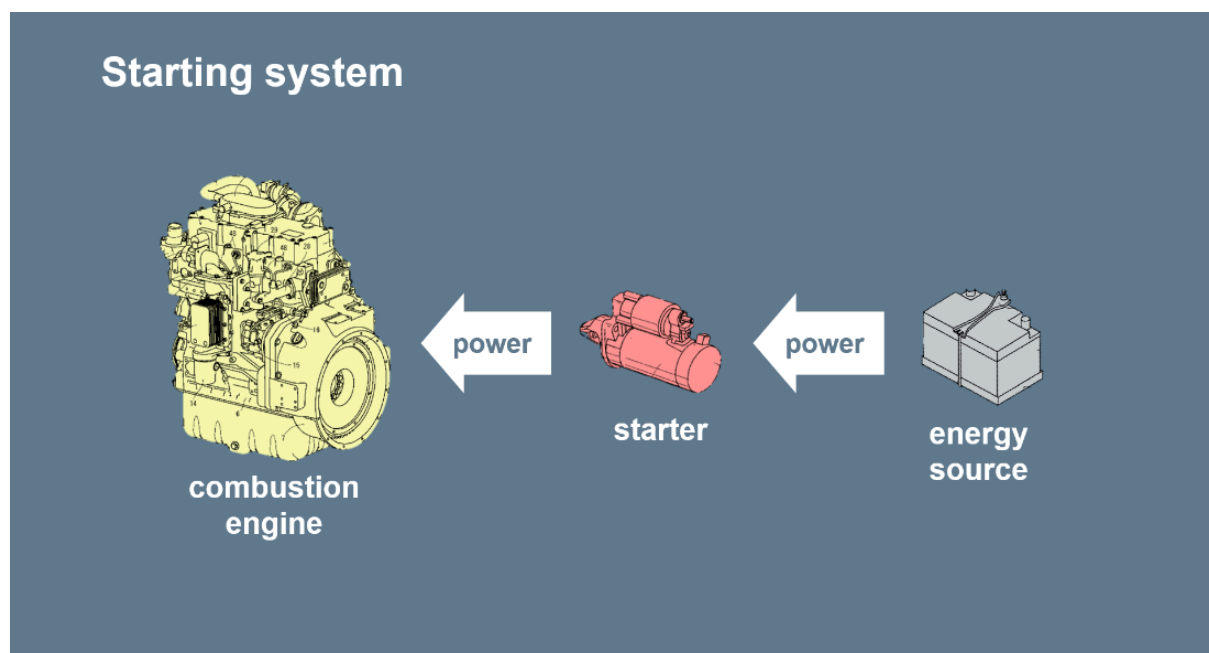


F02N**STARTING OF COMBUSTION ENGINES; STARTING AIDS FOR SUCH ENGINES, NOT OTHERWISE PROVIDED FOR****Definition statement**

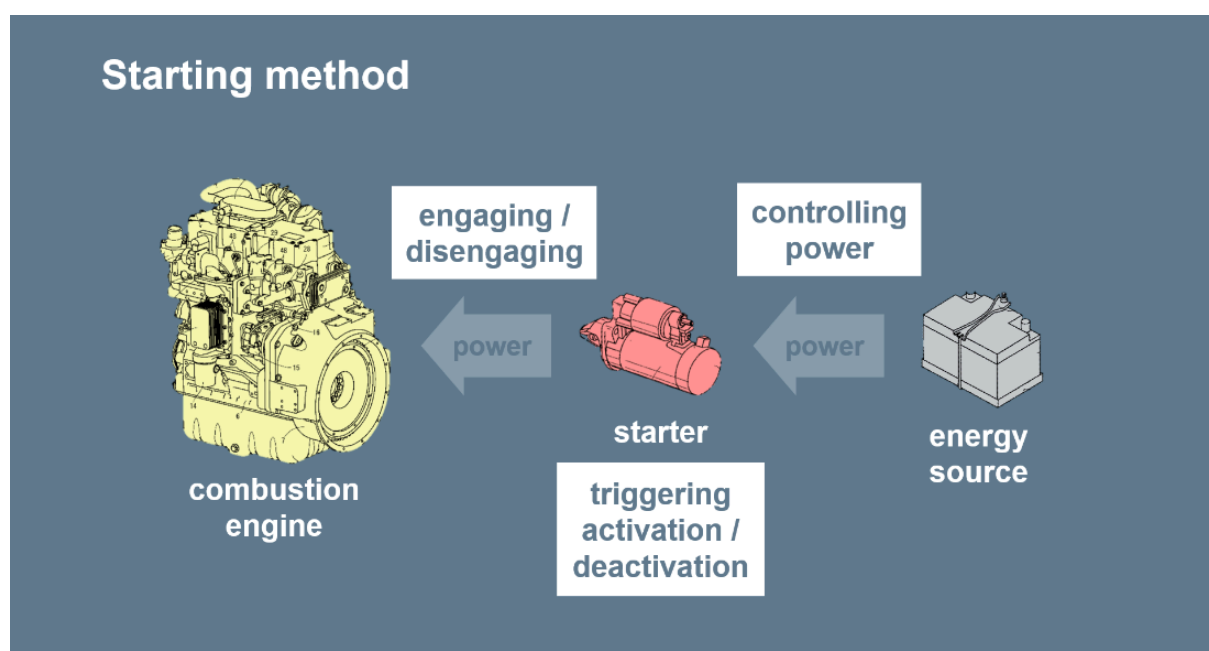
This place covers:

