

# 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 ( <a href="#">F02N 11/08</a> takes precedence)	15/066	. . . . . {the starter being of the coaxial type}
11/101	. . {for preventing engine starter actuation or engagement ( <a href="#">preventing unauthorised use or theft of vehicles B60R 25/04</a> )}	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 ( <a href="#">F02N 11/0848</a> 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 ( <a href="#">F02N 11/12</a> takes precedence)		
13/00	<b>Starting of engines, or driving of starting apparatus by use of explosives, e.g. stored in cartridges</b>		
13/02	. Cartridges specially adapted therefor ( <a href="#">gas cartridges in general F42B 3/04</a> )		
15/00	<b>Other power-operated starting apparatus; Component parts, details, or accessories, not provided for in, or of interest apart from groups <a href="#">F02N 5/00</a> - <a href="#">F02N 13/00</a></b>		
15/003	. {Starters comprising a brake mechanism}		
		<b>19/00</b>	<b>Starting aids for combustion engines, not otherwise provided for</b>
		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 ( <a href="#">using electrically-heated glow-plugs F02P 19/02</a> )
		19/04	. . by heating of fluids used in engines ( <a href="#">heating of lubricants F01M 5/02</a> )
		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
		<b>99/00</b>	<b>Subject matter not provided for in other groups of this subclass</b>
		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}
		<b>2200/00</b>	<b>Parameters used for control of starting apparatus</b>
		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