**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 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**

<table>
<thead>
<tr>
<th>9/00</th>
<th>Starting of engines by supplying auxiliary pressure fluid to their working chambers</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/02</td>
<td>the pressure fluid being generated directly by combustion (by using explosive cartridges F02N 13/00)</td>
</tr>
<tr>
<td>9/04</td>
<td>the pressure fluid being generated otherwise, e.g. by compressing air</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>11/00</th>
<th>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)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11/003</td>
<td>[said electric motor being also used as a drive for auxiliaries, e.g. for driving transmission pumps or fuel pumps during engine stop]</td>
</tr>
<tr>
<td>11/006</td>
<td>[using a plurality of electric motors]</td>
</tr>
<tr>
<td>11/02</td>
<td>the motors having longitudinally-shiftable rotors</td>
</tr>
<tr>
<td>11/04</td>
<td>the motors being associated with current generators</td>
</tr>
<tr>
<td>11/06</td>
<td>[and with ignition apparatus]</td>
</tr>
<tr>
<td>11/08</td>
<td>Circuits (or control means) specially adapted for starting of engines</td>
</tr>
</tbody>
</table>

| 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)] |
Power-operated starting apparatus; Muscle-operated starting apparatus with intermediate power storage

11/037 . . . . (Environmental conditions thereof, e.g. traffic, weather or road conditions)
11/084 . . . . (State of vehicle accessories, e.g. air condition or power steering)
11/044 . . . . [with means for restarting the engine directly after an engine stop request, e.g. caused by change of driver mind]
11/048 . . . . [with means for detecting successful engine start, e.g. to stop starter actuation]
11/051 . . . . [characterised by means for controlling the engagement or disengagement between engine and starter, e.g. meshing of pinion and engine gear]
11/055 . . . . [during engine shutdown or after engine stop before start command, e.g. pre-engagement of pinion]
11/059 . . . . [specially adapted to the type of the starter motor or integrated into it]
11/062 . . . . [characterised by the electrical power supply means, e.g. battery]
11/066 . . . . [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]
2011/074 . . . . [characterised by said switch being an electronic switch]
2011/077 . . . . [said switch being used as a series-parallel switch, e.g. to switch circuit elements from series to parallel connection]
2011/081 . . . . [Components of the circuit not provided for by previous groups]
2011/085 . . . . [Capacitors, e.g. for additional power supply]
2011/088 . . . . [DC/DC converters]
2011/092 . . . . [Two coils being used in the starting circuit, e.g. in two windings in the starting relay or two field windings in the starter]
2011/096 . . . . [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 (preventing unauthorised use or theft of vehicles B60R 25/04)]
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 (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]
said parameters being related to the starter motor
2200/04 . said parameters being related to the power supply or driving circuits for the starter
2200/06 . said parameters being related to the vehicle or its components
2200/08 . said parameters being related to driver demands or status
2200/10 . said parameters being related to the vehicle exterior
2200/12 . said parameters being related to the starter motor
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**
2300/02 . Control of the starter motor speed; Control of the engine speed during cranking
2300/04 . Control of the starter motor torque
2300/06 . Control of starter current
2300/08 . Duty cycle control or pulse width modulation [PWM]
2300/10 . characterised by the control output, i.e. means or parameters used as a control output or target
2300/12 . using adaptive control
2300/14 . using prediction of future conditions
2300/20 . using different starting modes, methods, or actuators depending on circumstances, e.g. engine temperature or component wear
2300/22 . using a model
2300/24 . Control involving a delay; Control involving a waiting period before engine stop or engine start
2300/26 . characterised by the use of digital means
2300/30 . using data communication
2300/32 . with other systems inside the vehicle
2300/34 . with external senders or receivers, e.g. receiving signals from traffic lights, other vehicles or base stations

**2300/36**
2300/38 . said parameter being related to wear of starter or other components, e.g. based on total number of starts or age

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