Illustrative examples of subject matter classified in this place:

1.



2.



References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Ground or aircraft-carrier-deck installations for starting aircraft propulsion plant	B64F 1/34
Starting of free-piston combustion engines	F02B 71/02
Starting of gas-turbine plants	F02C 7/26

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

Limiting references

This place does not cover:

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

F02N 1/005

{Safety means ([F02N 1/02](#) takes precedence)}

Definition statement

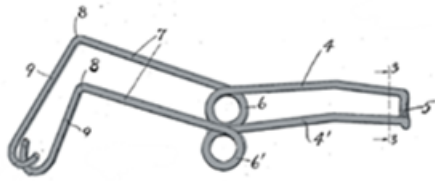
This place covers:

Safety arrangements of starting apparatus having hand cranks to reduce damage to the system (not necessarily to the operator).

Illustrative example of subject matter classified in this place:

Definition statement

1a. Resilient crank holder



1b. Crankshaft with resilient crank holder

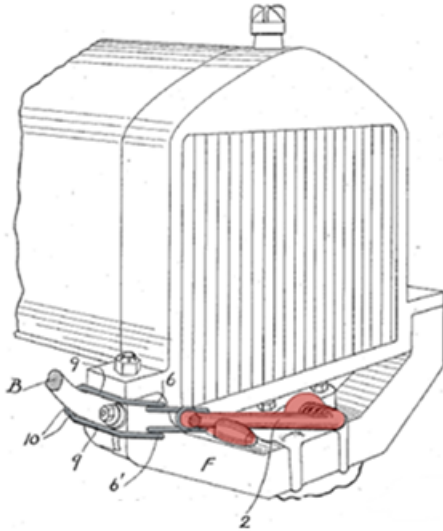


Figure 1b illustrates the resilient crank holder of Figure 1a connected to starter crank (2) and headlight bracket (B) for securing the starter crank (2) when not in use.

References

Limiting references

This place does not cover:

Safety means preventing damage caused by reverse rotation

F02N 1/02

F02N 1/02

having safety means preventing damage caused by reverse rotation

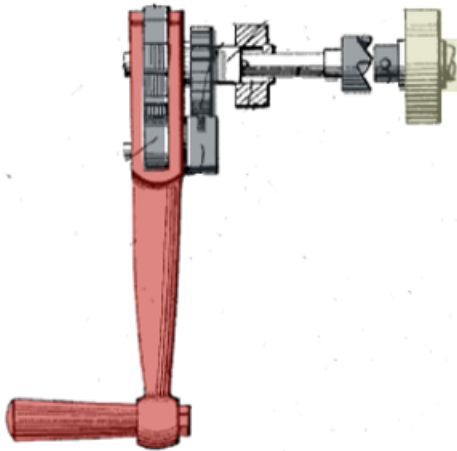
Definition statement

This place covers:

- Safety arrangements for preventing reverse rotations during start;
- Safety arrangements for reducing hazard for the person trying to start the engine.

