

CPC COOPERATIVE PATENT CLASSIFICATION

F02N STARTING OF COMBUSTION ENGINES (starting of free-piston combustion engines F02B 71/02; starting of gas-turbine plants F02C 7/26); STARTING AIDS FOR SUCH ENGINES, NOT OTHERWISE PROVIDED FOR

NOTES

1. Attention is drawn to the notes preceding class F01.
2. The starting of engines which are not explicitly stated to be combustion engines will be classified in this subclass insofar as their starting is equivalent to that of combustion engines.

Muscle-operated starting apparatus

- 1/00 Starting apparatus having hand cranks (with intermediate power storage F02N 5/00 - F02N 15/00)**
- 1/005 . {Safety means (F02N 1/02 takes precedence)}
- 1/02 . having safety means preventing damage caused by reverse rotation
- 3/00 Other muscle-operated starting apparatus (with intermediate power storage F02N 5/00 - F02N 15/00)**
- 3/02 . having pull-cords
- 3/04 . having foot-actuated levers

Power-operated starting apparatus; Muscle-operated starting apparatus with intermediate power storage

- 5/00 Starting apparatus having mechanical power storage**
- 5/02 . of spring type
- 5/04 . of inertia type
- 7/00 Starting apparatus having fluid-driven auxiliary engines or apparatus**
- 7/02 . the apparatus being of single-stroke piston type, e.g. pistons acting on racks or pull-cords
- 7/04 . . the pistons acting on screw-threaded members to effect rotation
- 7/06 . the engines being of reciprocating-piston type (of internal-combustion type F02N 7/10)
- 7/08 . the engines being of rotary type
- 7/10 . characterised by using auxiliary engines or apparatus of combustion type (by using explosive cartridges F02N 13/00)
- 7/12 . . the engines being of rotary type, e.g. turbines (F02N 7/14 takes precedence)
- 7/14 . . the starting engines being readily removable from main engines, e.g. of portable type
- 9/00 Starting of engines by supplying auxiliary pressure fluid to their working chambers**
- 9/02 . the pressure fluid being generated directly by combustion (by using explosive cartridges F02N 13/00)
- 9/04 . the pressure fluid being generated otherwise, e.g. by compressing air
- 11/00 Starting of engines by means of electric motors (arrangement or mounting of prime-movers consisting of electric motors and internal combustion engines for mutual or common propulsion B60K 6/20)**
- 11/003 . {said electric motor being also used as a drive for auxiliaries, e.g. for driving transmission pumps or fuel pumps during engine stop}

- 11/006 . {using a plurality of electric motors}
- 11/02 . the motors having longitudinally-shiftable rotors
- 11/04 . the motors being associated with current generators
- 11/06 . . and with ignition apparatus
- 11/08 . Circuits {or control means} specially adapted for starting of engines
- 11/0803 . . {characterised by means for initiating engine start or stop (F02N 11/0814 takes precedence)}
- 11/0807 . . . {Remote means}
- 11/0811 . . . {using a timer}
- 11/0814 . . {comprising means for controlling automatic idle-start-stop}
- 11/0818 . . . {Conditions for starting or stopping the engine or for deactivating the idle-start-stop mode}
- 11/0822 {related to action of the driver}
- 11/0825 {related to prevention of engine restart failure, e.g. disabling automatic stop at low battery state}
- 11/0829 {related to special engine control, e.g. giving priority to engine warming-up or learning}
- 11/0833 {Vehicle conditions (F02N 11/0822, F02N 11/0825 take precedence)}
- 11/0837 {Environmental conditions thereof, e.g. traffic, weather or road conditions}
- 11/084 {State of vehicle accessories, e.g. air condition or power steering}
- 11/0844 . . . {with means for restarting the engine directly after an engine stop request, e.g. caused by change of driver mind}
- 11/0848 . . {with means for detecting successful engine start, e.g. to stop starter actuation}
- 11/0851 . . {characterised by means for controlling the engagement or disengagement between engine and starter, e.g. meshing of pinion and engine gear}
- 11/0855 . . . {during engine shutdown or after engine stop before start command, e.g. pre-engagement of pinion}
- 11/0859 . . {specially adapted to the type of the starter motor or integrated into it}
- 11/0862 . . {characterised by the electrical power supply means, e.g. battery}
- 11/0866 . . . {comprising several power sources, e.g. battery and capacitor or two batteries}
- 11/087 . . {Details of the switching means in starting circuits, e.g. relays or electronic switches}
- 2011/0874 . . . {characterised by said switch being an electronic switch}

