

CPC COOPERATIVE PATENT CLASSIFICATION

F MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING (NOTE omitted)

ENGINES OR PUMPS

F02 COMBUSTION ENGINES (cyclically operating valves therefor, lubricating, exhausting, or silencing engines [F01](#)); HOT-GAS OR COMBUSTION-PRODUCT ENGINE PLANTS

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.

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.

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}	15/006	. {Assembling or mounting of starting devices}
11/084	. . . . . {State of vehicle accessories, e.g. air condition or power steering}	15/02	. Gearing between starting-engines and started engines; Engagement or disengagement thereof
11/0844	. . . {with means for restarting the engine directly after an engine stop request, e.g. caused by change of driver mind}	15/021	. . {the gearing including disengaging starter jaws}
11/0848	. . {with means for detecting successful engine start, e.g. to stop starter actuation}	15/022	. . {the starter comprising an intermediate clutch}
11/0851	. . {characterised by means for controlling the engagement or disengagement between engine and starter, e.g. meshing of pinion and engine gear}	15/023	. . . {of the overrunning type}
11/0855	. . . {during engine shutdown or after engine stop before start command, e.g. pre-engagement of pinion}	15/025	. . . {of the friction type}
11/0859	. . {specially adapted to the type of the starter motor or integrated into it}	15/026	. . . {of the centrifugal type}
11/0862	. . {characterised by the electrical power supply means, e.g. battery}	15/027	. . . {of the pawl type}
11/0866	. . . {comprising several power sources, e.g. battery and capacitor or two batteries}	15/028	. . . {of the jaw type}
11/087	. . {Details of the switching means in starting circuits, e.g. relays or electronic switches}	15/04	. . the gearing including disengaging toothed gears
2011/0874	. . . {characterised by said switch being an electronic switch}	15/043	. . . {the gearing including a speed reducer}
2011/0877	. . . {said switch being used as a series-parallel switch, e.g. to switch circuit elements from series to parallel connection}	15/046	. . . . {of the planetary type}
2011/0881	. . {Components of the circuit not provided for by previous groups}	15/06	. . . the toothed gears being moved by axial displacement
2011/0885	. . . {Capacitors, e.g. for additional power supply}	2015/061	. . . . {said axial displacement being limited, e.g. by using a stopper}
2011/0888	. . . {DC/DC converters}	15/062	. . . . {Starter drives}
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}	15/063	. . . . . {with resilient shock absorbers}
2011/0896	. . . {Inverters for electric machines, e.g. starter-generators}	15/065	. . . . . {with blocking means}
11/10	. Safety devices (F02N 11/08 takes precedence)	15/066	. . . . . {the starter being of the coaxial type}
11/101	. . {for preventing engine starter actuation or engagement (preventing unauthorised use or theft of vehicles B60R 25/04)}	15/067	. . . . . {the starter comprising an electro-magnetically actuated lever}
11/103	. . . {according to the vehicle transmission or clutch status}	15/068	. . . . {starter drive being actuated by muscular force}
11/105	. . . {when the engine is already running (F02N 11/0848 takes precedence)}	15/08	. . the gearing being of friction type
11/106	. . {for stopping or interrupting starter actuation}	15/10	. Safety devices not otherwise provided for
11/108	. . {for diagnosis of the starter or its components}		
11/12	. Starting of engines by means of mobile, e.g. portable, starting sets		
11/14	. Starting of engines by means of electric starters with external current supply (F02N 11/12 takes precedence)		
13/00	Starting of engines, or driving of starting apparatus by use of explosives, e.g. stored in cartridges		
13/02	. Cartridges specially adapted therefor (gas cartridges in general F42B 3/04)		
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		
15/003	. {Starters comprising a brake mechanism}		
		19/00	Starting aids for combustion engines, not otherwise provided for
		19/001	. {Arrangements thereof}
		2019/002	. {Aiding engine start by acting on fuel}
		19/004	. {Aiding engine start by using decompression means or variable valve actuation}
		19/005	. {Aiding engine start by starting from a predetermined position, e.g. pre-positioning or reverse rotation}
		2019/007	. . {using inertial reverse rotation}
		2019/008	. . {the engine being stopped in a particular position}
		19/02	. Aiding engine start by thermal means, e.g. using lighted wicks (using electrically-heated glow-plugs F02P 19/02)
		19/04	. . by heating of fluids used in engines (heating of lubricants F01M 5/02)
		19/06	. . . by heating of combustion-air by flame generating means, e.g. flame glow-plugs
		19/08	. . . . Arrangement thereof
		19/10	. . . by heating of engine coolants
		99/00	Subject matter not provided for in other groups of this subclass
		99/002	. {Starting combustion engines by ignition means}
		99/004	. . {Generation of the ignition spark}
		99/006	. . {Providing a combustible mixture inside the cylinder}
		99/008	. . {Providing a combustible mixture outside the cylinder}
		2200/00	Parameters used for control of starting apparatus
		2200/02	. said parameters being related to the engine
		2200/021	. . Engine crank angle

- 2200/022 . . Engine speed
- 2200/023 . . Engine temperature
- 2200/024 . . Engine oil temperature
- 2200/025 . . Engine oil pressure
- 2200/026 . . Catalyst temperature
- 2200/04 . . said parameters being related to the starter motor
- 2200/041 . . Starter speed
- 2200/042 . . Starter torque
- 2200/043 . . Starter voltage
- 2200/044 . . Starter current
- 2200/045 . . Starter temperature or parameters related to it
- 2200/046 . . Energy or power necessary for starting
- 2200/047 . . Information about pinion position
- 2200/048 . . Information about pinion speed, both translational or rotational speed
- 2200/06 . . said parameters being related to the power supply or driving circuits for the starter
- 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

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
- 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