

# 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

## F02K JET-PROPULSION PLANTS (features of jet-propulsion plants common to gas-turbine plants, air intakes or fuel supply control of air-breathing jet-propulsion plants [F02C 7/00](#), [F02C 9/00](#))

### NOTES

- In this subclass, the following expression is used with the meaning indicated:
  - "jet-propulsion plants" means plants using combustion to produce a fluid stream from which a propulsive thrust on the plant is obtained on the reaction principle.
  - "jet-pipe" means the exhaust duct of a jet engine that carries the exhaust to the nozzle.
- Attention is drawn to the notes preceding class [F01](#).

1/00	Plants characterised by the form or arrangement of the jet pipe or nozzle; Jet pipes or nozzles peculiar thereto (rocket nozzles <a href="#">F02K 9/97</a> )	1/1238	. . . {of two series of flaps, the upstream series having its flaps hinged at their upstream ends on a fixed structure and the downstream series having its flaps hinged at their upstream ends on a substantially axially movable structure}
1/002	. {with means to modify the direction of thrust vector ( <a href="#">F02K 1/54</a> takes precedence; thrust vectoring of rockets <a href="#">F02K 9/80</a> )}	1/1246	. . . {of two series of flaps, the upstream series having its flaps hinged at their upstream ends on a fixed structure and the downstream series having its flaps hinged at their downstream ends on a substantially axially movable structure}
1/004	. . {by using one or more swivable nozzles rotating about their own axis}	1/1253	. . . {of one series of flaps hinged at their upstream ends on a fixed structure and of a substantially axially movable external member}
1/006	. . {within one plane only}	1/1261	. . . {of one series of flaps hinged at their upstream ends on a substantially axially movable structure}
1/008	. . {in any rearward direction}	1/1269	. . . {of three series of flaps, the upstream series having its flaps hinged at their upstream ends on a fixed structure and the internal downstream series having its flaps hinged at their downstream ends on the downstream ends of the flaps of the external downstream series hinged on a fixed structure at their upstream ends}
1/04	. Mounting of an exhaust cone in the jet pipe	1/1276	. . . {of three series of flaps, the upstream series having its flaps hinged at their upstream ends on a substantially axially movable structure and the downstream or external series having its flaps hinged at their upstream ends on a fixed structure}
1/06	. Varying effective area of jet pipe or nozzle (by using fluid jets to influence the jet flow <a href="#">F02K 1/30</a> )	1/1284	. . . {of three series of flaps, the upstream series having its flaps hinged at their upstream ends on a fixed structure and the internal downstream series having its flaps hinged at their downstream ends on the downstream ends of the flaps of the external downstream series hinged at their upstream ends on a substantially axially movable structure}
1/08	. . by axially moving or transversely deforming an internal member, e.g. the exhaust cone		
1/085	. . . {by transversely deforming an internal member}		
1/09	. . by axially moving an external member, e.g. a shroud ( <a href="#">F02K 1/12</a> takes precedence)		
1/10	. . by distorting the jet pipe or nozzle		
1/11	. . by means of pivoted eyelids		
1/12	. . by means of pivoted flaps		
1/1207	. . . {of one series of flaps hinged at their upstream ends on a fixed structure ( <a href="#">F02K 1/1215</a> - <a href="#">F02K 1/1292</a> take precedence)}		
1/1215	. . . {of two series of flaps, the upstream series having its flaps hinged at their upstream ends on a fixed structure, and the downstream series having its flaps hinged at their downstream ends on a fixed structure}		
1/1223	. . . {of two series of flaps, the upstream series having its flaps hinged at their upstream ends on a fixed structure and the downstream series having its flaps hinged at their upstream ends on the downstream ends of the flaps of the upstream series}		
1/123	. . . {of two series of flaps, both having their flaps hinged at their upstream ends on a fixed structure}		

