CLAIMS

1. An ultrasonic wave washing unit comprising:

a power source;

a housing;

a plurality of ultrasonic transducers; and

an air filter support structure, wherein

the housing comprises a media inlet, a media outlet, and a bottom surface, and is configured to hold ultrasonic transmitting media and permit immersion of an air filter supported by the support structure in the ultrasonic transmitting media,

the ultrasonic transducers surround the support structure and are coupled to the power source,

the air filter support structure comprises a chair disposed along the bottom surface of the housing,

the chair comprises a chair height, an interior chair diameter, an outer chair diameter, an upper chair surface, an outer chair surface, a plurality of supports, and a plurality of outer apertures,

the plurality of outer apertures are along and disposed within the outer chair surface and comprise respective circumferential widths and aperture heights,

the respective aperture heights are at least 90% of the chair height, and

the media outlet is disposed such that, upon application of ultrasonic energy to an air filter supported by the chair at the upper chair surface, residue from an air filter supported by the chair at the upper chair surface is collected within the chair and subsequently removed from within the chair through the apertures and out of the housing through the media outlet.

2. The ultrasonic wave washing unit of claim 1, wherein the chair comprises four supports and defines four apertures, each comprising an aperture height that is at least 90% of the chair height.

3. The ultrasonic wave washing unit of claim 1, wherein the chair comprises stainless steel.

4. The ultrasonic wave washing unit of claim 1, wherein the media inlet and the media outlet are the same.

5. The ultrasonic wave washing unit of claim 1, wherein the support structure is coaxially disposed within the housing.

6. The ultrasonic wave washing unit of claim 1, wherein the interior chair diameter is from between 50% and 80% of the outer chair diameter.

7. The ultrasonic wave washing unit of claim 6, wherein the chair height is from between 10% to 90% of the outer chair diameter.

8. The ultrasonic wave washing unit of claim 1, wherein:
the chair comprises a sleeve extending from the upper chair surface; and
the sleeve is operable to engage with the air filter and secure the air filter within the chair.

9. The ultrasonic wave washing unit of claim 1, wherein the plurality of ultrasonic transducers emit ultrasonic energy.

10. The ultrasonic wave washing unit of claim 1, wherein the ultrasonic transducers are evenly spaced within the housing.

11. The ultrasonic wave washing unit of claim 1, wherein the ultrasonic transducers are in communication with a transducer control unit, and the transducers control unit is coupled to the power source.

12. The ultrasonic wave washing unit of claim 1, wherein the media outlet, the media inlet, or both, are in communication with a media source.

13. The ultrasonic wave washing unit of claim 12, wherein the media source is external to the ultrasonic wave washing unit.

14. The ultrasonic wave washing unit of claim 1, wherein the media outlet is disposed at a height lower than the height of the support structure.

15. A method for cleaning an air filter, the method comprising:

placing an air filter on an air filter support structure, the air filter support structure being disposed in a ultrasonic wave washing unit comprising

a power source,

a housing comprising a media inlet, a media outlet, bottom surface, and configured to hold ultrasonic transmitting media and permit immersion of an air filter supported by the support structure in the ultrasonic transmitting media,

a plurality of transducers surrounding the support structure; and

the air filter support structure, wherein the air filter support structure comprises a chair disposed along the bottom surface of the housing and the chair comprises a chair height, an interior diameter, an outer diameter and one or more apertures comprising aperture heights that are at least 90% of the chair height;

adding ultrasonic transmitting media to the housing;

applying ultrasonic energy to the ultrasonic transmitting media to remove residue from the air filter;

collecting the residue within the chair;

removing the residue from the chair through the apertures; and

removing the ultrasonic transmitting media and residue from the housing through the media outlet.

16. The method of claim 15, wherein the ultrasonic wave washing unit is filled with ultrasonic transmitting media before the air filter is placed in the ultrasonic wave washing unit.

17. The method of claim 15, wherein the ultrasonic wave washing unit is filled with ultrasonic transmitting media after the air filter is placed in the ultrasonic wave washing unit.

18. The method of claim 15, further comprising adding detergent to the ultrasonic transmitting media after a time delay.

19. The method of claim 15, wherein the ultrasonic transmitting media is held at a controlled temperature.