ence of high-amplitude side lobes, but there will also be no null positions. Off-axis locations will experience peak pressures comparable to those characteristic of the peaks for individual sources at the same distance, but possibly for somewhat longer duration. Consequentially, ear protection for the operators is recommended.

The advantage of the acoustic cannon of the invention is illustrated by the Example that follows.

EXAMPLE

Four acoustic tubes each having an inside diameter of 6 inches and a length of 12 inches were placed at the corners of a 36 inch square. Each tube was charged with a mixture of hydrogen and oxygen in approximate stoichiometric ratio. The gaseous mixture of each tube was simultaneously ignited by an electric spark, generating four shock waves that cooperated in the formation of a Mach disk. The acoustic pressure at a distance of 50 feet from the output ends of the acoustic tubes, was measured to be in excess of 165 dB (greater than 0.7 psi over-pressure) effective to provide deterrence and debilitation.

It is apparent that there has been provided in accordance with the present invention an acoustic cannon that fully satisfies the objects, means and advantages set forth hereinabove. While the invention has been described in combination with embodiments thereof, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art in light of the foregoing description. Accordingly, it is intended to embrace all such alternatives, modifications and variations as fall within the spirit and broad scope of the appended claims.

We claim:

1. An acoustic cannon, comprising:

a plurality of acoustic sources each having an input end and an output end with an interior bore disposed therebetween, each said input end receiving a plurality of discrete sonic pulses and each said output end emitting a sonic output in the form of discrete sonic pulses;

a sonic pulse generator coupled to each said input end; and

a timing mechanism coupled to said sonic pulse generator such that each one of said discrete sonic pulses is received by each one of said input ends at substantially the same time and is of substantially the same frequency and duration when emitted from each one of said output ends whereby a plurality of said sonic outputs interact to generate a shock-driven output pulse.

2. The acoustic cannon of claim **1** wherein said plurality of output ends form a planar array about a central point and there are a minimum of three said output ends.

3. The acoustic cannon of claim **2** wherein there are from about 10 to about 40 of said output ends arrange symmetrically about said central point.

4. The acoustic cannon of claim **3** wherein there are from about 20 to about 30 of said output ends arranged as an ellipse about said central point.

5. The acoustic cannon of claim **3** wherein said sonic pulse generator includes a source of an explosive fluid, a spark gap disposed within said interior bore, a power supply coupled to said spark gap and a fluid control valve to deliver a desired amount of said explosive fluid to said interior bore.

6. The acoustic cannon of claim **5** wherein said explosive fluid is a mixture selected from the group consisting of hydrogen/oxygen, oxygen/propane, air/propane, air/acetylene, oxygen/acetylene, oxygen/gasoline, and air/gasoline.

7. The acoustic cannon of claim **6** wherein said explosive fluid is a mixture of hydrogen and oxygen and said power supply is capable of delivering a pulse of from about 30 kilovolts to about 50 kilovolts to said spark gap.

8. The acoustic cannon of claim **3** wherein said sonic pulse generator includes a solid explosive mix, an explosive squib coupled to said explosive mix and a power supply coupled to said explosive squib.

9. An acoustic cannon, comprising:

a plurality of acoustic sources each having an input end and an output end with an interior bore disposed therebetween, each said input end receiving a plurality of discrete sonic pulses and each said output end emitting a sonic output in the form of discrete sonic pulses;

a sonic pulse generator coupled to each said input end, said sonic pulse generator including a shock tube having a high pressure region and a low pressure region whereby a differential between said high pressure region and said low pressure region is effective to generate a shock wave; and

a timing mechanism coupled to said sonic pulse generator controlling interaction of said high pressure region with said low pressure region and the generation of said sonic pulses such that each one of said discrete sonic pulses is received by each one of said input ends at substantially the same time and is of substantially the same frequency and duration when emitted from each of said output ends whereby a plurality of said sonic outputs interact to generate a shock-driven output pulse.

10. The acoustic cannon of claim **9** wherein a first electrode having a front end extends through said high pressure portion, a dielectric layer coats said first electrode except for said front end, and a second electrode extends into said high pressure portion and is spaced from said front end by a distance, L.

11. The acoustic cannon of claim **10** wherein L is from about 6 inches to about 36 inches.

12. The acoustic cannon of claim **11** wherein a power supply capable of generating a voltage pulse of at least 100 kilovolts between said first electrode and said second electrode once every 0.5 seconds to every 2 seconds is coupled to said timing mechanism.

13. A method for incapacitating a biological target, comprising the steps of;

generating multiple, discrete, sonic pulses in the form of a Mach disk with a dominant frequency of between about 2 kHz and about 5 kHz and an intensity from about 150 decibels to about 200 decibels by substantially simultaneously emitting sonic pulses from a plurality of output sources that are arranged in a planar array, wherein said sonic pulses are generated by rapid heating of a gas contained within a high pressure region of a shock tube; and

directing said multiple, discrete sonic pulses in the form of a Mach disk at said biological targets.

14. The method of claim **13** including the steps of filling said high pressure region and said low pressure region with air at ambient pressure and then rapidly heating the air in the high pressure region thereby expanding the air contained therein.

15. The method of claim **14** wherein said air is rapidly heated by exposure to an electric spark for a required length of time.

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