What is claimed is:

1. A megasonic processing apparatus comprising:

a first piezoelectric transducer operating in thickness mode and having a fundamental resonant frequency of at least 300 KHz and having a first operating frequency;

a second piezoelectric transducer operating in thickness mode and having a fundamental resonant frequency of at least 300 KHz and having a second operating frequency different from the first operating frequency;

a mounting plate upon which the first and second transducers are mounted, wherein at the location of the first transducer the mounting plate has a first thickness and has a fundamental resonant or harmonic frequency substantially equal to the first operating frequency, and wherein at the location of the second transducer the mounting plate has a second thickness different from the first thickness and has a fundamental resonant or harmonic frequency substantially equal to the second operating frequency;

a tank adapted to contain fluid and one or more parts to be processed, wherein said mounting plate is operatively coupled to the tank so that the transducers provide vibrations to the tank and its contents; and

a generator coupled to the transducers for supplying driving signals at the first and second operating frequencies.

~~2. An apparatus as recited in claim 1 wherein the first operating frequency of the first transducer is its fundamental resonant frequency, and wherein the second operating frequency of the second transducer is its third harmonic frequency.~~

~~3. An apparatus as recited in claim 2 wherein the first and second transducers have substantially the same dimensions, and wherein the mounting plate has a uniform thickness, and wherein the uniform thickness of the mounting plate has a fundamental resonant frequency substantially equal to the fundamental resonant frequency of the first transducer, and wherein the uniform thickness of the mounting plate has a third harmonic frequency substantially equal to the third harmonic frequency of the second transducer.~~

~~4. An apparatus as recited in claim 2 wherein the mounting plate has a fundamental resonant frequency substantially equal to the fundamental resonant frequency of the first~~

~~transducer, and wherein the mounting plate has a third harmonic frequency substantially equal to the third harmonic frequency of the second transducer.~~

~~5. An apparatus as recited in claim 2 further comprising a plurality of first transducers and a plurality of second transducers, said transducers arranged on the mounting plate in alternating sequence.~~

~~6~~2. An apparatus as recited in claim 1 wherein the first operating frequency of the first transducer is its fundamental resonant frequency, wherein the second operating frequency of the second transducer is its fundamental resonant frequency, and wherein the fundamental resonant frequencies of the first and second transducers are different.

~~7~~3. An apparatus as recited in claim ~~6~~ 2 wherein at the location of the first transducer the mounting plate has a first thickness and has a fundamental resonant frequency substantially equal to the fundamental resonant frequency of the first transducer, and wherein at the location of the second transducer the mounting plate has a second thickness and has a fundamental resonant frequency substantially equal to the fundamental resonant frequency of the second transducer.

~~8~~4. An apparatus as recited in claim ~~7~~ 3 wherein the second thickness of the mounting plate is less than the first thickness of the mounting plate, and wherein the second thickness is formed by removing material from the mounting plate.

~~9~~5. An apparatus as recited in claim ~~7~~ 3 wherein the second thickness of the mounting plate is less than the first thickness of the mounting plate, and wherein the first thickness is formed by adding material to the mounting plate.

~~10~~6. An apparatus as recited in claim ~~6~~ 2 further comprising a plurality of first transducers and a plurality of second transducers, said transducers arranged on the mounting plate in alternating sequence.

~~11~~7. An apparatus as recited in claim 1 wherein the mounting plate is integral with the tank.

~~12~~8. An apparatus as recited in claim 1 wherein the mounting plate is attached to the tank.

~~13. An apparatus as recited in claim 1 wherein the mounting plate has a uniform thickness selected so that the mounting plate has a fundamental resonant or harmonic frequency substantially equal to an operating frequency.~~

~~14~~9. An apparatus as recited in claim 1 wherein the mounting plate has more than one thickness, wherein each thickness is selected so that the mounting plate has a fundamental resonant or harmonic frequency substantially equal to an operating frequency.

~~15~~10. An apparatus as recited in claim 1 wherein the mounting plate is immersed in the tank.

11. An apparatus as recited in claim 1 further comprising additional transducers having a fundamental frequency of at least 300 KHz and each having an operating frequency different from the operating frequencies of the first and second transducers.

12. An apparatus as recited in claim 11 wherein the transducers are arranged in a sequence starting with the lowest operating frequency and progressing to the highest operating frequency.

13. An apparatus as recited in claim 11 further comprising a transport mechanism for moving the parts to be processed through the tank to subject the parts to vibrations provided by each transducer.

14. An apparatus as recited in claim 1 wherein the generator supplies the driving signals at a variable frequency throughout a frequency range that includes the operating frequencies of the transducers.