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D + D NUCLEAR FUSION CELL

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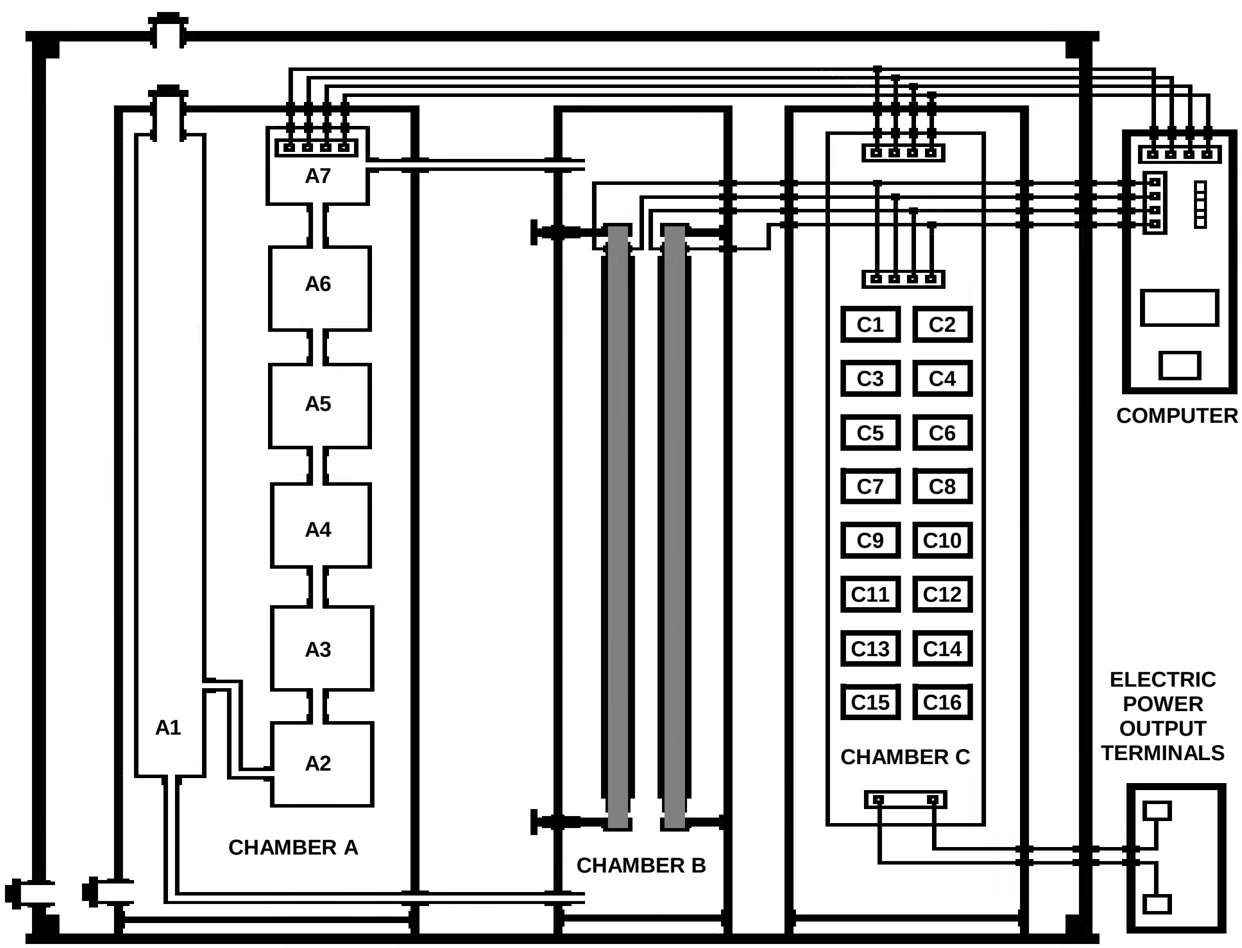
To my dear wife, Velma, with all my love, gratitude, and devotion

Frank Boring Fitzgerald

ABSTRACT

My paper herein begins to describe my assisted sonic bubble D + D nuclear fusion reactor cell covered in Specifications and Claims of Ukraine Patent 90326 issued to this author April 26, 2010. See "METHOD OF GENERATING NUCLEAR FUSION" www.wbabin.net/ntham/fitzgerald17.pdf for further details.



