

# 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

**F02P IGNITION, OTHER THAN COMPRESSION IGNITION, FOR INTERNAL-COMBUSTION ENGINES; TESTING OF IGNITION TIMING IN COMPRESSION-IGNITION ENGINES** ({anti-pollution means for internal-combustion engines [F02B 17/00](#)}; specially adapted for rotary-piston or oscillating-piston engines [F02B 53/12](#); {ignition of gas turbine plants [F02C 7/26](#); ignition of jet propulsion plants [F02K 9/95](#); starting of combustion engines [F02N 9/00](#)}; ignition of combustion apparatus in general, glowing plugs [F23Q](#); measuring of physical variables in general [G01](#); controlling in general [G05](#); data processing in general [G06](#); electrical components in general see Section H; {ignition coils [H01F 38/12](#)}; sparking plugs [H01T 13/00](#))

#### **WARNING**

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

#### **Electric spark ignition installations characterised by the type of ignition power generation or storage**

- 1/00 Installations having electric ignition energy generated by magneto- or dynamo- electric generators without subsequent storage** {(combination starter-magneto [F02N 11/06](#); magneto- or dynamo-electric generators [H02K 21/00](#))}
- 1/005 . {Construction and fastening of elements of magnetos other than the magnetic circuit and the windings ([F02P 1/02](#) - [F02P 1/08](#) take precedence)}
- 1/02 . the generator rotor being characterised by forming part of the engine flywheel
- 1/04 . the generator being specially adapted for use with specific engine types, e.g. engines with V arrangement of cylinders
- 1/06 . Generator drives, e.g. having snap couplings
- 1/08 . Layout of circuits
- 1/083 . . {for generating sparks by opening or closing a coil circuit}
- 1/086 . . {for generating sparks by discharging a capacitor into a coil circuit}
- 3/00 Other installations**
- 3/005 . {having inductive-capacitance energy storage (capacitive storage installations using an intermediate charging inductance [F02P 3/0876](#))}
- 3/01 . Electric spark ignition installations without subsequent energy storage, i.e. energy supplied by an electrical oscillator (with magneto- or dynamo-electric generators [F02P 1/00](#); piezo-electric ignition [F02P 3/12](#); with continuous electric spark [F02P 15/10](#))

- 3/02 . having inductive energy storage, e.g. arrangements of induction coils {(ignition coils structurally combined with sparking plugs [F02P 13/00](#); constructional details of ignition coils [H01F 38/12](#))}
- 3/04 . . Layout of circuits
- 3/0407 . . . {Opening or closing the primary coil circuit with electronic switching means ([F02P 3/045](#) - [F02P 3/055](#) take precedence)}
- 3/0414 . . . . {using digital techniques ([F02P 3/0428](#), [F02P 3/0442](#) take precedence)}
- 3/0421 . . . . . {with electronic tubes}
- 3/0428 . . . . . {using digital techniques}
- 3/0435 . . . . . {with semiconductor devices ([F02P 3/0453](#), [F02P 3/051](#), [F02P 3/0552](#) take precedence)}
- 3/0442 . . . . . {using digital techniques ([F02P 3/0456](#), [F02P 3/053](#), [F02P 3/0554](#), [F02P 3/0558](#) take precedence)}
- 3/045 . . . for control of the dwell or anti dwell time
- 3/0453 . . . . {Opening or closing the primary coil circuit with semiconductor devices}
- 3/0456 . . . . . {using digital techniques}
- 3/05 . . . for control of the magnitude of the current in the ignition coil (during starting [F02P 15/12](#))
- 3/051 . . . . {Opening or closing the primary coil circuit with semiconductor devices}
- 3/053 . . . . . {using digital techniques}
- 3/055 . . . with protective means to prevent damage to the circuit, {e.g. semiconductor devices} or the ignition coil
- 3/0552 . . . . {Opening or closing the primary coil circuit with semiconductor devices}
- 3/0554 . . . . . {using digital techniques ([F02P 3/0558](#) takes precedence)}

