

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

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|---|--------|--|
| | 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)} |
| 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)} | 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)} |
| 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)} | 3/0414 | • • • • {using digital techniques (F02P 3/0428, F02P 3/0442 take precedence)} |
| 1/02 • the generator rotor being characterised by forming part of the engine flywheel | 3/0421 | • • • • • {with electronic tubes} |
| 1/04 • the generator being specially adapted for use with specific engine types, e.g. engines with V arrangement of cylinders | 3/0428 | • • • • • {using digital techniques} |
| | 3/0435 | • • • • • {with semiconductor devices (F02P 3/0453, F02P 3/051, F02P 3/0552 take precedence)} |
| 1/06 • Generator drives, e.g. having snap couplings | 3/0442 | • • • • • {using digital techniques (F02P 3/0456, F02P 3/053, F02P 3/0554, F02P 3/0558 take precedence)} |
| 1/08 • Layout of circuits | 3/045 | • • • • for control of the dwell or anti dwell time |
| 1/083 • • {for generating sparks by opening or closing a coil circuit} | 3/0453 | • • • • • {Opening or closing the primary coil circuit with semiconductor devices} |
| 1/086 • • {for generating sparks by discharging a capacitor into a coil circuit} | 3/0456 | • • • • • {using digital techniques} |
| 3/00 Other installations | 3/05 | • • • for control of the magnitude of the current in the ignition coil (during starting F02P 15/12) |
| 3/005 • {having inductive-capacitance energy storage (capacitive storage installations using an intermediate charging inductance F02P 3/0876)} | 3/051 | • • • • • {Opening or closing the primary coil circuit with semiconductor devices} |
| 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; piezoelectric ignition F02P 3/12; with continuous electric spark F02P 15/10) | 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 F02P 5/075)}
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 (piezoelectric or electrostatic ignition F02P 3/12)	5/14	. . . . . dependent on specific conditions other than engine speed or engine fluid pressure, e.g. temperature
3/08	. . . . . Layout of circuits (for low tension F02P 3/10)	5/142	. . . . . {dependent on a combination of several specific conditions (F02P 5/075 , F02P 5/106 takes precedence)}
3/0807	. . . . . {Closing the discharge circuit of the storage capacitor with electronic switching means (F02P 3/0853 , F02P 3/0876 , F02P 3/09 take precedence)}	5/145	. . . . . using electrical means
3/0815	. . . . . {using digital techniques (F02P 3/083 , F02P 3/0846 take precedence)}	5/1455	. . . . . {by using a second control of the closed loop type (dependent on pinking F02P 5/152)}
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 (F02P 3/0861 , F02P 3/0884 , F02P 3/093 take precedence)}	5/1504	. . . . . {with particular means during a transient phase, e.g. acceleration, deceleration, gear change (during starting F02P 5/1506)}
3/0846	. . . . . {using digital techniques (F02P 3/0869 , F02P 3/0892 , F02P 3/096 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 (F02P 15/12 takes precedence)	5/152	. . . . . dependent on pinking (detecting or indicating knocks in internal-combustion engines G01L 23/22)
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	. . . . . Piezoelectric 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 (when variation of characteristics results only from incorrect functioning F02P 5/1526)}
<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>		5/1526	. . . . . {with means for taking into account incorrect functioning of the pinking sensor or of the electrical means}
5/00	Advancing or retarding ignition; Control therefor	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 (dependent on position of personal controls of engine F02P 5/02)	5/155	. . . . . Analogue data processing
5/045	. . . . . {combined with electronic control of other engine functions, e.g. fuel injection (in general F02D 37/02)}	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}	9/00	Electric spark ignition control, not otherwise provided for
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 F02P 3/05 , F02P 3/09 , during starting F02P 15/12)}
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}
7/00	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 F02P 5/00; such devices per se, see the relevant classes of Section H, e.g. rotary switches H01H 19/00, contact-breakers, distributors H01R 39/00, generators H02K)	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	11/00	Safety means for electric spark ignition, not otherwise provided for
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 F02P 3/0556)}
7/023	. . . {with magnetically controlled mechanical contacts}	11/04	. Preventing unauthorised use of engines (of vehicles B60R 25/04 ; ignition locks H01H 27/00)
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}	13/00	Sparking plugs structurally combined with other parts of internal-combustion engines
7/027	. . . . {combined with centrifugal advance devices}	({connection of ignition coil to spark plug connector F02P 3/02 ;} with fuel injectors F02M 57/06 {; spark plug connector per se H01T 13/04 – H01T 13/06 ; predominant aspects of sparking plug, see H01T 13/40 – H01T 13/44 })	
7/028	. . . . {combined with circuit-makers or -breakers (and with centrifugal advance devices F02P 7/027)}	15/00	Electric spark ignition having characteristics not provided for in, or of interest apart from, groups F02P 1/00 - F02P 13/00 {and combined with layout of ignition circuits (not combined F02B, F02C, F02G, F02K)}
7/03	. . with electrical means (ignition occurring simultaneously at different places in one engine cylinder or in two or more separate engine cylinders F02P 15/08)	15/001	. {Ignition installations adapted to specific engine types (ignition of jet propulsion plants F02K 9/95 ; for rotary piston engines F02B 53/12)}
7/035	. . . {without mechanical switching means}	15/003	. . {Layout of ignition circuits for gas turbine plants (ignition of gas turbine plants per se F02C 7/26)}
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 F02B 53/12)}
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 F02P 5/045)}
7/061	. . {pick-up devices without mechanical contacts (F02P 7/067 - F02P 7/077 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}