Illustrative example of subject matter classified in this place:

1a. Crank assembly with unidirectional gearing (side view)



1b. Crank assembly with unidirectional gearing (front view)



References

Informative references

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

Gearing between starting-engines and started engines, the gearing including disengaging starter jaws	F02N 15/021
Starter comprising an intermediate clutch of the pawl type	F02N 15/027

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:

Muscle-operated starting apparatus with intermediate power storage	F02N 5/00 - F02N 15/00
--	--

Informative references

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

Starting apparatus having hand cranks	F02N 1/00
---------------------------------------	---------------------------

F02N 3/02

having pull-cords

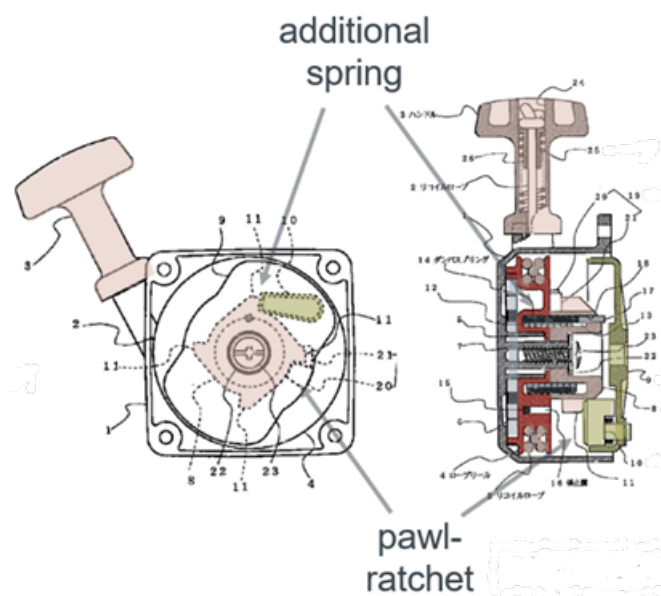
Definition statement

This place covers:

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

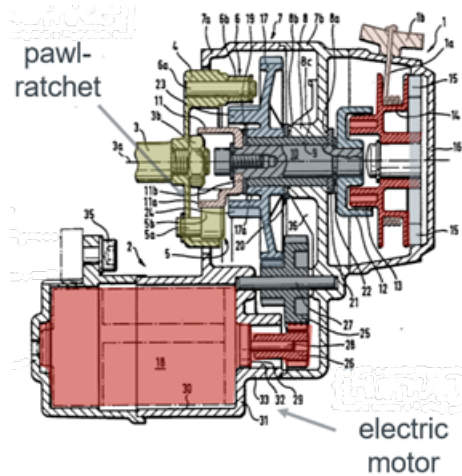
Illustrative examples of subject matter classified in this place:

1.



Definition statement

2.



References

Informative references

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

Toothed gear type starter drives with resilient shock absorbers	F02N 15/063
---	-----------------------------

Special rules of classification

Combinations of pull-cord actuated starting apparatus with other starting means are classified by allocating [F02N 3/02](#) as well as the symbol corresponding to said other starting means, e.g. [F02N 5/00](#) for intermediate mechanical power storage or [F02N 11/00](#) for electric motors.

F02N 3/04

having foot-actuated levers

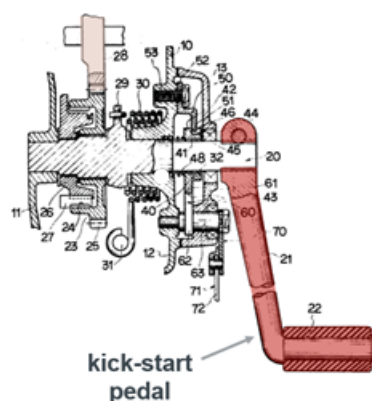
Definition statement

This place covers:

- Kick starters for motorbikes and similar arrangements;
- Hand-actuated levers.

Illustrative examples of subject matter classified in this place:

1.



Definition statement

2.

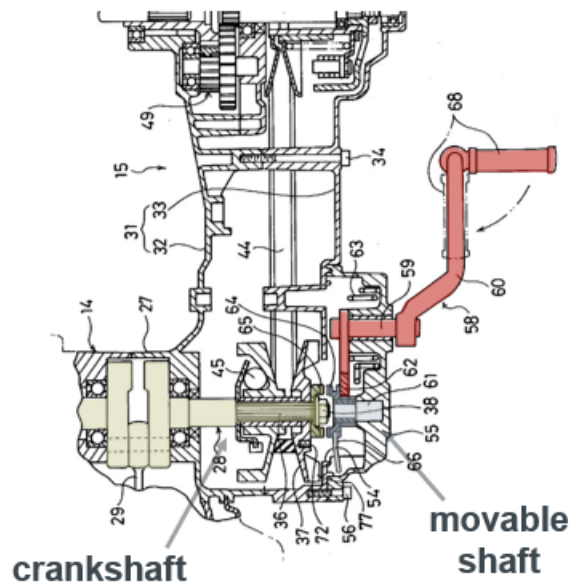


Figure 2 illustrates a kick starter having two ratchet gears (64, 65) selectively connecting the kickstart lever to the combustion engine, wherein said ratchet gears (64, 65) are mounted on two different coaxial shafts and move to engage each other.

