

APPENDIX: U.S. patent classifications related to energy used in They Don't Invent Them Like They Used To: An Examination of Energy Patent Citations Over Time

Guide to definitions: The first phrase is the main classification. For example, class 208 contains patents for Mineral Oils: Processes and Products. These are followed by the various subclassifications, listed in descending order of precedence.

Supply Technologies:

Coal Liquefaction:

208/400-435 Mineral Oils: Processes and Products/By treatment of solid material (e.g. coal liquefaction)

Coal Gasification:

48/200 Gas: Heating and Illuminating/Processes/Coal, oil and water
 48/201 Gas: Heating and Illuminating/Processes/Coal and oil
 48/202 Gas: Heating and Illuminating/Processes/Coal and water
 48/210 Gas: Heating and Illuminating/Processes/Coal
 48/71 Gas: Heating and Illuminating/Generators/Cupola/Coal, oil and water
 48/72 Gas: Heating and Illuminating/Generators/Cupola/Coal and oil
 48/73 Gas: Heating and Illuminating/Generators/Cupola/Coal and water
 48/77 Gas: Heating and Illuminating/Generators/Cupola/Producers/Coal
 48/98 Gas: Heating and Illuminating/Generators/Retort/Coal, oil and water
 48/99 Gas: Heating and Illuminating/Generators/Retort/Coal and water
 48/100 Gas: Heating and Illuminating/Generators/Retort/Coal and oil
 48/101 Gas: Heating and Illuminating/Generators/Retort/Coal

Solar Energy:

60/641.8-641.15 Power Plants/Utilizing natural heat/Solar
 62/235.1 Refrigeration/Utilizing solar energy
 126/561-568 Stoves and Furnaces/Solar heat collector for pond or pool
 126/569-713 Stoves and Furnaces/Solar heat collector
 126/903 Stoves and Furnaces/Cross-Reference Art/Solar collector cleaning device
 126/904 Stoves and Furnaces/Cross-Reference Art/Arrangements for sealing solar collector
 126/905 Stoves and Furnaces/Cross-Reference Art/Preventing condensing of moisture in solar collector
 126/906 Stoves and Furnaces/Cross-Reference Art/Connecting plural solar collectors in a circuit
 126/910 Stoves and Furnaces/Cross-Reference Art/Heat storage liquid

Solar Energy – Batteries:

136/206	Batteries: Thermoelectric and Photoelectric/Thermoelectric/Electric power generator/ Solar energy type
136/243	Batteries: Thermoelectric and Photoelectric/Photoelectric
136/244-251	Batteries: Thermoelectric and Photoelectric/Photoelectric/Panel
136/252-265	Batteries: Thermoelectric and Photoelectric/Photoelectric/Cells

Fuel Cells:

429/12-46	Chemistry: Electrical Current Producing Apparatus, Product, and Process/Fuel cell, subcombination thereof or method of operating
-----------	--

Using waste as fuel:

110/235-259	Furnaces/Refuse incinerator
110/346	Furnaces/Incinerating refuse

*Demand Technologies:**Waste heat:*

122/7R	Liquid Heaters and Vaporizers/Industrial/Waste heat
7A	Liquid Heaters and Vaporizers/Industrial/Waste heat/Steel converter
7B	Liquid Heaters and Vaporizers/Industrial/Waste heat/Additional burner
7C	Liquid Heaters and Vaporizers/Industrial/Waste heat/Waste sulfate
7D	Liquid Heaters and Vaporizers/Industrial/Waste heat/Carbon monoxide
60/597-624	Power Plants/Fluid motor means driven by waste heat or by exhaust energy from internal combustion engine

Heat exchange:

165	Heat Exchange
-----	---------------

Heat pumps:

62/238.7	Refrigeration/Disparate apparatus utilized as heat source or absorber/With vapor compression system/Reversible, i.e. heat pump
62/324.1-325	Refrigeration/Reversible, i.e., heat pump

Stirling engine:

60/517-526	Power Plants/Motor operated by expansion and/or contraction of a unit of mass of motivating medium/Unit of mass is a gas which is heated or cooled in one of a plurality of constantly communicating expandible chambers and freely transferable therebetween
------------	---

Continuous casting:

- 148/541 Metal Treatment/Process of modifying of maintaining internal physical structure (i.e. microstructure) or chemical properties of metal, process of reactive coating of metal and process of chemical-heat removing (e.g., flame-cutting, etc.) or burning of metal/With casting or solidifying from melt/Iron(Fe) or iron base alloy/Continuous casting
- 148/551 Metal Treatment/Process of modifying of maintaining internal physical structure (i.e. microstructure) or chemical properties of metal, process of reactive coating of metal and process of chemical-heat removing (e.g., flame-cutting, etc.) or burning of metal/With casting or solidifying from melt/Aluminum (Al) or aluminum base alloy/Continuous casting
- 164/263 Metal Founding/With product severing or trimming means/Associated with continuous casting means
- 164/268 Metal Founding/With coating means/associated with a continuous or semicontinuous casting means
- 164/415 Metal Founding/Means providing inert or reducing atmosphere/In continuous casting apparatus
- 164/416 Metal Founding/Including vibrator means/In continuous casting mold
- 164/417 Metal Founding/Combined/Including continuous casting apparatus
- 164/418-444 Metal Founding/Means to shape metallic material/Continuous or semicontinuous casting
- 164/445-446 Metal Founding/Starter bar
- 164/447-448 Metal Founding/Product supporting or withdrawal means for continuous casting apparatus
- 164/449.1-450.5 Metal Founding/Control means responsive to or actuated by means sensing or measuring a condition or variable (i.e., automatic control)/Control of feed material enroute to shaping area/Responsive to material level/In continuous casting apparatus
- 164/451-455 Metal Founding/Process/With measuring, testing, inspecting, or condition determination/Of continuous or semicontinuous casting
- 164/459-491 Metal Founding/Process/Shaping liquid metal against a forming surface/Continuous or semicontinuous casting
- 164/502-504 Metal Founding/Including means to directly apply magnetic force to work or to manipulate or hold shaping means/In continuous casting apparatus
- 164/505-509 Metal Founding/Means to directly apply electrical or wave energy to work/In continuous casting apparatus
- 164/154.4 Metal Founding/Control means responsive to or actuated by means sensing or measuring a condition or variable (i.e., automatic control)/Responsive to position or spatial dimension/Responsive to rate of change/Continuous casting
- 164/154.5 Metal Founding/Control means responsive to or actuated by means sensing or measuring a condition or variable (i.e., automatic control)/Responsive to position or spatial dimension/Continuous casting