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Oil and Water Alchemy

Eric Cottell, a British-born inventor, does not change base metals into gold, but he does mix oil and water—and these days that may be the most welcome alchemy of all. Cottell claims that in a furnace a blend of three parts oil and one part water burns so much more cleanly and efficiently than ordinary oil that it can cut fuel consumption by at least 20% while producing almost no soot or ash. He also claims that road tests show that a car can run on 18% water and 82% gasoline, with such a low output of pollutants that the engine does not need the mileage-robbing emission-control devices required on new cars. Similar results are reported by University of Oklahoma Professor Walter Ewbank, who is testing a gasoline blend containing 13% water on some Postal Service trucks.

Cottell's process is being used experimentally in the boiler rooms of a grade school and Adelphi University, both on Long Island. Based on favorable early results at the grade school, Francis Cashin, chairman of the Committee on Energy and Environment of the New York State Society of Professional Engineers, recommended that Adelphi try the process. The university is devising a series of tests, and Cashin expects the boilers' efficiency (the amount of energy that they can draw from a given amount of fuel) to rise significantly. This month the government of Nassau County, N.Y., plans to begin burning oil and water in the boilers of the county executive center.

Cottell, 50, took out his first major patent 22 years ago on a device to break down and emulsify heavy liquids. His process is still widely used to prepare Worcestershire sauce, ketchup, cosmetics and paint. Five years ago he set out to design a more advanced machine, which would have enough force to rip apart single-cell organisms, releasing their protein to provide a cheap and plentiful food supplement. He built the Cottell Ultrasonic Reactor, which is hardly larger than a long loaf of bread and resembles an electric drill. The reactor is a mechanical torture chamber in which liquids and semiliquids are broken down under pressures of 1 million lbs. per sq. in. This force is built up by a titanium piston that plunges back and forth within the chamber at the rate of 20,000 times each second. Cottell reasoned that so powerful a tool could be used to emulsify materials that had been too tough to be broken down by his earlier invention. Among them were oil and water.

Surprise Bonus. On the long-accepted principle that minute particles of water improve combustion. Cottell began experimenting with mixtures of oil and water. He broke them down in his reactor, and the tiny droplets of oil absorbed and encapsulated much tinier droplets of water. The emulsion burned so cleanly in his home furnace that, after months of testing, the fire had even oxidized away caked-on soot from the inner surfaces of the pipes. As a surprise bonus, says Cottell, the old furnace's fuel consumption fell by 25%.

How does this phenomenon work? Nobody is fully certain, but Cottell knows that when the emulsion prepared in his reactor is pumped into a furnace, the water droplets explode into superheated steam, shattering the oil droplets and exposing a maximum of the oils surface. This provides quick, nearly complete burning.

Cottell is producing more reactors to sell to institutions and industry and for use in apartment buildings. He is also developing a smaller model, the size of a flashlight, that he hopes to market for homeowners and motorists at \$50 to \$100 each. Now Cottell is experimenting with a new emulsion that will consist of 55% oil, 30% water and 15% sludge, the slushy sediment produced by partially treating sewer wastes. Recycled sewage, he says, may well be a fuel of the future.

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