3.

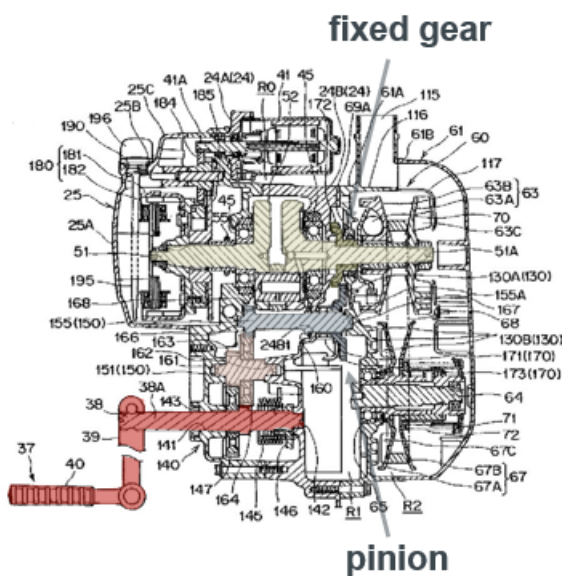


Figure 3 illustrates a kick starter having two ratchet gears (pinion 170, fixed gear 172) selectively connecting the kickstart lever to a combustion engine, wherein said ratchet gears are mounted on two different eccentric shafts and move to engage each other.

4.

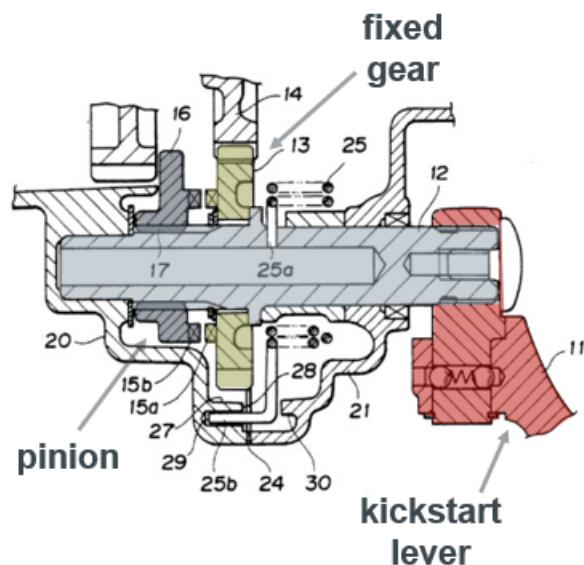


Figure 4 illustrates a kick starter having two ratchet gears (pinion 13, gear 16) selectively connecting the kickstart lever to the combustion engine, wherein said ratchet gears are mounted on the same shaft and move to engage each other.

References

Informative references

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

Starter comprising an intermediate clutch of the jaw type	F02N 15/028
---	-----------------------------

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

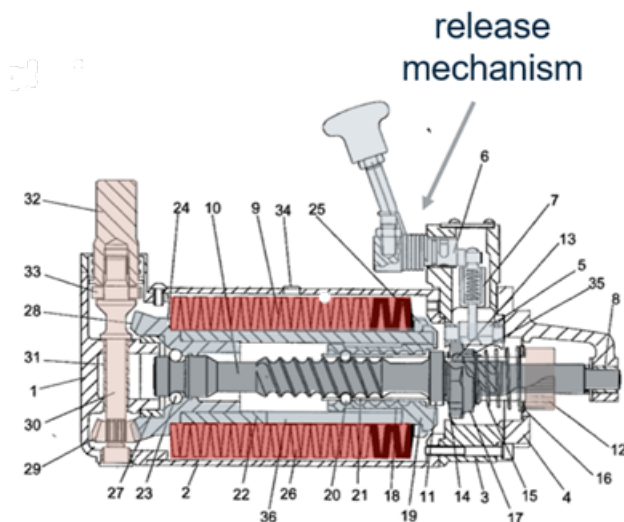
Definition statement

This place covers:

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

Definition statement

Illustrative example of subject matter classified in this place:



References

Informative references

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

Muscle-operated starting apparatus having foot-actuated levers	F02N 3/04
--	---------------------------

F02N 5/04

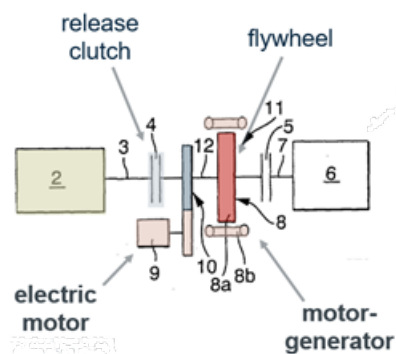
of inertia type

Definition statement

This place covers:

- Starting apparatus, whereby the energy for starting is stored in moving parts (e.g. the engine flywheel);
- Using the vehicle inertia to start the engine;
- 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;
- Acceleration of the starter before the starter and the engine are connected.

Illustrative example of subject matter classified in this place:



The Figure illustrates a powertrain for a motor vehicle comprising an engine (2) connected to a flywheel (11) by crankshaft (3) for storing mechanical energy via flywheel (11).

Special rules of classification

When the initial source of power is an electric motor, then additional classification should be given in [F02N 11/00](#).

F02N 7/00

Starting apparatus having fluid-driven auxiliary engines or apparatus

Definition statement

This place covers:

Starting apparatus having fluid-driven auxiliary engines or apparatus, e.g. hydraulic or air motors.

F02N 7/02

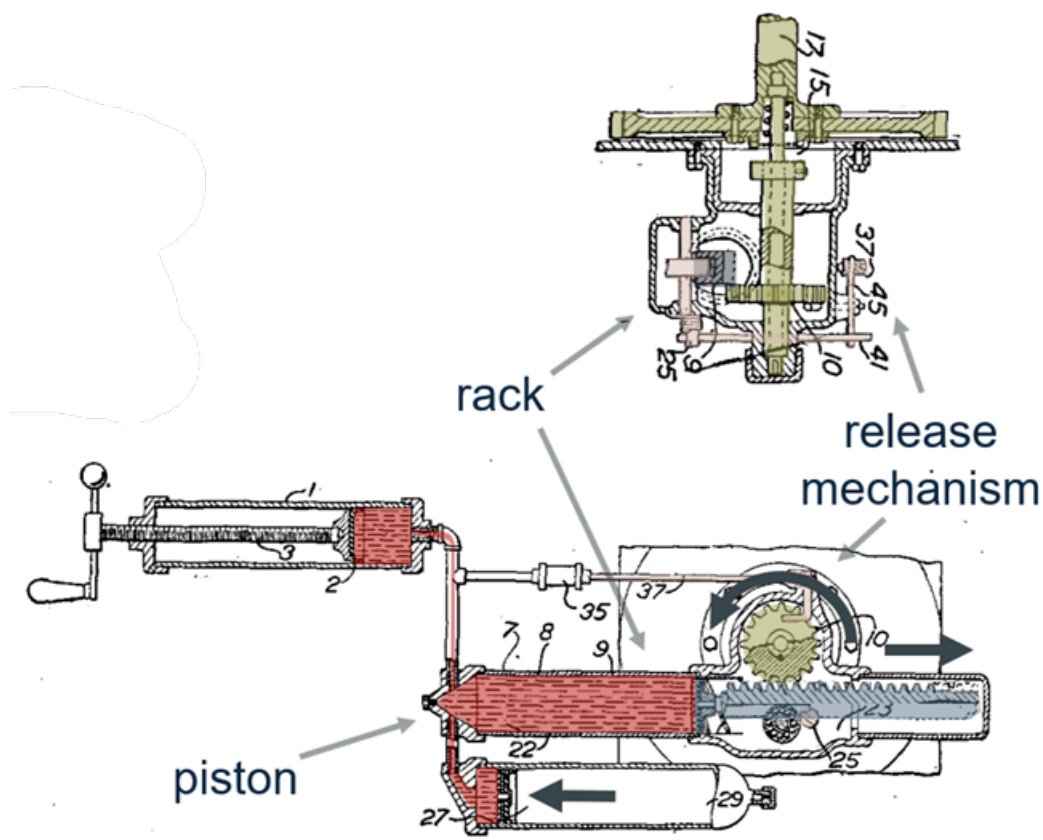
the apparatus being of single-stroke piston type, e.g. pistons acting on racks or pull-cords