3/0556	. . . . . {Protecting the coil when the engine is stopped}	5/106	. . . . . {Combustion-air pressure devices combined with other specific conditions (with centrifugal devices <a href="#">F02P 5/075</a> )}
3/0558	. . . . . {using digital techniques}	5/12	. . . . . dependent a specific pressure other than that of combustion-air, e.g. of exhaust, cooling fluid, lubricant
3/06	. having capacitive energy storage ( <a href="#">piezo-electric or electrostatic ignition F02P 3/12</a> )	5/14	. . . . . dependent on specific conditions other than engine speed or engine fluid pressure, e.g. temperature
3/08	. . Layout of circuits ( <a href="#">for low tension F02P 3/10</a> )	5/142	. . . . . {dependent on a combination of several specific conditions ( <a href="#">F02P 5/075</a> , <a href="#">F02P 5/106</a> takes precedence)}
3/0807	. . . {Closing the discharge circuit of the storage capacitor with electronic switching means ( <a href="#">F02P 3/0853</a> , <a href="#">F02P 3/0876</a> , <a href="#">F02P 3/09</a> take precedence)}	5/145	. . . using electrical means
3/0815	. . . . . {using digital techniques ( <a href="#">F02P 3/083</a> , <a href="#">F02P 3/0846</a> take precedence)}	5/1455	. . . {by using a second control of the closed loop type ( <a href="#">dependent on pinking F02P 5/152</a> )}
3/0823	. . . . . {with electronic tubes}	5/15	. . . Digital data processing
3/083	. . . . . {using digital techniques}	5/1502	. . . . . {using one central computing unit}
3/0838	. . . . . {with semiconductor devices ( <a href="#">F02P 3/0861</a> , <a href="#">F02P 3/0884</a> , <a href="#">F02P 3/093</a> take precedence)}	5/1504	. . . . . {with particular means during a transient phase, e.g. acceleration, deceleration, gear change ( <a href="#">during starting F02P 5/1506</a> )}
3/0846	. . . . . {using digital techniques ( <a href="#">F02P 3/0869</a> , <a href="#">F02P 3/0892</a> , <a href="#">F02P 3/096</a> take precedence)}	5/1506	. . . . . {with particular means during starting}
3/0853	. . . {for control of the dwell or anti-dwell time}	5/1508	. . . . . {with particular means during idling}
3/0861	. . . . . {Closing the discharge circuit of the storage capacitor with semiconductor devices}	5/151	. . . . . {with means for compensating the variation of the characteristics of the engine or of a sensor, e.g. by ageing}
3/0869	. . . . . {using digital techniques}	5/1512	. . . . . {with particular means concerning an individual cylinder}
3/0876	. . . {the storage capacitor being charged by means of an energy converter (DC-DC converter) or of an intermediate storage inductance}	5/1514	. . . . . {with means for optimising the use of registers or of memories, e.g. interpolation}
3/0884	. . . . . {Closing the discharge circuit of the storage capacitor with semiconductor devices}	5/1516	. . . . . {with means relating to exhaust gas recirculation, e.g. turbo}
3/0892	. . . . . {using digital techniques}	5/1518	. . . . . {using two or more central computing units, e.g. interpolation}
3/09	. . . for control of the charging current in the capacitor ( <a href="#">F02P 15/12</a> takes precedence)	5/152	. . . . . dependent on pinking ( <a href="#">detecting or indicating knocks in internal-combustion engines G01L 23/22</a> )
3/093	. . . . . {Closing the discharge circuit of the storage capacitor with semiconductor devices}	5/1521	. . . . . {with particular means during a transient phase, e.g. starting, acceleration, deceleration, gear change}
3/096	. . . . . {using digital techniques}	5/1522	. . . . . {with particular means concerning an individual cylinder}
3/10	. . Low-tension installation, e.g. using surface-discharge sparking plugs	5/1523	. . . . . {with particular laws of return to advance, e.g. step by step, differing from the laws of retard}
3/12	. Piezo-electric ignition; Electrostatic ignition	5/1525	. . . . . {with means for compensating the variation of the characteristics of the pinking sensor or of the electrical means, e.g. by ageing ( <a href="#">when variation of characteristics results only from incorrect functioning F02P 5/1526</a> )}
<b><u>Advancing or retarding electric ignition spark; Arrangements of distributors or of circuit-makers or -breakers for electric spark ignition; Electric spark ignition control or safety means, not otherwise provided for</u></b>		5/1526	. . . . . {with means for taking into account incorrect functioning of the pinking sensor or of the electrical means}
5/00	<b>Advancing or retarding ignition; Control therefor</b>	5/1527	. . . . . {with means allowing burning of two or more fuels, e.g. super or normal, premium or regular}
5/005	. {with combination of automatic and non- automatic means}	5/1528	. . . . . {for turbocompressed engine}
5/02	. non-automatically; dependent on position of personal controls of engine, e.g. throttle position	5/153	. . . . . dependent on combustion pressure
5/04	. automatically, as a function of the working conditions of the engine or vehicle or of the atmospheric conditions ( <a href="#">dependent on position of personal controls of engine F02P 5/02</a> )	5/155	. . . Analogue data processing
5/045	. . {combined with electronic control of other engine functions, e.g. fuel injection ( <a href="#">in general F02D 37/02</a> )}	5/1551	. . . . . {by determination of elapsed time with reference to a particular point on the motor axle, dependent on specific conditions}
5/05	. . using mechanical means		
5/06	. . . dependent on engine speed		
5/07	. . . . Centrifugal timing mechanisms		
5/075	. . . . . {Centrifugal devices combined with other specific conditions}		
5/10	. . . dependent on fluid pressure in engine, e.g. combustion-air pressure		
5/103	. . . . {dependent on the combustion-air pressure in engine}		

