

MECHANICAL PROPULSION AT SEA

By Richard Sorokin

James Watts developed the first steam engine in England to remove water from the mines. It's piston drive was quickly modified for land travel, railroads and autos. In 1801 Robert Fulton had the *Clearmont* steaming on the Hudson River. Fulton worked on submarines in Europe first.

All these vessels used side paddles wheels. The largest steam driven paddle wheel vessel was the *Great Eastern*-18,914 tons. She was built to lay the first trans-Atlantic telephone cable.

The side wheel paddle propulsion system was inefficient and fragile. A better drive had to be found. Archimedes, a great Greek, invented the water wheel to lift water by turning a wheel. This lead to the propulsion screw used to replace the side wheel paddle.

Steam drove pistons that turned the shaft that had a screw propeller at its end to drive the vessel. All vessels use the screw propeller to drive it through the water. Exceptions are jet and wind propeller boats.

Steam engines were first replaced by gasoline engines. Gas however was too dangerous. A German inventor by the name of Diesel invented an engine that ran on oil, a much safer fuel. Diesel engines replaced steam engines during the Second World War. Diesel engines still power our large vessels today but through a vastly different system.

The diesel engine is now used on board to create electricity by driving dynamos. Huge electrical motors connected to screws, encased in a flattened elliptical housing drive the vessel. These pods are on shafts that can turn and change the thrust direction of the screws. There are no more rudders. By using the pods and bow thrusters a very large ship can turn on a dime. Long river boats can move sideways in a lock. Tug boats are rarely needed. There is less drag and more control. Most ships at sea are controlled by automatic pilots using GPS. On the bridge of the modem ocean liner there is no steering wheels, just a small joy stick.

Atomic power at sea supplies steam to drive the steam turbines that create electricity that drive the electric motors that drive the screws.