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| 2011/0877 | . . . {said switch being used as a series-parallel switch, e.g. to switch circuit elements from series to parallel connection} | 15/08 | . . the gearing being of friction type |
| 2011/0881 | . . {Components of the circuit not provided for by previous groups} | 15/10 | . Safety devices not otherwise provided for |
| 2011/0885 | . . . {Capacitors, e.g. for additional power supply} | 19/00 Starting aids for combustion engines, not otherwise provided for | |
| 2011/0888 | . . . {DC/DC converters} | 19/001 | . {Arrangements thereof} |
| 2011/0892 | . . . {Two coils being used in the starting circuit, e.g. in two windings in the starting relay or two field windings in the starter} | 2019/002 | . {Aiding engine start by acting on fuel} |
| 2011/0896 | . . . {Inverters for electric machines, e.g. starter-generators} | 19/004 | . {Aiding engine start by using decompression means or variable valve actuation} |
| 11/10 | . Safety devices (F02N 11/08 takes precedence) | 19/005 | . {Aiding engine start by starting from a predetermined position, e.g. pre-positioning or reverse rotation} |
| 11/101 | . . {for preventing engine starter actuation or engagement (preventing unauthorised use or theft of vehicles B60R 25/04)} | 2019/007 | . . {using inertial reverse rotation} |
| 11/103 | . . . {according to the vehicle transmission or clutch status} | 2019/008 | . . {the engine being stopped in a particular position} |
| 11/105 | . . . {when the engine is already running (F02N 11/0848 takes precedence)} | 19/02 | . Aiding engine start by thermal means, e.g. using lighted wicks (using electrically-heated glow-plugs F02P 19/02) |
| 11/106 | . . {for stopping or interrupting starter actuation} | 19/04 | . . by heating of fluids used in engines (heating of lubricants F01M 5/02) |
| 11/108 | . . {for diagnosis of the starter or its components} | 19/06 | . . . by heating of combustion-air by flame generating means, e.g. flame glow-plugs |
| 11/12 | . Starting of engines by means of mobile, e.g. portable, starting sets | 19/08 | Arrangement thereof |
| 11/14 | . Starting of engines by means of electric starters with external current supply (F02N 11/12 takes precedence) | 19/10 | . . . by heating of engine coolants |
| 13/00 | Starting of engines, or driving of starting apparatus by use of explosives, e.g. stored in cartridges | 99/00 | Subject matter not provided for in other groups of this subclass |
| 13/02 | . Cartridges specially adapted therefor (gas cartridges in general F42B 3/04) | 99/002 | . {Starting combustion engines by ignition means} |
| 15/00 | Other power-operated starting apparatus; Component parts, details, or accessories, not provided for in, or of interest apart from groups F02N 5/00 - F02N 13/00 | 99/004 | . . {Generation of the ignition spark} |
| 15/003 | . {Starters comprising a brake mechanism} | 99/006 | . . {Providing a combustible mixture inside the cylinder} |
| 15/006 | . {Assembling or mounting of starting devices} | 99/008 | . . {Providing a combustible mixture outside the cylinder} |
| 15/02 | . Gearing between starting-engines and started engines; Engagement or disengagement thereof | 2200/00 | Parameters used for control of starting apparatus |
| 15/021 | . . {the gearing including disengaging starter jaws} | 2200/02 | . said parameters being related to the engine |
| 15/022 | . . {the starter comprising an intermediate clutch} | 2200/021 | . . Engine crank angle |
| 15/023 | . . . {of the overrunning type} | 2200/022 | . . Engine speed |
| 15/025 | . . . {of the friction type} | 2200/023 | . . Engine temperature |
| 15/026 | . . . {of the centrifugal type} | 2200/024 | . . Engine oil temperature |
| 15/027 | . . . {of the pawl type} | 2200/025 | . . Engine oil pressure |
| 15/028 | . . . {of the jaw type} | 2200/026 | . . Catalyst temperature |
| 15/04 | . . the gearing including disengaging toothed gears | 2200/04 | . said parameters being related to the starter motor |
| 15/043 | . . . {the gearing including a speed reducer} | 2200/041 | . . Starter speed |
| 15/046 | {of the planetary type} | 2200/042 | . . Starter torque |
| 15/06 | . . . the toothed gears being moved by axial displacement | 2200/043 | . . Starter voltage |
| 2015/061 | {said axial displacement being limited, e.g. by using a stopper} | 2200/044 | . . Starter current |
| 15/062 | {Starter drives} | 2200/045 | . . Starter temperature or parameters related to it |
| 15/063 | {with resilient shock absorbers} | 2200/046 | . . Energy or power necessary for starting |
| 15/065 | {with blocking means} | 2200/047 | . . Information about pinion position |
| 15/066 | {the starter being of the coaxial type} | 2200/048 | . . Information about pinion speed, both translational or rotational speed |
| 15/067 | {the starter comprising an electro-magnetically actuated lever} | 2200/06 | . said parameters being related to the power supply or driving circuits for the starter |
| 15/068 | {starter drive being actuated by muscular force} | 2200/061 | . . Battery state of charge [SOC] |
| | | 2200/062 | . . Battery current |
| | | 2200/063 | . . Battery voltage |
| | | 2200/064 | . . Battery temperature |
| | | 2200/065 | . . Relay current |
| | | 2200/066 | . . Relay temperature |
| | | 2200/08 | . said parameters being related to the vehicle or its components |