5/1553	. . . . {by determination of elapsed angle with reference to a particular point on the motor axle, dependent on specific conditions}	7/08	. . having air-tight casings
5/1555	. . . . {using a continuous control, dependent on speed}	7/10	. Drives of distributors or of circuit-makers or -breakers
5/1556	. . . . {using a stepped control, dependent on speed}	<b>9/00</b>	<b>Electric spark ignition control, not otherwise provided for</b>
5/1558	. . . . {with special measures for starting}	9/002	. {Control of spark intensity, intensifying, lengthening, suppression (by means of current control in the storage devices <a href="#">F02P 3/05</a> , <a href="#">F02P 3/09</a> , during starting <a href="#">F02P 15/12</a> )}
5/16	. characterised by the mechanical transmission between sensing elements or personal controls and final actuating elements	9/005	. . {by weakening or suppression of sparks to limit the engine speed}
<b>7/00</b>	<b>Arrangements of distributors, circuit-makers or -breakers, {e.g. of distributor and circuit-breaker combinations} or pick-up devices (advancing or retarding ignition or control therefor <a href="#">F02P 5/00</a>; such devices per se, see the relevant classes of Section H, e.g. rotary switches <a href="#">H01H 19/00</a>, contact-breakers, distributors <a href="#">H01R 39/00</a>, generators <a href="#">H02K</a>)</b>	9/007	. . {by supplementary electrical discharge in the pre-ionised electrode interspace of the sparking plug, e.g. plasma jet ignition}
7/02	. of distributors	<b>11/00</b>	<b>Safety means for electric spark ignition, not otherwise provided for</b>
7/021	. . {Mechanical distributors}	11/02	. Preventing damage to engines or engine-driven gearing
7/022	. . . {Details of the distributor rotor or electrode}	11/025	. . {Shortening the ignition when the engine is stopped (to prevent damage to the coil <a href="#">F02P 3/0556</a> )}
7/023	. . . {with magnetically controlled mechanical contacts}	11/04	. Preventing unauthorised use of engines (of vehicles <a href="#">B60R 25/04</a> ; ignition locks <a href="#">H01H 27/00</a> )
7/025	. . . {with noise suppression means specially adapted for the distributor}	11/06	. Indicating unsafe conditions
7/026	. . . {Distributors combined with other ignition devices, e.g. coils, fuel-injectors}	<b>13/00</b>	<b>Sparking plugs structurally combined with other parts of internal-combustion engines</b>
7/027	. . . . {combined with centrifugal advance devices}	((connection of ignition coil to spark plug connector <a href="#">F02P 3/02</a> ); with fuel injectors <a href="#">F02M 57/06</a> ; {spark plug connectors per se <a href="#">H01T 13/04</a> - <a href="#">H01T 13/06</a> ; predominant aspects of sparking plug, see <a href="#">H01T 13/40</a> - <a href="#">H01T 13/44</a> }; predominant aspects of the parts, see the relevant subclasses)	
7/028	. . . . {combined with circuit-makers or -breakers (and with centrifugal advance devices <a href="#">F02P 7/027</a> )}	<b>15/00</b>	<b>Electric spark ignition having characteristics not provided for in, or of interest apart from, groups <a href="#">F02P 1/00</a> - <a href="#">F02P 13/00</a> {and combined with layout of ignition circuits (not combined <a href="#">F02B</a>, <a href="#">F02C</a>, <a href="#">F02G</a>, <a href="#">F02K</a>)}</b>
7/03	. . with electrical means (ignition occurring simultaneously at different places in one engine cylinder or in two or more separate engine cylinders <a href="#">F02P 15/08</a> )	15/001	. {Ignition installations adapted to specific engine types (ignition of jet propulsion plants <a href="#">F02K 9/95</a> ; for rotary piston engines <a href="#">F02B 53/12</a> )}
7/035	. . . {without mechanical switching means}	15/003	. . {Layout of ignition circuits for gas turbine plants (ignition of gas turbine plants per se <a href="#">F02C 7/26</a> )}
7/04	. . having distributors with air-tight casing	15/005	. . {Layout of ignition circuits for rotary- or oscillating piston engines (ignition of those engines per se <a href="#">F02B 53/12</a> )}
7/06	. of circuit-makers or -breakers, or pick-up devices adapted to sense particular points of the timing cycle	15/006	. {Ignition installations combined with other systems, e.g. fuel injection (to advance or to retard the ignition spark <a href="#">F02P 5/045</a> )}
7/061	. . {pick-up devices without mechanical contacts ( <a href="#">F02P 7/067</a> - <a href="#">F02P 7/077</a> take precedence)}	15/008	. {Reserve ignition systems; Redundancy of some ignition devices}
7/063	. . Mechanical pick-up devices, circuit-makers or -breakers, e.g. contact-breakers	15/02	. Arrangements having two or more sparking plugs
7/0631	. . . {Constructional details of contacts}	15/04	. one of the spark electrodes being mounted on the engine working piston
7/0632	. . . {with rotary contacts}	15/06	. the electric spark triggered by engine working cylinder compression
7/0634	. . . {Details of cams or cam-followers}	15/08	. having multiple-spark ignition, i.e. ignition occurring simultaneously at different places in one engine cylinder or in two or more separate engine cylinders
7/0635	. . . {with means to set the breaker gap}	15/10	. having continuous electric sparks
7/0637	. . . {with several circuit-makers or -breakers actuated by the same cam}	15/12	. having means for strengthening spark during starting
7/0638	. . . {with noise suppression means specially adapted for the breakers}		
7/067	. . Electromagnetic pick-up devices {, e.g. providing induced current in a coil}		
7/0672	. . . {using Wiegand effect}		
7/0675	. . . {with variable reluctance, e.g. depending on the shape of a tooth}		
7/0677	. . . {Mechanical arrangements}		
7/07	. . . Hall-effect pick-up devices		
7/073	. . Optical pick-up devices		
7/077	. . Circuits therefor, e.g. pulse generators		
7/0775	. . . {Electronical verniers}		