- 1/1292 . . . {of three series of flaps, the upstream series having its flaps hinged at their upstream ends on a fixed structure, the internal downstream series having its flaps hinged at their upstream ends on the downstream ends of the flaps of the upstream series and at their downstream ends on the downstream ends of the flaps of the external downstream series hinged at their upstream ends on a substantially axially movable structure}
- 1/15 . . Control or regulation
- 1/16 . . . conjointly with another control
- 1/165 . . . . {with air intake control}
- 1/17 . . . . with control of fuel supply
- 1/18 . . . automatic
- 1/28 . using fluid jets to influence the jet flow
- 1/30 . . for varying effective area of jet pipe or nozzle
- 1/32 . . for reversing thrust
- 1/34 . . for attenuating noise
- 1/36 . having an ejector
- 1/38 . Introducing air inside the jet (F02K 1/28 takes precedence)
- 1/383 . . {with retractable elements}
- 1/386 . . {mixing devices in the jet pipe, e.g. for mixing primary and secondary flow}
- 1/40 . Nozzles having means for dividing the jet into a plurality of partial jets or having an elongated cross-section outlet
- 1/42 . . the means being movable into an inoperative position
- 1/44 . Nozzles having means, e.g. a shield, reducing sound radiation in a specified direction (F02K 1/40 takes precedence)
- 1/46 . Nozzles having means for adding air to the jet or for augmenting the mixing region between the jet and the ambient air, e.g. for silencing (F02K 1/28, F02K 1/36, F02K 1/38 take precedence)
- 1/48 . . Corrugated nozzles
- 1/50 . . Deflecting outwardly a portion of the jet by retractable scoop-like baffles
- 1/52 . Nozzles specially constructed for positioning adjacent to another nozzle or to a fixed member, e.g. fairing
- 1/54 . Nozzles having means for reversing jet thrust (reversing jet thrust using fluid jets F02K 1/32)
- 1/56 . . Reversing jet main flow
- 1/563 . . . {in specified direction, e.g. to obviate its reinjection}
- 1/566 . . . {by blocking the rearward discharge by means of a translatable member}
- 1/58 . . . Reversers mounted on the inner cone or the nozzle housing {or the fuselage}
- 1/60 . . . by blocking the rearward discharge by means of pivoted eyelids or clamshells, e.g. target-type reversers
- 1/605 . . . . {the aft end of the engine cowl being movable to uncover openings for the reversed flow}
- 1/62 . . . by blocking the rearward discharge by means of flaps
- 1/625 . . . . {the aft end of the engine cowl being movable to uncover openings for the reversed flow}
- 1/64 . . Reversing fan flow
- 1/645 . . . . {using inflatable diaphragms}
- 1/66 . . . using reversing fan blades
- 1/68 . . . Reversers mounted on the engine housing downstream of the fan exhaust section
- 1/70 . . . using thrust reverser flaps or doors mounted on the fan housing
- 1/72 . . . . the aft end of the fan housing being movable to uncover openings in the fan housing for the reversed flow
- 1/74 . . Reversing at least one flow in relation to at least one other flow in a plural- flow engine
- 1/76 . . Control or regulation of thrust reversers
- 1/763 . . . {with actuating systems or actuating devices; Arrangement of actuators for thrust reversers}
- 1/766 . . . {with blocking systems or locking devices; Arrangement of locking devices for thrust reversers}
- 1/78 . Other construction of jet pipes
- 1/80 . . Couplings or connections
- 1/805 . . . {Sealing devices therefor, e.g. for movable parts of jet pipes or nozzle flaps}
- 1/82 . . Jet pipe walls, e.g. liners
- 1/822 . . . {Heat insulating structures or liners, cooling arrangements, e.g. post combustion liners; Infrared radiation suppressors}
- 1/825 . . . . {Infrared radiation suppressors}
- 1/827 . . . {Sound absorbing structures or liners}
- 3/00 Plants including a gas turbine driving a compressor or a ducted fan**
- 3/02 . in which part of the working fluid by-passes the turbine and combustion chamber
- 3/025 . . {the by-pass flow being at least partly used to create an independent thrust component}
- 3/04 . . the plant including ducted fans, i.e. fans with high volume, low pressure outputs, for augmenting the jet thrust, e.g. of double-flow type
- 3/06 . . . with front fan
- 3/062 . . . with aft fan
- 3/065 . . . with front and aft fans
- 3/068 . . . being characterised by a short axial length relative to the diameter
- 3/072 . . . with counter-rotating {, e.g. fan} rotors
- 3/075 . . . controlling flow ratio between flows
- 3/077 . . . the plant being of the multiple flow type, i.e. having three or more flows
- 3/08 . with supplementary heating of the working fluid; Control thereof (control of fuel supply therefor F02C 9/26)
- 3/10 . . by after-burners (F02K 3/105 takes precedence)
- 3/105 . . Heating the by-pass flow
- 3/11 . . . by means of burners or combustion chambers
- 3/115 . . . by means of indirect heat exchange
- 3/12 . characterised by having more than one gas turbine
- 5/00 Plants including an engine, other than a gas turbine, driving a compressor or a ducted fan**
- 5/02 . the engine being of the reciprocating-piston type
- 5/023 . . {the compressor being of the reciprocating-piston type (F02K 5/026 takes precedence)}
- 5/026 . . {free-piston engines}

