

## 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**

### Definition statement

*This place covers:*

Devices and methods for initiating operation of machines using oxidation of a fuel.

### References

#### Limiting references

*This place does not cover:*

Starting of free-piston combustion engines	<a href="#">F02B 71/02</a>
starting of gas-turbine plants	<a href="#">F02C 7/26</a>

## F02N 1/00

**Starting apparatus having hand cranks (with intermediate power storage [F02N 5/00](#) - [F02N 15/00](#))**

### Definition statement

*This place covers:*

Starting apparatus having hand cranks.

In old vehicles the engine was started using hand cranks. Nowadays these are limited to special applications like some airplanes

### References

#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Starting apparatus having mechanical power storage	<a href="#">F02N 5/00</a>
Starting apparatus having fluid-driven auxiliary engines or apparatus	<a href="#">F02N 7/00</a>
Starting of engines by supplying auxiliary pressure fluid to their working chambers	<a href="#">F02N 9/00</a>
Starting of engines by means of electric motors	<a href="#">F02N 11/00</a>
Starting of engines, or driving of starting apparatus by use of explosives	<a href="#">F02N 13/00</a>
Other power-operated starting apparatus	<a href="#">F02N 15/00</a>

**F02N 3/00****Other muscle-operated starting apparatus (with intermediate power storage  
[F02N 5/00](#) - [F02N 15/00](#))****Definition statement**

*This place covers:*

Starting of engines achieved by manual actuation by the operator

**References****Limiting references**

*This place does not cover:*

With intermediate power storage	<a href="#">F02N 5/00</a> - <a href="#">F02N 15/00</a>
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**Informative references**

*Attention is drawn to the following places, which may be of interest for search:*

Starting using hand cranks	<a href="#">F02N 1/00</a>
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**F02N 3/02****having pull-cords****Definition statement**

*This place covers:*

Pull-cord actuated starting, e.g. recoil mechanisms used in lawn mowers.

**F02N 3/04****having foot-actuated levers****Definition statement**

*This place covers:*

Kick starters for motorbikes and similar arrangements

**F02N 5/00****Starting apparatus having mechanical power storage****Definition statement**

*This place covers:*

Starting apparatus having mechanical power storage

**F02N 5/02****of spring type****Definition statement**

*This place covers:*

Starting apparatus, whereby the energy for starting is at least partially stored in a spring and subsequently released to effect starting.

**F02N 5/04****of inertia type****Definition statement**

*This place covers:*

Starting apparatus, whereby the energy for starting is stored in moving parts. This can be the engine flywheel. Also covers the connection of the engine via the clutch to the wheels of a moving vehicle to accelerate the engine for starting (e.g. in hybrid vehicles) and the acceleration of the starter before the starter and the engine are connected.

**F02N 7/00****Starting apparatus having fluid-driven auxiliary engines or apparatus****Definition statement**

*This place covers:*

Starting apparatus, starting of engine by using auxiliary engine or hydraulic motors, e.g. air motor.

**F02N 9/00****Starting of engines by supplying auxiliary pressure fluid to their working chambers****Definition statement**

*This place covers:*

Supply of high pressure fluid to engine to achieve engine start.

**F02N 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](#))****Definition statement**

*This place covers:*

The usual way to start an engine is to use one or more electric motors.

**Special rules of classification**

Subgroups also cover control of engine starting.

**F02N 11/04****the motors being associated with current generators****Definition statement***This place covers:*

The starter is also used as a generator during normal engine running. Normally called starter/generator or starter/alternator.

**F02N 11/06****and with ignition apparatus****Definition statement***This place covers:*

Starting apparatus with ignition apparatus.

**F02N 11/08****Circuits {or control means} specially adapted for starting of engines****Definition statement***This place covers:*

Circuits or control means specially adapted for starting engines; Starting apparatus.

**F02N 11/0803****{characterised by means for initiating engine start or stop ([F02N 11/0814](#) takes precedence)}****Definition statement***This place covers:*

Means to initiate the engine start, could be related to specific arrangements of ignition switches but also automatic restart at engine stall or based on temperature measurements, both in driver cabin (for trucks) and engine temperature.

Furthermore automatically stopping the engine at extended idling (important for the US) or after they have been automatically started.