Definition statement

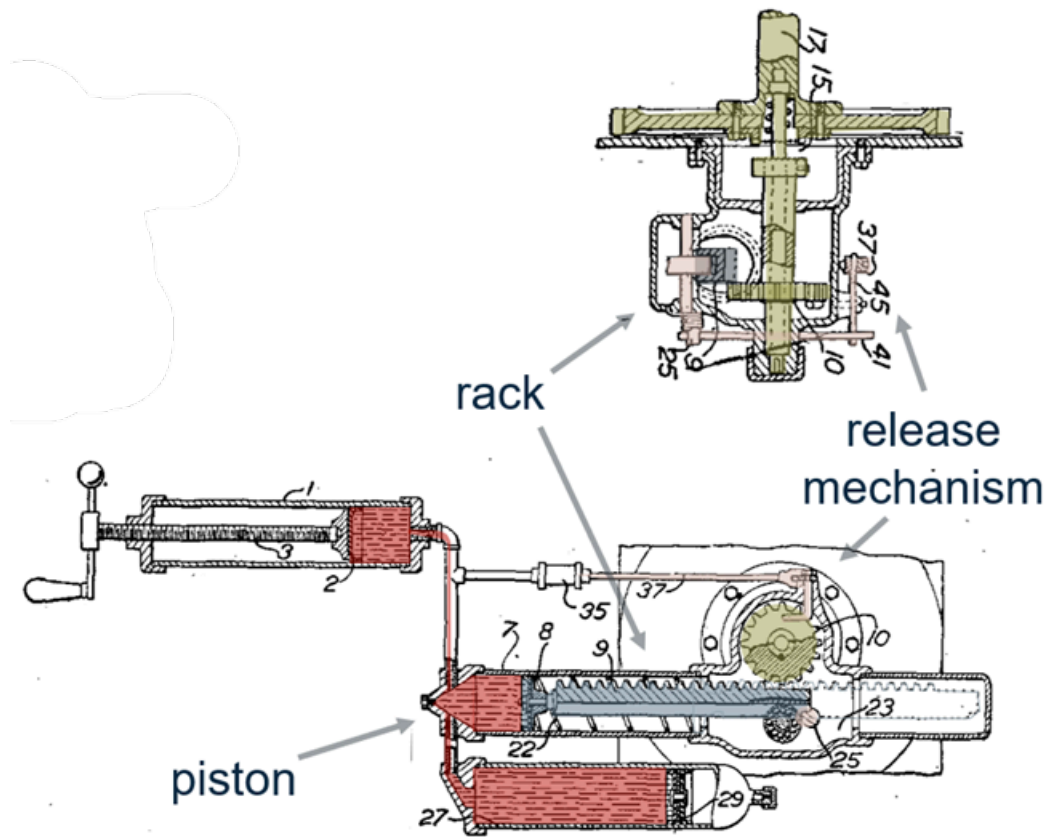
This place covers:

Illustrative examples of subject matter classified in this place:

1a.



1b.



2a. Hydraulic starting device (front view)

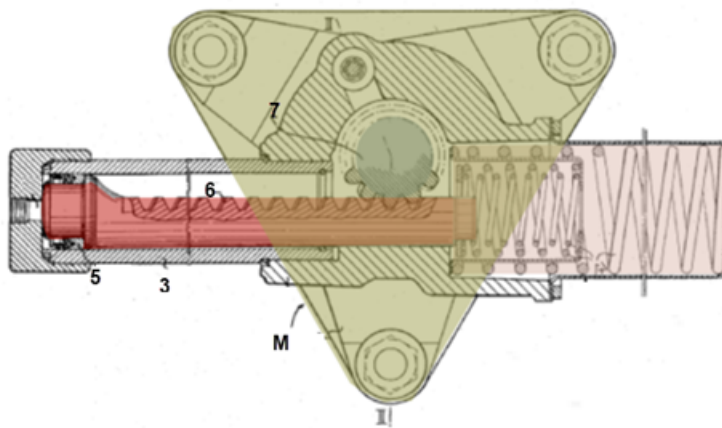


Figure 2a illustrates a fluid operated hydraulic jack (3) with a toothed rack (6) highlighted in red that forms a threaded connection with a rotary pinion (7) for starting a motor (M).