- 2200/0801 . . Vehicle speed
- 2200/0802 . . Transmission state, e.g. gear ratio or neutral state
- 2200/0803 . . Parking brake state
- 2200/0804 . . Temperature inside the vehicle cabin
- 2200/0805 . . Detection of vehicle emergency state, e.g. from ABS, ESP, external sensors
- 2200/0806 . . Air condition state
- 2200/0807 . . Brake booster state
- 2200/0808 . . Steering state, e.g. state of power assisted steering
- 2200/0809 . . Electrical loads
- 2200/0811 . . Heating state
- 2200/0812 . . Power-take-off state
- 2200/0813 . . Windscreen wiper state
- 2200/0814 . . Bonnet switches
- 2200/0815 . . Vehicle door sensors
- 2200/10 . . said parameters being related to driver demands or status
- 2200/101 . . Accelerator pedal position
- 2200/102 . . Brake pedal position
- 2200/103 . . Clutch pedal position
- 2200/104 . . Driver's intention to turn, e.g. by evaluating direction indicators
- 2200/105 . . Driver behaviours or types, e.g. sportive or economic type driver
- 2200/106 . . Driver presence, e.g. detected by door lock, seat sensor or belt sensor
- 2200/12 . . said parameters being related to the vehicle exterior
- 2200/121 . . Atmospheric pressure, e.g. for determination of geodetic height
- 2200/122 . . Atmospheric temperature
- 2200/123 . . Information about vehicle position, e.g. from navigation systems or GPS signals
- 2200/124 . . Information about road conditions, e.g. road inclination or surface
- 2200/125 . . Information about other vehicles, traffic lights or traffic congestion
- 2200/14 . . said parameter being related to wear of starter or other components, e.g. based on total number of starts or age
- 2300/2004 . . using adaptive control
- 2300/2006 . . using prediction of future conditions
- 2300/2008 . . using a model
- 2300/2011 . . Control involving a delay; Control involving a waiting period before engine stop or engine start
- 2300/30 . . characterised by the use of digital means
- 2300/302 . . using data communication
- 2300/304 . . . with other systems inside the vehicle
- 2300/306 . . . with external senders or receivers, e.g. receiving signals from traffic lights, other vehicles or base stations

Muscle-operated starting apparatus

- 2250/00 Problems related to engine starting or engine's starting apparatus**
- 2250/02 . . Battery voltage drop at start, e.g. drops causing ECU reset
- 2250/04 . . Reverse rotation of the engine
- 2250/06 . . Engine stall and related control features, e.g. for automatic restart
- 2250/08 . . Lubrication of starters; Sealing means for starters
- 2300/00 Control related aspects of engine starting**
- 2300/10 . . characterised by the control output, i.e. means or parameters used as a control output or target
- 2300/102 . . Control of the starter motor speed; Control of the engine speed during cranking
- 2300/104 . . Control of the starter motor torque
- 2300/106 . . Control of starter current
- 2300/108 . . Duty cycle control or pulse width modulation [PWM]
- 2300/20 . . characterised by the control method
- 2300/2002 . . using different starting modes, methods, or actuators depending on circumstances, e.g. engine temperature or component wear