

# CPC COOPERATIVE PATENT CLASSIFICATION

## F MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING (NOTE omitted)

### ENGINES OR PUMPS

## F02 COMBUSTION ENGINES; HOT-GAS OR COMBUSTION-PRODUCT ENGINE PLANTS

## F02G HOT GAS OR COMBUSTION-PRODUCT POSITIVE-DISPLACEMENT ENGINE PLANTS (steam engine plants, special vapour plants, plants operating on either hot gas or combustion-product gases together with other fluid [F01K](#); gas-turbine plants [F02C](#); jet-propulsion plants [F02K](#)); USE OF WASTE HEAT OF COMBUSTION ENGINES; NOT OTHERWISE PROVIDED FOR

### NOTE

Attention is drawn to the notes preceding class [F01](#).

<b>1/00</b>	<b>Hot gas positive-displacement engine plants</b>	<b>2242/10</b>	. . . . having mechanically actuated valves, e.g. "Gifford" or "McMahon engines"
1/02	. of open-cycle type	<b>2242/30</b>	. . having variable working volume
1/04	. of closed-cycle type	<b>2242/32</b>	. . . Regenerative displacers with independent pistons
1/043	. . the engine being operated by expansion and contraction of a mass of working gas which is heated and cooled in one of a plurality of constantly communicating expansible chambers, e.g. Stirling cycle type engines	<b>2242/40</b>	. Piston-type engines
1/0435	. . . {the engine being of the free piston type}	<b>2242/42</b>	. . having a single piston regenerative displacer attached to the piston, e.g. "Gifford-McMahon" engines
1/044	. . . having at least two working members, e.g. pistons, delivering power output	<b>2242/44</b>	. . having two pistons and reverse flow regenerators
1/0445	. . . . {Engine plants with combined cycles, e.g. Vuilleumier}	<b>2243/00</b>	<b>Stirling type engines having closed regenerative thermodynamic cycles with flow controlled by volume changes</b>
1/045	. . . Controlling	<b>2243/02</b>	. having pistons and displacers in the same cylinder
1/047	. . . . by varying the heating or cooling	<b>2243/04</b>	. . Crank-connecting-rod drives
1/05	. . . . by varying the rate of flow or quantity of the working gas	<b>2243/06</b>	. . . Regenerative displacers
1/053	. . . Component parts or details	<b>2243/08</b>	. . . External regenerators, e.g. "Rankine Napier" engines
1/0535	. . . . {Seals or sealing arrangements}	<b>2243/20</b>	. . each having a single free piston, e.g. "Beale engines"
1/055	. . . . Heaters or coolers	<b>2243/202</b>	. . . resonant
1/057	. . . . Regenerators	<b>2243/204</b>	. . . non-resonant
1/06	. Controlling	<b>2243/206</b>	. . . externally excited
<b>3/00</b>	<b>Combustion-product positive-displacement engine plants</b>	<b>2243/22</b>	. . with oscillating cylinders
3/02	. with reciprocating-piston engines	<b>2243/24</b>	. . with free displacers
<b>5/00</b>	<b>Profiting from waste heat of combustion engines, not otherwise provided for</b>	<b>2243/30</b>	. having their pistons and displacers each in separate cylinders ( <a href="#">two-piston machines F02G 2244/00</a> )
5/02	. Profiting from waste heat of exhaust gases	<b>2243/32</b>	. . Regenerative displacers having parallel cylinder, e.g. "Lauberau" or "Schwartzkopff" engines
5/04	. . in combination with other waste heat from combustion engines	<b>2243/34</b>	. . Regenerative displacers having their cylinders at right angle, e.g. "Robinson" engines
<b>2242/00</b>	<b>Ericsson-type engines having open regenerative cycles controlled by valves</b>	<b>2243/36</b>	. . with twin-expansion cylinders, e.g. "Rainbow" engines
2242/02	. Displacer-type engines	<b>2243/38</b>	. . External regenerators having parallel cylinders, e.g. "Heinrici" engines
2242/04	. . having constant working volume	<b>2243/40</b>	. . with free displacers
2242/06	. . . with external drive displacers	<b>2243/50</b>	. . having resonance tubes
2242/08	. . . . having gas actuated valves, e.g. "Bush engines"	<b>2243/52</b>	. . . acoustic