<b>7/00</b>	<b>Plants in which the working fluid is used in a jet only, i.e. the plants not having a turbine or other engine driving a compressor or a ducted fan; Control thereof (rocket-engine plants F02K 9/00)</b>	9/48	. . . . driven by a gas turbine fed by propellant combustion gases {or fed by vaporized propellants or other gases}
7/005	. {the engine comprising a rotor rotating under the actions of jets issuing from this rotor}	9/50	. . . using pressurised fluid to pressurise the propellants
7/02	. the jet being intermittent, i.e. pulse-jet	9/52	. . . Injectors
7/04	. . with resonant combustion chambers	9/54	. . . Leakage detectors; Purging systems; Filtration systems
7/06	. . with combustion chambers having valves	9/56	. . . Control
7/067	. . . having aerodynamic valves	9/563	. . . . {of propellant feed pumps}
7/075	. . with multiple pulse-jet engines	9/566	. . . . {elements and safety devices, e.g. pressure relief valves}
7/08	. the jet being continuous	9/58	. . . . Propellant feed valves
7/10	. characterised by having ram-action compression, i.e. aero-thermo-dynamic-ducts or ram-jet engines	9/60	. . Constructional parts; Details not otherwise provided for
7/105	. . {using a solid fuel}	9/605	. . . {Reservoirs}
7/12	. . Injection-induction jet engines	9/62	. . . Combustion or thrust chambers
7/14	. . with external combustion, e.g. scram-jet engines	9/64	. . . . having cooling arrangements
7/16	. . Composite ram-jet/turbo-jet engines	9/66	. . . . of the rotary type
7/18	. . Composite ram-jet/rocket engines	9/68	. . . Decomposition chambers
7/20	. . Composite ram-jet/pulse-jet engines	9/70	. using semi- solid or pulverulent propellants
<b>9/00</b>	<b>Rocket-engine plants, i.e. plants carrying both fuel and oxidant therefor; Control thereof</b>	9/72	. using liquid and solid propellants, i.e. hybrid rocket-engine plants
9/08	. using solid propellants (F02K 9/72 takes precedence; using semi-solid or pulverulent propellants F02K 9/70)	9/74	. combined with another jet-propulsion plant
9/10	. . Shape or structure of solid propellant charges	9/76	. . with another rocket-engine plant; Multistage rocket-engine plants
9/12	. . . made of two or more portions burning at different rates {or having different characteristics}	9/763	. . . {with solid propellant}
9/14	. . . made from sheet-like materials, e.g. of carpet-roll type, of layered structure	9/766	. . . {with liquid propellant}
9/16	. . . of honeycomb structure	9/78	. . with an air-breathing jet-propulsion plant (with a ram-jet engine F02K 7/18)
9/18	. . . of the internal-burning type having a star or like shaped internal cavity	9/80	. characterised by thrust or thrust vector control (burning control of solid propellants F02K 9/26; feeding control of liquid or gaseous propellants F02K 9/56; re-ignitable, restartable or intermittently operated rocket-engine plants F02K 9/94)
9/20	. . . of the external-burning type	9/805	. . {servo-mechanisms or control devices therefor}
9/22	. . . of the front-burning type	9/82	. . by injection of a secondary fluid into the rocket exhaust gases
9/24	. . Charging rocket engines with solid propellants; Methods or apparatus specially adapted for working solid propellant charges	9/84	. . using movable nozzles
9/26	. . Burning control {(F02K 9/10, F02K 9/34, F02K 9/86, F02K 9/92 and F02K 9/94 take precedence)}	9/86	. . using nozzle throats of adjustable cross- section {(F02K 9/978 takes precedence)}
9/28	. . having two or more propellant charges with the propulsion gases exhausting through a common nozzle	9/88	. . using auxiliary rocket nozzles
9/30	. . with the propulsion gases exhausting through a plurality of nozzles	9/90	. . using deflectors (F02K 9/82 takes precedence)
9/32	. . Constructional parts; Details not otherwise provided for	9/92	. . incorporating means for reversing or terminating thrust
9/34	. . . Casings; Combustion chambers; Liners thereof	9/94	. Re-ignitable or restartable rocket- engine plants; Intermittently operated rocket-engine plants
9/343	. . . . {Joints, connections, seals therefor}	9/95	. characterised by starting or ignition means or arrangements (safety devices F02K 9/38)
9/346	. . . . {Liners, e.g. inhibitors}	9/96	. characterised by specially adapted arrangements for testing or measuring
9/36	. . . Propellant charge supports	9/97	. Rocket nozzles (thrust or thrust vector control F02K 9/80)
9/38	. . . Safety devices, e.g. to prevent accidental ignition	9/972	. . {Fluid cooling arrangements for nozzles (F02K 9/64 takes precedence)}
9/40	. . . Cooling arrangements {(for nozzles F02K 9/972)}	9/974	. . {Nozzle- linings; Ablative coatings}
9/42	. using liquid or gaseous propellants (F02K 9/72 takes precedence)	9/976	. . {Deployable nozzles}
9/425	. . {Propellants}	9/978	. . {Closures for nozzles; Nozzles comprising ejectable or discardable elements}
9/44	. . Feeding propellants	<b>99/00</b>	<b>Subject matter not provided for in other groups of this subclass</b>
9/46	. . . using pumps		