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; piezoelectric 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}
3/0558 . . . . . {using digital techniques}
3/06 . having capacitive energy storage (piezoelectric or electrostatic ignition F02P 3/12)
3/08 . . Layout of circuits (for low tension F02P 3/10)
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)}
3/0815 . . . . {using digital techniques (F02P 3/083, F02P 3/0846 take precedence)}
3/0823 . . . . {with electronic tubes}
3/083 . . . . . {using digital techniques}
3/0838 . . . . {with semiconductor devices (F02P 3/0861, F02P 3/0884, F02P 3/093 take precedence)}
3/0846 . . . . . {using digital techniques (F02P 3/0869, F02P 3/0892, F02P 3/096 take precedence)}
3/0853 . . . {for control of the dwell or anti-dwell time}
3/0861 . . . . {Closing the discharge circuit of the storage capacitor with semiconductor devices}
3/0869 . . . . . {using digital techniques}
3/0876 . . . {the storage capacitor being charged by means of an energy converter (DC-DC converter) or of an intermediate storage inductance}
3/0884 . . . . {Closing the discharge circuit of the storage capacitor with semiconductor devices}
3/0892 . . . . . {using digital techniques}
3/09 . . . for control of the charging current in the capacitor (F02P 15/12 takes precedence)
3/093 . . . . {Closing the discharge circuit of the storage capacitor with semiconductor devices}
3/096 . . . . . {using digital techniques}
3/10 . . Low-tension installation, e.g. using surface-discharge sparking plugs
3/12 . Piezoelectric ignition; Electrostatic ignition

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

5/00 Advancing or retarding ignition; Control therefor
5/005 . {with combination of automatic and non- automatic means}
5/02 . non-automatically; dependent on position of personal controls of engine, e.g. throttle position
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)
5/045 . . {combined with electronic control of other engine functions, e.g. fuel injection (in general F02D 37/02)}
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}
5/106 . . . . . {Combustion-air pressure devices combined with other specific conditions (with centrifugal devices F02P 5/075)}
5/12 . . . . dependent a specific pressure other than that of combustion-air, e.g. of exhaust, cooling fluid, lubricant
5/14 . . . dependent on specific conditions other than engine speed or engine fluid pressure, e.g. temperature
5/142 . . . . {dependent on a combination of several specific conditions (F02P 5/075, F02P 5/106 takes precedence)}
5/145 . . using electrical means
5/1455 . . . {by using a second control of the closed loop type (dependent on pinking F02P 5/152)}
5/15 . . . Digital data processing
5/1502 . . . . {using one central computing unit}
5/1504 . . . . . {with particular means during a transient phase, e.g. acceleration, deceleration, gear change (during starting F02P 5/1506)}
5/1506 . . . . . {with particular means during starting}
5/1508 . . . . . {with particular means during idling}
5/151 . . . . . {with means for compensating the variation of the characteristics of the engine or of a sensor, e.g. by ageing}
5/1512 . . . . . {with particular means concerning an individual cylinder}
5/1514 . . . . . {with means for optimising the use of registers or of memories, e.g. interpolation}
5/1516 . . . . . {with means relating to exhaust gas recirculation, e.g. turbo}
5/1518 . . . . {using two or more central computing units, e.g. interpolation}
5/152 . . . . dependent on pinking (detecting or indicating knocks in internal-combustion engines G01L 23/22)
5/1521 . . . . . {with particular means during a transient phase, e.g. starting, acceleration, deceleration, gear change}
5/1522 . . . . . {with particular means concerning an individual cylinder}
5/1523 . . . . . {with particular laws of return to advance, e.g. step by step, differing from the laws of retard}
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)}
5/1526 . . . . . {with means for taking into account incorrect functioning of the pinking sensor or of the electrical means}
5/1527 . . . . . {with means allowing burning of two or more fuels, e.g. super or normal, premium or regular}
5/1528 . . . . . {for turbocompressed engine}
5/153 . . . . dependent on combustion pressure
5/155 . . . Analogue data processing
5/1551 . . . . {by determination of elapsed time with reference to a particular point on the motor axle, dependent on specific conditions}