**References****Limiting references***This place does not cover:*

Arrangements for automatically starting and stopping engine during idling, e.g. at vehicle stop	<a href="#">F02N 11/0814</a>
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**Informative references***Attention is drawn to the following places, which may be of interest for search:*

Ignition switches	<a href="#">H01N27/06</a>
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### Special rules of classification

Safety means, especially for preventing engine start for safety reasons, should additionally be classified in [F02N 11/10](#)

### F02N 11/0807

{Remote means}

#### Definition statement

*This place covers:*

Automatic engine start using a remote, popular especially in the US to preheat the vehicle or the engine.

### F02N 11/0814

{comprising means for controlling automatic idle-start-stop}

#### Definition statement

*This place covers:*

Starting apparatus comprising means for controlling automatic idle-start-stop.

Starting apparatus with a start-stop system wherein the engine is automatically stopped when the vehicle has stopped at e.g. a traffic light. The engine will then be automatically restarted based on driver's intention to continue driving or based on system requirements.

### F02N 11/0822

{related to action of the driver}

#### Definition statement

*This place covers:*

Means for detecting driver's will to continue driving or to maintain current vehicle position.

### F02N 11/0825

{related to prevention of engine restart failure, e.g. disabling automatic stop at low battery state}

#### Definition statement

*This place covers:*

Means not allowing automatic engine stop if restart cannot be guaranteed, e.g. at low battery or starter failure.

**F02N 11/0829**

**{related to special engine control, e.g. giving priority to engine warming-up or learning}**

**Definition statement**

*This place covers:*

Means prohibiting automatic stop is if engine running is required for other reasons related to the engine, e.g. for adaptation, cleaning of catalyts or purging of fuel vapors.

**F02N 11/084**

**{State of vehicle accessories, e.g. air condition or power steering}**

**Definition statement**

*This place covers:*

The engine is automatically started (or not stopped) if the engine running is required to support vehicle accessories.

**References****Informative references**

*Attention is drawn to the following places, which may be of interest for search:*

Engine is started if battery charge is low	<a href="#">F02N 11/0825</a>
Engine running is required for engine related aspects	<a href="#">F02N 11/0829</a>

**F02N 11/0844**

**{with means for restarting the engine directly after an engine stop request, e.g. caused by change of driver mind}**

**Definition statement**

*This place covers:*

Means restarting engine when engine is still rotating.

**References****Informative references**

*Attention is drawn to the following places, which may be of interest for search:*

Control of engagement between starter pinion and engine gear while engine is still rotating	<a href="#">F02N 11/0855</a>
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**F02N 11/0848**

**{with means for detecting successful engine start, e.g. to stop starter actuation}**

**Definition statement**

*This place covers:*

Means for detecting successful engine start, e.g. to stop starter actuation; Means detecting when the engine has started, e.g. to stop the starter or for other engine control.

**F02N 11/0851**

**{characterised by means for controlling the engagement or disengagement between engine and starter, e.g. meshing of pinion and engine gear}**

**Definition statement**

*This place covers:*

Means for controlling the engagement or disengagement between engine and starter, e.g. meshing of pinion and engine gear; Control or circuit aspects for connecting the starter and the engine, mainly starters using pinions.

**References****Informative references**

*Attention is drawn to the following places, which may be of interest for search:*

More mechanical aspects concerning the connection between the engine and the starter	<a href="#">F02N 15/02</a>
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**F02N 11/0855**

**{during engine shutdown or after engine stop before start command, e.g. pre-engagement of pinion}**

**Definition statement**

*This place covers:*

Engagement of pinion while the engine is still rotating, e.g. by accelerating starter first and thereafter engage the pinion with the engine gear.

Also engaging the pinion when the engine has stopped but when no engine start request has been detected. This can be done when future engine start is likely, e.g. based on vehicle door opening.

**F02N 11/0859**

**{specially adapted to the type of the starter motor or integrated into it}**

**Definition statement**

*This place covers:*

All circuits specially adapted to a certain type of motor, e.g. all inverter circuits are inside here.

## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Starter/generators	<a href="#">F02N 11/04</a>
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## F02N 11/0862

{characterised by the electrical power supply means, e.g. battery}

### Definition statement

*This place covers:*

Anything related to the battery or other means for supplying energy for starting.

