

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

F02N STARTING OF COMBUSTION ENGINES; 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

- 9/04 . the pressure fluid being generated otherwise, e.g. by compressing air

11/00 Starting of engines by means of electric motors

- 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}

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](#))

11/0855	. . . {during engine shutdown or after engine stop before start command, e.g. pre-engagement of pinion}	15/06	. . . the toothed gears being moved by axial displacement
11/0859	. . {specially adapted to the type of the starter motor or integrated into it}	2015/061	. . . . {said axial displacement being limited, e.g. by using a stopper}
11/0862	. . {characterised by the electrical power supply means, e.g. battery}	15/062	. . . . {Starter drives}
11/0866	. . . {comprising several power sources, e.g. battery and capacitor or two batteries}	15/063	. . . . {with resilient shock absorbers}
11/087	. . {Details of the switching means in starting circuits, e.g. relays or electronic switches}	15/065	. . . . {with blocking means}
2011/0874	. . . {characterised by said switch being an electronic switch}	15/066	. . . . {the starter being of the coaxial type}
2011/0877	. . . {said switch being used as a series-parallel switch, e.g. to switch circuit elements from series to parallel connection}	15/067	. . . . {the starter comprising an electro-magnetically actuated lever}
2011/0881	. . {Components of the circuit not provided for by previous groups}	15/068	. . . . {starter drive being actuated by muscular force}
2011/0885	. . . {Capacitors, e.g. for additional power supply}	15/08	. . the gearing being of friction type
2011/0888	. . . {DC/DC converters}	15/10	. Safety devices not otherwise provided for
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}		
2011/0896	. . . {Inverters for electric machines, e.g. starter-generators}		
11/10	. Safety devices (F02N 11/08 takes precedence)	19/00	Starting aids for combustion engines, not otherwise provided for
11/101	. . {for preventing engine starter actuation or engagement}	19/001	. {Arrangements thereof}
11/103	. . . {according to the vehicle transmission or clutch status}	2019/002	. {Aiding engine start by acting on fuel}
11/105	. . . {when the engine is already running (F02N 11/0848 takes precedence)}	19/004	. {Aiding engine start by using decompression means or variable valve actuation}
11/106	. . {for stopping or interrupting starter actuation}	19/005	. {Aiding engine start by starting from a predetermined position, e.g. pre-positioning or reverse rotation}
11/108	. . {for diagnosis of the starter or its components}	2019/007	. . {using inertial reverse rotation}
11/12	. Starting of engines by means of mobile, e.g. portable, starting sets	2019/008	. . {the engine being stopped in a particular position}
11/14	. Starting of engines by means of electric starters with external current supply (F02N 11/12 takes precedence)	19/02	. Aiding engine start by thermal means, e.g. using lighted wicks
13/00	Starting of engines, or driving of starting apparatus by use of explosives, e.g. stored in cartridges	19/04	. . by heating of fluids used in engines
13/02	. Cartridges specially adapted therefor	19/06	. . . by heating of combustion-air by flame generating means, e.g. flame glow-plugs
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	19/08	. . . . Arrangement thereof
15/003	. {Starters comprising a brake mechanism}	19/10	. . . by heating of engine coolants
15/006	. {Assembling or mounting of starting devices}	99/00	Subject matter not provided for in other groups of this subclass
15/02	. Gearing between starting-engines and started engines; Engagement or disengagement thereof	99/002	. {Starting combustion engines by ignition means}
15/021	. . {the gearing including disengaging starter jaws}	99/004	. . {Generation of the ignition spark}
15/022	. . {the starter comprising an intermediate clutch}	99/006	. . {Providing a combustible mixture inside the cylinder}
15/023	. . . {of the overrunning type}	99/008	. . {Providing a combustible mixture outside the cylinder}
15/025	. . . {of the friction type}	2200/00	Parameters used for control of starting apparatus
15/026	. . . {of the centrifugal type}	2200/02	. said parameters being related to the engine
15/027	. . . {of the pawl type}	2200/021	. . Engine crank angle
15/028	. . . {of the jaw type}	2200/022	. . Engine speed
15/04	. . the gearing including disengaging toothed gears	2200/023	. . Engine temperature
15/043	. . . {the gearing including a speed reducer}	2200/024	. . Engine oil temperature
15/046	. . . . {of the planetary type}	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	2300/102	. . Control of the starter motor speed; Control of the engine speed during cranking
2200/061	. . Battery state of charge [SOC]	2300/104	. . Control of the starter motor torque
2200/062	. . Battery current	2300/106	. . Control of starter current
2200/063	. . Battery voltage	2300/108	. . Duty cycle control or pulse width modulation [PWM]
2200/064	. . Battery temperature	2300/20	. characterised by the control method
2200/065	. . Relay current	2300/202	. . using different starting modes, methods, or actuators depending on circumstances, e.g. engine temperature or component wear
2200/066	. . Relay temperature	2300/2004	. . using adaptive control
2200/08	. said parameters being related to the vehicle or its components	2300/2006	. . using prediction of future conditions
2200/0801	. . Vehicle speed	2300/2008	. . using a model
2200/0802	. . Transmission state, e.g. gear ratio or neutral state	2300/2011	. . Control involving a delay; Control involving a waiting period before engine stop or engine start
2200/0803	. . Parking brake state	2300/30	. characterised by the use of digital means
2200/0804	. . Temperature inside the vehicle cabin	2300/302	. . using data communication
2200/0805	. . Detection of vehicle emergency state, e.g. from ABS, ESP, external sensors	2300/304	. . . with other systems inside the vehicle
2200/0806	. . Air condition state	2300/306	. . . with external senders or receivers, e.g. receiving signals from traffic lights, other vehicles or base stations
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