**17/00 Testing of ignition installations, e.g. in combination with adjusting (testing fuel injection apparatus F02M 65/00; testing ignition installations in general F23Q 23/00); Testing of ignition timing in compression-ignition engines**

- 2017/003 . {using an inductive sensor, e.g. trigger tongs}
- 2017/006 . {using a capacitive sensor}
- 17/02 . Checking or adjusting ignition timing
- 17/04 . . dynamically
- 17/06 . . . using a stroboscopic lamp
- 17/08 . . . using a cathode-ray oscilloscope (F02P 17/06 takes precedence)
- 17/10 . Measuring dwell or antidwell time
- 17/12 . Testing characteristics of the spark, ignition voltage or current (testing of sparking plugs H01T 13/60)
- 2017/121 . . {by measuring spark voltage}
- 2017/123 . . {Generating additional sparks for diagnostics}
- 2017/125 . . {Measuring ionisation of combustion gas, e.g. by using ignition circuits}
- 2017/126 . . . {for burners}
- 2017/128 . . . {for knock detection}

**Other ignition**

**19/00 Incandescent ignition, e.g. during starting of internal combustion engines; Combination of incandescent and spark ignition**

- 19/02 . electric, e.g. layout of circuits of apparatus having glowing plugs
- 19/021 . . {characterised by power delivery controls}
- 19/022 . . . {using intermittent current supply}
- 19/023 . . . {Individual control of the glow plugs}
- 19/025 . . {with means for determining glow plug temperature or glow plug resistance}
- 19/026 . . {Glow plug actuation during engine operation}
- 19/027 . . {Safety devices, e.g. for diagnosing the glow plugs or the related circuits}
- 19/028 . . {the glow plug being combined with or used as a sensor}
- 19/04 . non-electric, e.g. heating incandescent spots by burners (use of burners for direct ignition F02P 21/00)

**21/00 Direct use of flames or burners for ignition**

- 21/02 . the flames being kept burning essentially external to engine working chambers
- 21/04 . Burning-cartridges or like inserts being arranged in engine working chambers (as starting aid F02N 19/02)

**23/00 Other ignition**

- 23/02 . Friction, pyrophoric, or catalytic ignition
- 23/04 . Other physical ignition means, e.g. using laser rays
- 23/045 . . {using electromagnetic microwaves}