2243/54	. . . thermo-acoustic	2256/04	. Cooler tubes
<b>2244/00</b>	<b>Machines having two pistons</b>	2256/50	. with coolant circulation
2244/02	. Single-acting two piston engines	<b>2257/00</b>	<b>Regenerators</b>
2244/04	. . of rotary cylinder type, e.g. "Finkelstein" engines	2257/02	. rotating
2244/06	. . of stationary cylinder type	<b>2258/00</b>	<b>Materials used</b>
2244/08	. . . having parallel cylinder, e.g. "Rider" engines	2258/10	. ceramic
2244/10	. . . having cylinders in V-arrangement	2258/20	. having heat insulating properties
2244/12	. . . having opposed pistons	2258/50	. having frictional properties
2244/50	. Double acting piston machines	2258/80	. having magnetic properties
2244/52	. . having interconnecting adjacent cylinders constituting a single system, e.g. "Rinia" engines	2258/90	. Processing of materials
2244/54	. . having two-cylinder twin systems, with compression in one cylinder and expansion in the other cylinder for each of the twin systems, e.g. "Finkelstein" engines	<b>2260/00</b>	<b>Recuperating heat from exhaust gases of combustion engines and heat from cooling circuits</b>
<b>2250/00</b>	<b>Special cycles or special engines</b>	<b>2262/00</b>	<b>Recuperating heat from exhaust gases of combustion engines and heat from lubrication circuits</b>
2250/03	. Brayton cycles	<b>2270/00</b>	<b>Constructional features</b>
2250/06	. Beau de Rochas constant volume cycles	2270/005	. Shells, e.g. a sealed or sealing shell for a Stirling engine
2250/09	. Carnot cycles in general	2270/02	. Pistons for reciprocating and rotating
2250/12	. Malone liquid thermal cycles	2270/04	. Roller assemblies connecting opposed pistons
2250/15	. Sabathe mixed air cycles	2270/10	. Rotary pistons
2250/18	. Vuilleumier cycles	2270/15	. Rotating cylinders
2250/21	. Cooke Yarborough engines	2270/20	. Plural piston swash plates
2250/24	. Ringbom engines, the displacement of the free displacer being obtained by expansion of the heated gas and the weight of the piston	2270/30	. Displacer assemblies
2250/27	. Martini Stirling engines	2270/40	. Piston assemblies
2250/31	. Nano- or microengines	2270/42	. Displacer drives
<b>2253/00</b>	<b>Seals</b>	2270/425	. . the displacer being driven by a four-bar mechanism, e.g. a rhombic mechanism
2253/01	. Rotary piston seals	2270/45	. Piston rods
2253/02	. Reciprocating piston seals	2270/50	. Crosshead guiding pistons
2253/03	. Stem seals	2270/55	. Cylinders
2253/04	. Displacer seals	2270/60	. Counterweights for pistons
2253/06	. Bellow seals	2270/70	. Liquid pistons
2253/08	. Stem with rolling membranes	2270/80	. Engines without crankshafts
2253/10	. Piston with rolling membranes	2270/85	. Crankshafts
2253/50	. Liquid seals	2270/90	. Valves
2253/60	. Sealing of the lubrication circuit	2270/95	. Pressurised crankcases
2253/80	. Sealing of the crankcase	<b>2275/00</b>	<b>Controls</b>
<b>2254/00</b>	<b>Heat inputs</b>	2275/10	. for vibration reduction
2254/05	. by air	2275/20	. for preventing piston over stroke
2254/10	. by burners	2275/30	. for proper burning
2254/11	. . Catalytic burners	2275/40	. for starting
2254/12	. by ejectors	<b>2280/00</b>	<b>Output delivery</b>
2254/15	. by exhaust gas	2280/005	. Medical applications, e.g. for prosthesis or artificial hearts
2254/18	. using deflectors, e.g. spirals	2280/10	. Linear generators
2254/20	. using heat transfer tubes	2280/20	. Rotary generators
2254/30	. using solar radiation	2280/50	. Compressors or pumps
2254/40	. using heat accumulators	2280/60	. Heat pumps
2254/45	. by electric heating	2280/70	. Clutches
2254/50	. Dome arrangements for heat input	<b>2290/00</b>	<b>Engines characterised by the use of a particular power transfer medium, e.g. Helium</b>
2254/60	. using air preheaters		
2254/70	. by catalytic conversion, i.e. flameless oxydation		
2254/90	. by radioactivity		
<b>2255/00</b>	<b>Heater tubes</b>		
2255/10	. dome shaped		
2255/20	. Heater fins		
<b>2256/00</b>	<b>Coolers</b>		
2256/02	. Cooler fins		