5/1553 . . . . {by determination of elapsed angle with reference to a particular point on the motor axle, dependent on specific conditions}
5/1555 . . . . . {using a continuous control, dependent on speed}
5/1556 . . . . . {using a stepped control, dependent on speed}
5/1558 . . . . {with special measures for starting}
5/16 . characterised by the mechanical transmission between sensing elements or personal controls and final actuating elements

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)

7/02 . of distributors
7/021 . . {Mechanical distributors}
7/022 . . . {Details of the distributor rotor or electrode}
7/023 . . . {with magnetically controlled mechanical contacts}
7/025 . . . {with noise suppression means specially adapted for the distributor}
7/026 . . . {Distributors combined with other ignition devices, e.g. coils, fuel-injectors}
7/027 . . . . {combined with centrifugal advance devices}
7/028 . . . . {combined with circuit-makers or -breakers (and with centrifugal advance devices F02P 7/027)}
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)
7/035 . . . {without mechanical switching means}
7/04 . . having distributors with air-tight casing
7/06 . of circuit-makers or -breakers, or pick-up devices adapted to sense particular points of the timing cycle
7/061 . . {pick-up devices without mechanical contacts (F02P 7/067 - F02P 7/077 take precedence)}
7/063 . . Mechanical pick-up devices, circuit-makers or -breakers, e.g. contact-breakers
7/0631 . . . {Constructional details of contacts}
7/0632 . . . {with rotary contacts}
7/0634 . . . {Details of cams or cam-followers}
7/0635 . . . {with means to set the breaker gap}
7/0637 . . . {with several circuit-makers or -breakers actuated by the same cam}
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}
7/08 . . having air-tight casings
7/10 . Drives of distributors or of circuit-makers or -breakers

9/00 Electric spark ignition control, not otherwise provided for

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)}
9/005 . . {by weakening or suppression of sparks to limit the engine speed}
9/007 . . {by supplementary electrical discharge in the pre-ionised electrode interspace of the sparking plug, e.g. plasma jet ignition}

11/00 Safety means for electric spark ignition, not otherwise provided for

11/02 . Preventing damage to engines or engine-driven gearing
11/025 . . {Shortening the ignition when the engine is stopped (to prevent damage to the coil F02P 3/0556)}
11/04 . Preventing unauthorised use of engines (of vehicles B60R 25/04; ignition locks H01H 27/00)
11/06 . Indicating unsafe conditions

13/00 Sparking plugs structurally combined with other parts of internal-combustion engines ({connection of ignition coil to spark plug connector F02P 3/02}; with fuel injectors F02M 57/06; {spark plug connectors per se H01T 13/04 - H01T 13/06; predominant aspects of sparking plug, see H01T 13/40 - H01T 13/44}; predominant aspects of the parts, see the relevant subclasses)

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)**}**

15/001 . {Ignition installations adapted to specific engine types (ignition of jet propulsion plants F02K 9/95; for rotary piston engines F02B 53/12)}
15/003 . . {Layout of ignition circuits for gas turbine plants (ignition of gas turbine plants per se F02C 7/26)}
15/005 . . {Layout of ignition circuits for rotary- or oscillating piston engines (ignition of those engines per se F02B 53/12)}
15/006 . {Ignition installations combined with other systems, e.g. fuel injection (to advance or to retard the ignition spark F02P 5/045)}
15/008 . {Reserve ignition systems; Redundancy of some ignition devices}
15/02 . Arrangements having two or more sparking plugs
15/04 . one of the spark electrodes being mounted on the engine working piston
15/06 . the electric spark triggered by engine working cylinder compression
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
15/10 . having continuous electric sparks
15/12 . having means for strengthening spark during starting

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}