## F02N 11/0866

{comprising several power sources, e.g. battery and capacitor or two batteries}

### Definition statement

*This place covers:*

Everything related to the use of two batteries or power supplies in a vehicle in relation with starting:

- choice of battery;
- one battery for starting and one battery for accessories;
- capacitor charging, e.g. before engine start.

## F02N 11/10

Safety devices ([F02N 11/08](#) takes precedence)

### Definition statement

*This place covers:*

Safety devices; diagnosis of starters.

## References

### Limiting references

*This place does not cover:*

Circuits or control means specially adapted for starting engines	<a href="#">F02N 11/08</a>
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## F02N 11/101

{for preventing engine starter actuation or engagement (preventing unauthorised use or theft of vehicles [B60R 25/04](#))}

### Definition statement

*This place covers:*

Devices prohibiting engine start, and therefore the starter actuation, in order to protect the engine, the starter or the environment.



## References

### *Informative references*

Attention is drawn to the following places, which may be of interest for search:

Preventing unauthorised use or theft of vehicle	<a href="#">B60R 25/04</a>
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## F02N 11/105

{when the engine is already running ([F02N 11/0848](#) takes precedence)}

### Definition statement

*This place covers:*

Devices preventing new starter actuation when the engine is already or still running in order to protect the starter, e.g. the pinion.

## References

### *Limiting references*

*This place does not cover:*

With means for detecting successful engine start	<a href="#">F02N 11/0848</a>
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## F02N 13/00

Starting of engines, or driving of starting apparatus by use of explosives, e.g. stored in cartridges

### Definition statement

*This place covers:*

Systems or Methods for starting combustion engines moved by explosive mixture other than the combustion mixture, in particular explosive cartridges. It could be either portable or constructional fixed to the engine. This is e.g. the case for model cars

## F02N 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](#)

### Definition statement

*This place covers:*

Covers all remaining aspects of starting devices, especially the connection between the starting apparatus and the engine.

**F02N 15/02**

**Gearing between starting-engines and started engines; Engagement or disengagement thereof**

**Definition statement**

*This place covers:*

Connections between the engine and the starting means.

**F02N 15/04**

**the gearing including disengaging toothed gears**

**Definition statement**

*This place covers:*

The gearing between the engine and the starting means (mainly starter) is disengaged.

**References****Informative references**

*Attention is drawn to the following places, which may be of interest for search:*

Electrical or electronical control of the engagement and disengagement and circuits therefore	<a href="#">F02N 11/0851</a>
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**F02N 19/00**

**Starting aids for combustion engines, not otherwise provided for**

**Definition statement**

*This place covers:*

Starting aids; means for aiding engine start.

**F02N 19/004**

**{Aiding engine start by using decompression means or variable valve actuation}**

**Definition statement**

*This place covers:*

Means for reduction of the necessary torque for starting using decompression valves or variable intake or exhaust valve actuation

**F02N 19/005**

**{Aiding engine start by starting from a predetermined position, e.g. pre-positioning or reverse rotation}**

**Definition statement**

*This place covers:*

Means for reducing torque needed to start the engine taking into account engine crank angle, e.g. by moving the engine to a certain position the necessary torque can be reduced.

**F02N 19/02**

**Aiding engine start by thermal means, e.g. using lighted wicks (using electrically-heated glow-plugs [F02P 19/02](#))**

**Definition statement**

*This place covers:*

Heating the engine or its components prior to engine start.

**References****Informative references**

*Attention is drawn to the following places, which may be of interest for search:*

Control of glow plugs	<a href="#">F02P 19/02</a>
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**F02N 99/00**

**Subject matter not provided for in other groups of this subclass**

**Definition statement**

*This place covers:*

Subject matter not provided for in other groups of this subclass.

**F02N 99/002**

**{Starting combustion engines by ignition means}**

**Definition statement**

*This place covers:*

So-called direct start by injecting fuel into one engine cylinder and igniting it, can be without or combined with starter actuation.

**F02N 99/006**

**{Providing a combustible mixture inside the cylinder}**

**Definition statement**

*This place covers:*

Starting whereby the fuel is injected directly into the combustion chamber and then ignited to achieve engine start.