I shall not go very far into theory of my reactor cell in this paper. Theory can best be seen in my paper, "Sonoluminescence and Sonofusion - How and Why" www.wbabin.net/physics/fitzgerald7.pdf and its addendum www.wbabin.net/physics/fitzgerald8.pdf both archived at wbabin.net under author Fitzgerald, Frank B.

My reactor cell has Chambers, A, B, C, plus an external touch-screen computer with manual shut-down over-ride and an external electric power output terminal. The external computer houses a rechargeable battery which provides startup power and thereafter kept charged.

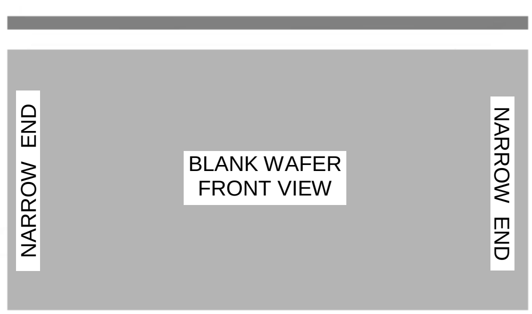
Central to my reactor cell design and operation is chamber B which houses the transducers and nuclear reaction gap between the narrow spaced parallel transducers. The number of transducers is ***not*** limited to only 2. 2 quartz crystal transducers were chosen for my Patent Applications for simplicity of presentation and ease of understanding. And the piezoelectric material of the transducers is ***not*** limited to quartz crystal. Very large transducers could be made of ceramic materials in, for example, construction of interstellar nuclear rocket engines to produce hundreds of tons of thrust instead of electricity.

In my quartz crystal reactor cell, I begin the design in Chamber B with wafers of quartz crystal cut for thickness expansion-contraction resonance which gives a much better energy coupling match than cantilever resonance. The thickness of each wafer is adjusted for eventual operation as a transducer in 100% pure D2O at the resonance of 2 MHz and are matched very closely.

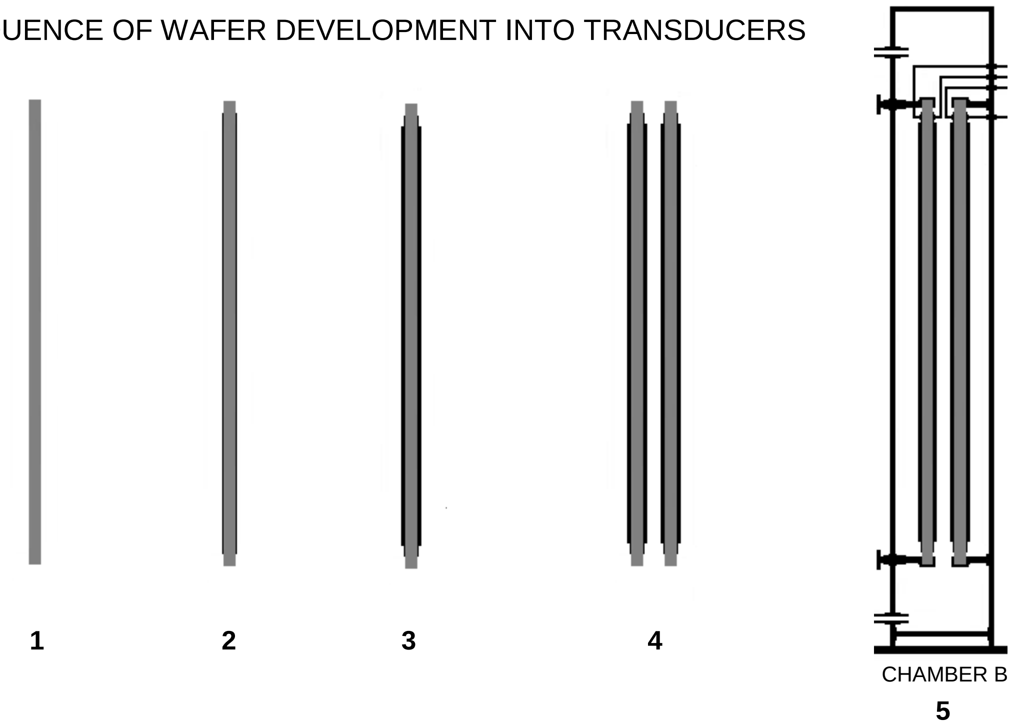
After thorough cleaning and drying, a plating resistant first picture is applied to each side of each wafer at their narrow ends and around all edges, then gold plated. After thorough cleaning and drying but leaving the first resistant picture in place, a second resistant picture is applied so two cross-polarized chrome flashings can take place on each side of each wafer which chrome flashings then contain a smaller end area, than the gold plating, at one end of both sides of each wafer. After chrome flashings, both resistant pictures are removed and each wafer is thoroughly cleaned and dried so electrical wires can be bonded to the exposed gold plating near wafer narrow end having the larger exposed gold plating area. A single wire on each side of same wafer near the same narrow end. Both narrow ends of each wafer are free of plating and flashing for eventual holder mounting of the wafers.

