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

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**

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}
2011/0877 . . . {said switch being used as a series-parallel switch, e.g. to switch circuit elements from series to parallel connection}
2011/0881 . . {Components of the circuit not provided for by previous groups}
2011/0885 . . . {Capacitors, e.g. for additional power supply}
2011/0888 . . . {DC/DC converters}
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)
11/101 . . {for preventing engine starter actuation or engagement}
11/103 . . . {according to the vehicle transmission or clutch status}
11/105 . . . {when the engine is already running (F02N 11/0848 takes precedence)}
11/106 . . {for stopping or interrupting starter actuation}
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

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}
15/006 . {Assembling or mounting of starting devices}
15/02 . Gearing between starting-engines and started engines; Engagement or disengagement thereof
15/021 . . {the gearing including disengaging starter jaws}
15/022 . . {the starter comprising an intermediate clutch}
15/023 . . . {of the overrunning type}
15/025 . . . {of the friction type}
15/026 . . . {of the centrifugal type}
15/027 . . . {of the pawl type}
15/028 . . . {of the jaw type}
15/04 . . the gearing including disengaging toothed gears
15/043 . . . {the gearing including a speed reducer}
15/046 . . . . {of the planetary type}
15/06 . . . the toothed gears being moved by axial displacement
2015/061 . . . . {said axial displacement being limited, e.g. by using a stopper}
15/062 . . . . {Starter drives}
15/063 . . . . . {with resilient shock absorbers}
15/065 . . . . . {with blocking means}
15/066 . . . . {the starter being of the coaxial type}
15/067 . . . . {the starter comprising an electro-magnetically actuated lever}
15/068 . . . . {starter drive being actuated by muscular force}
15/08 . . the gearing being of friction type
15/10 . Safety devices not otherwise provided for

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
19/04 . . by heating of fluids used in engines
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