the isolated air chamber formed by the end cap 107, the rear body 101B, the wiper seal 805, and the piston shaft 105A, in accordance with the present invention shown in FIG. 2. It will be appreciated that bushing 2201, wave spring 2203, bushing 2202, and tensioner 2205 are contained within the isolated air chamber formed by aforementioned elements.

[0050] Referring also to FIG. 9 there is shown a partial exploded view of the piston assembly valve in accordance with the present invention shown in FIG. 2. Tension spring pin hole 105B location on metal piston 105A is predetermined for desired spring tension when tension adjuster 2205 is adjusted such that tension spring hole 105 is visible. It will be further understood that the location of tension spring hole 105B is predetermined as a function of the desired spring constant associated with spring 2203, and expected air pressure. For example, the hole 105B can be located on piston 105A such that the distance D is 0.125 inches (or between 3.165 to 3.185 mm) for a given, or predetermined, spring constant associated with compression spring 803 and expected air pressure. Similarly, slotted tensioner 1201 may be turned on piston 105A threads 105B (See FIG. 8) until the tensioner 2205 bottoms out at the end of the threads 105B. The end of the threads, or thread length, 105B may be predetermined such that the distance D is 0.093 inches (or between 2.352 to 2.372 mm) for a given spring constant and air pressure.

[0051] Also shown in FIG. 9 is valve shaft rectangular end or key 105D. Valve shaft key 105D is adaptable to mate with rectangular slot 107D in end cap 107 shown in FIG. 10. It will be appreciated that when aerator 100 is fully assembled valve shaft rectangular end 105D fitted into slot 107D is unable to rotate.

[0052] It should be understood that the foregoing description is only illustrative of the invention. Thus, various alternatives and modifications can be devised by those skilled in the art without departing from the invention. Accordingly, the present invention is intended to embrace all such alternatives, modifications and variances that fall within the scope of the appended claims.

CLAIMS

What is claimed is:

1. A sanitary high pressure aerator valve assembly comprising:

a main body having substantially coaxial opposite ends;

a coupling collar attachable to one end of the substantially coaxial opposite ends;

an end cap attachable to the end opposite of the coupling collar end;

an inlet adaptor attachable to the main body, wherein the inlet adaptor is substantially perpendicular to the substantially coaxial opposite ends;

an air chamber comprising a central passageway disposed between the inlet adaptor and the coupling collar end;

an air isolation chamber, wherein the air isolation chamber comprises:

a wave spring; and

a plurality of bushings disposed on either end of the wave spring for compressing the wave spring;

a one-piece unitary piston member slidable for a predetermined distance within a portion of the central passageway coaxial with the main body coaxial ends and the air isolation chamber; and wherein the one-piece unitary piston member comprises:

an enlarged head disposed at one end of the one-piece unitary piston member for sealing the coupling collar end of the air chamber; and

a threaded end disposed at an end opposite the enlarged head end within the isolation chamber and a tension spring hole; and

wherein the threaded end is isolated from the central passageway by the air chamber isolation assembly; and

wherein a location of the tension spring hole is predetermined as a function of the spring constant, air pressure, and the first predetermined distance.

2. The one-piece unitary piston member as in claim 1 wherein the first predetermined distance is between 3.165 to 3.185 mm.

3. The one-piece unitary piston member as in claim 1 wherein the length of the threaded end is predetermined as a function of the spring constant, air pressure, and a second predetermined distance.

4. The one-piece unitary piston member as in claim 3 wherein the second predetermined distance is between 2.352 to 2.372 mm.

5. The sanitary high pressure aerator valve as in claim 1 further comprising a spring tensioner for adjusting tension of a compression spring.