The following wafer depictions are not to scale:

1



SEQUENCE OF WAFER DEVELOPMENT INTO TRANSDUCERS



1: Raw quartz crystal wafer is cut to proper optical-angle, size and thickness
2: Plating resistant picture is placed on both sides then gold plated both sides
3: Flashing resistant picture is placed on both sides then double Chrome flashed in cross-polarized bath
4: Resistant pictures are removed then two transducers are placed side-by-side into Chamber B with narrow reaction gap between
5: Two transducers properly wired and mounted in Chamber B with left transducer mounted in adjustable mounting holder for fine-tuning of finished laboratory model during testing and quality control. Once adjustable mounting holder fine-tuning is determined, further models do not need the adjustable mounting holder but the left transducer can be placed in permanent mounting holder same as right holder.

The above procedure provides transducers which progress from raw wafers to gold plated and chrome flashed to allowing wires and narrow end holders to be put in place within Chamber B at 5. Each transducer is suspended from its narrow ends by firm mounting holders. These holders prevent D2O from going around the outside of the transducers but only into and thru the narrow reaction gap between the transducers driven by the pump in Chamber A.

Chamber A deals with the D2O, gases, filtration, sensors, pressure regulation, pump, and storage.
A1: Gas separator
A2: Heavy molecule separator
A3: Radioactive molecule separator
A4: D2O storage
A5: Pump
A6: Pressure regulator

A7: Sensors

Chamber C contains the electronics having a 2 MHz generator, phase shifter, and drivers, UHF generator, 2 MHz phase shifter, modulator, and drivers, comparators, phase detector, emergency shut-down shunts, 2 MHz to 60 Hz converter and driver.
C1: 2 MHz generator
C2: 2 MHz ± phase shifter for transducers
C3: 2 MHz Driver for left transducer
C4: Shut-down shunt for left transducer
C5: 2 MHz Driver for right transducer
C6: Shut-down shunt for right transducer
C7: UHF generator
C8: 2 MHz from 2 MHz generator ± phase shifter for UHF modulator
C9: UHF 2 MHz modulator
C10: UHF driver
C11: Comparator 1 - compares sensors output to computer program
C12: Comparator 2 - compares sensors output to electric power output current and to computer program
C13: Comparator 3 - compares electric power output voltage to current and to computer program
C14: Comparator 4 - compares all circuit outputs to computer program
C15: Phase detector - compares 2 MHz phase ± shifter for UHF modulator with 2 MHz phase ± shifter for transducers and with computer program
C16: Converter - 2 MHz piezoelectric AC output of transducers to 60 Hz of electric power output terminals

The "memory problem", mentioned in my patent applications, is automatically overcome via appropriate functioning of electronics in Chamber C which permits the 3 stage D + D nuclear fusion to take place in the reaction gap in the first place. Fusion takes place because the collapsing bubbles are spherical. That sphericalness is formed, controlled, and maintained via the electronics automatically adjusting phases of gap energies to proper for both the sonic wave and the modulation on the EM wave as against the phase of the collapsing bubbles. Thus the sphericalness permitting the 3 stages of nuclear fusion to take place is the functioning part of the electronics which prevents the "memory problem".

External computer controls overall operation. It has a manually programmable touch-screen. It has a manual shut-down push-switch, a warning alarm enunciator, and a USB port for in-out of programs and external monitoring.

Each Chamber housing is fashioned from stainless steel and are coated on the inside and outside with lead. The outside container box is fashioned of stainless steel coated on the inside with lead to protect against radiation escaping to the environment. Gamma rays, alpha particles, helium-4, and oxygen-16 are by-products of Chamber B reaction gap. All electronics are protected from "electro-magnetic impulses" generated via the 3 stages of D + D nuclear fusion taking place in collapsing bubbles of the reaction gap.