt, the rim engaging the axial end of the bolt when the pin is in the upper position.

~~a spring biasing the pin in the upper position.~~

2. The fastener assembly of ~~Claim~~claim 1, wherein the bolt includes a flange and the top face of the bolt extends inwardly from an outer periphery of the flange.

~~3. The fastener assembly of Claim 1, wherein the pin includes a rim engaging an axial end of the bolt when the pin is in the upper position.~~

~~4. The fastener assembly of Claim 1,~~ 3. A fastener assembly for use in a plasma processing chamber which avoids parasitic plasma formation when used to attach parts inside the plasma chamber, the fastener assembly comprising: a bolt having a tubular body with an axially extending center through hole, a threaded outer surface, and a tool engaging socket at the top of the through hole, the socket configured to engage a tool used to rotate the bolt during insertion of the bolt in a threaded hole; a pin having a shaft extending a length greater than a length of the through hole, the pin being movable from a lower position at which an upper portion of the through hole is not filled to an upper position at which a top face of the pin is flush with a top face of the bolt; and a spring biasing the pin in the upper position; wherein the spring is a helical spring surrounding a lower section of the pin, the spring having a length greater than a length of the lower section of the pin and the pin includes a retention ring engaging at least one turn of the spring and a stop engaging an upper end of the spring when the spring is compressed.

~~5~~ 4. The fastener assembly of ~~Claim~~claim 1, wherein the pin and bolt are made of aluminum and the top faces of the bolt and pin are anodized surfaces.

~~6. The fastener assembly of Claim 1~~ 5. A fastener assembly for use in a plasma processing chamber which avoids parasitic plasma formation when used to attach parts inside the plasma chamber, the fastener assembly comprising: a bolt having a tubular body with an axially extending center through hole, a threaded outer surface, and a tool engaging socket at the top of the through hole, the socket configured to engage a tool used to rotate the bolt during insertion of the bolt in a threaded hole, wherein the bolt includes a top flange with an outer diameter of 0.38 inch and length of 0.08 inch, an unthreaded section extending from the flange having a diameter of 0.24 inch and length of 0.35 inch, and a threaded section extending from the unthreaded section having ISO screw threads of ~~M6xl~~M6.times.1 and length of 0.37 inch, and the tool engaging socket ~~comprising~~comprises a hex socket extending from the top face having a length of 0.19 inch; a pin having a shaft extending a length greater than a length of the through hole, the pin being movable from a lower position at which an upper portion of the through hole is not filled to an upper position at which a top face of the pin is flush with a top face of the bolt; and a spring biasing the pin in the upper position.

~~7. The fastener assembly of Claim 1,~~ 6. A fastener assembly for use in a plasma processing chamber which avoids parasitic plasma formation when used to attach parts inside the plasma chamber, the fastener assembly comprising: a bolt having a tubular body with an axially extending center through hole, a threaded outer surface, and a tool engaging socket at the top of the through hole, the socket configured to engage a tool used to rotate the bolt during insertion of the bolt in a threaded hole; a pin having a shaft extending a length greater than a length of the through hole, the pin being movable from a lower position at which an upper portion of the through hole is not filled to an upper position at which a top face of the pin is flush with a top face of the bolt; and a spring biasing the pin in the upper position; wherein the pin includes seven sections including a first section extending from the top face having a diameter of 0.11 inch and length of 0.21 inch, a second section extending from the first section having a diameter of 0.14 inch and length of 0.56 inch, a third section extending from the second section having a diameter of 0.12 inch and length of 0.03 inch, a fourth section extending from the third section having a diameter of 0.19 inch and length of 0.1 inch, a fifth section extending from the fourth section having a diameter of 0.13 inch and length of 0.05 inch, a sixth section extending from the fifth section having a diameter of 0.15 inch and length of 0.025 inch, and a seventh section extending from the sixth section having a diameter of 0.13 inch and length of 0.68 inch.

~~8~~ 7. A bolted assembly of a plasma chamber attached together with ~~the~~a fastener assembly ~~of Claim 1~~ which avoids parasitic plasma formation when used to attach parts inside the plasma chamber, comprising:

an upper part having a stepped hole;

a lower part having a blind hole with an upper threaded section and a lower unthreaded section;

~~the~~ and a fastener assembly, comprising: a bolt having a tubular body with an axially extending center through hole, a threaded outer surface, and a tool engaging socket at the top of the through hole, the socket configured to engage a tool used to rotate the bolt during insertion of the bolt in a threaded hole; a pin having a shaft extending a length greater than a length of the through hole, the pin being movable from a lower position at which an upper portion of the through hole is not filled to an upper position at which a top face of the pin is flush with a top face of the bolt; and a spring biasing the pin in the upper position; wherein the bolt has a flange received in an upper section of the stepped hole, an unthreaded section received in a lower section of the stepped hole, a threaded section engaged with a threaded upper section of the blind hole;

and the spring ~~surrounding~~surrounds a lower section of the pin and is received in the lower section of the blind hole, the spring being compressed against a stop on the pin and pressing a rim of the pin against an axial end of the bolt when the pin is in the upper position.

~~9~~ 8. The bolted assembly of ~~Claim 8~~claim 7, wherein the socket is a hex socket and the upper and lower parts are aluminum plates of a lower electrode assembly on which a substrate is supported during plasma processing thereof.

~~10~~ 9. The bolted assembly of ~~Claim 8,<'>~~claim 7, wherein the upper part comprises a cover ring having a plurality of stepped holes therein, an upper section of each stepped hole receiving a flange of the bolt such that the top face of the bolt and the top face of the pin are flush with an upper surface of the cover ring.

~~11~~ 10. A method of attaching the bolted assembly of ~~Claim 8~~claim 7, comprising:

placing the spring on a lower end of the pin;

inserting an upper end of the pin in the through hole of the bolt;

inserting the bolt with the pin fitted therein into the stepped hole of the upper part and with the spring on the lower end of the pin in the blind hole of the lower part;

depressing the pin with a tool which matingly engages the socket in the bolt and rotating the bolt with the tool until the top face of the bolt is flush with an upper surface of the upper part;

removing the tool and allowing the spring to push the pin to the upper position with the top face of the pin flush with the top face of the bolt.

~~12~~ 11. A method of detaching the bolted assembly of ~~Claim 8~~claim 7, comprising:

depressing the pin with a tool which matingly engages the socket in the bolt and rotating the bolt with the tool until the threads of the bolt disengage with the threads of the blind hole.