Definition statement

2b. Fluid feed and return system for hydraulic starting device (top view)

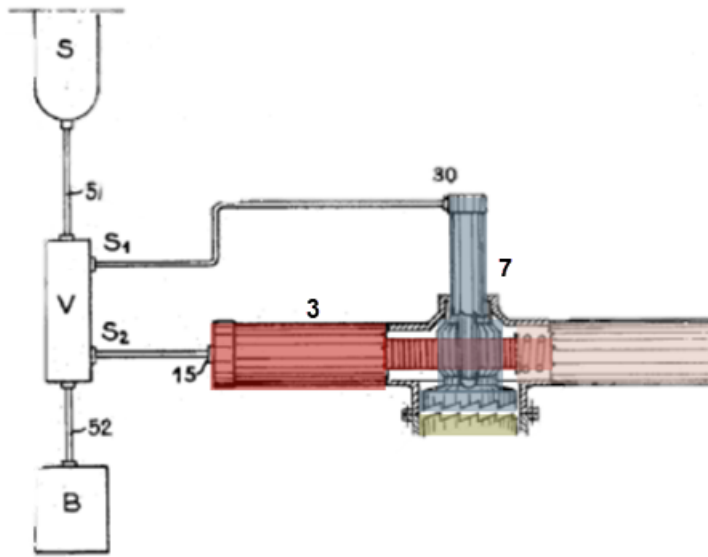


Figure 2b illustrates a hydraulic circuit with a source of hydraulic pressure (S) and a pressure valve (V) for supplying fluid to feed-and-return lines (S1, S2) connected to auxiliary port (30) and main port (15) for operation of the hydraulic jack (3) and pinion (7).

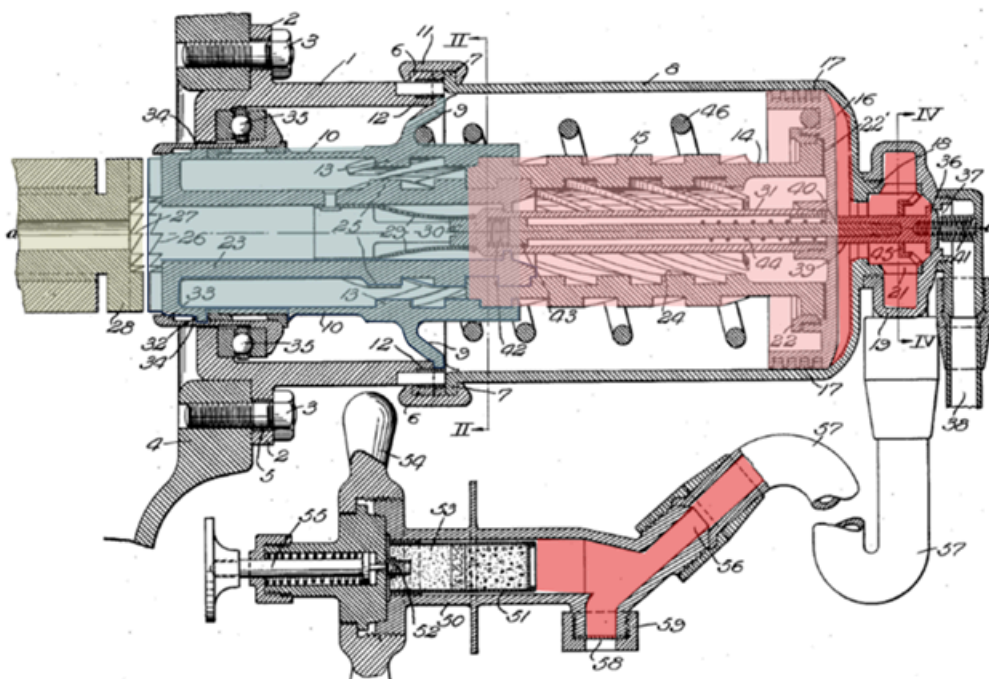
F02N 7/04

the pistons acting on screw-threaded members to effect rotation

Definition statement

This place covers:

Illustrative example of subject matter classified in this place:



The Figure illustrates a system comprising a chamber (50) for generating a pressurized gas (53) used to create a longitudinal displacement of a piston (16) resulting in a rotation of a driven member (14) due to screw threading (15) on a surface of the driven member (14), where the rotational movement of the driven member (14) is used to start a motor via a connecting element (28).

F02N 7/06

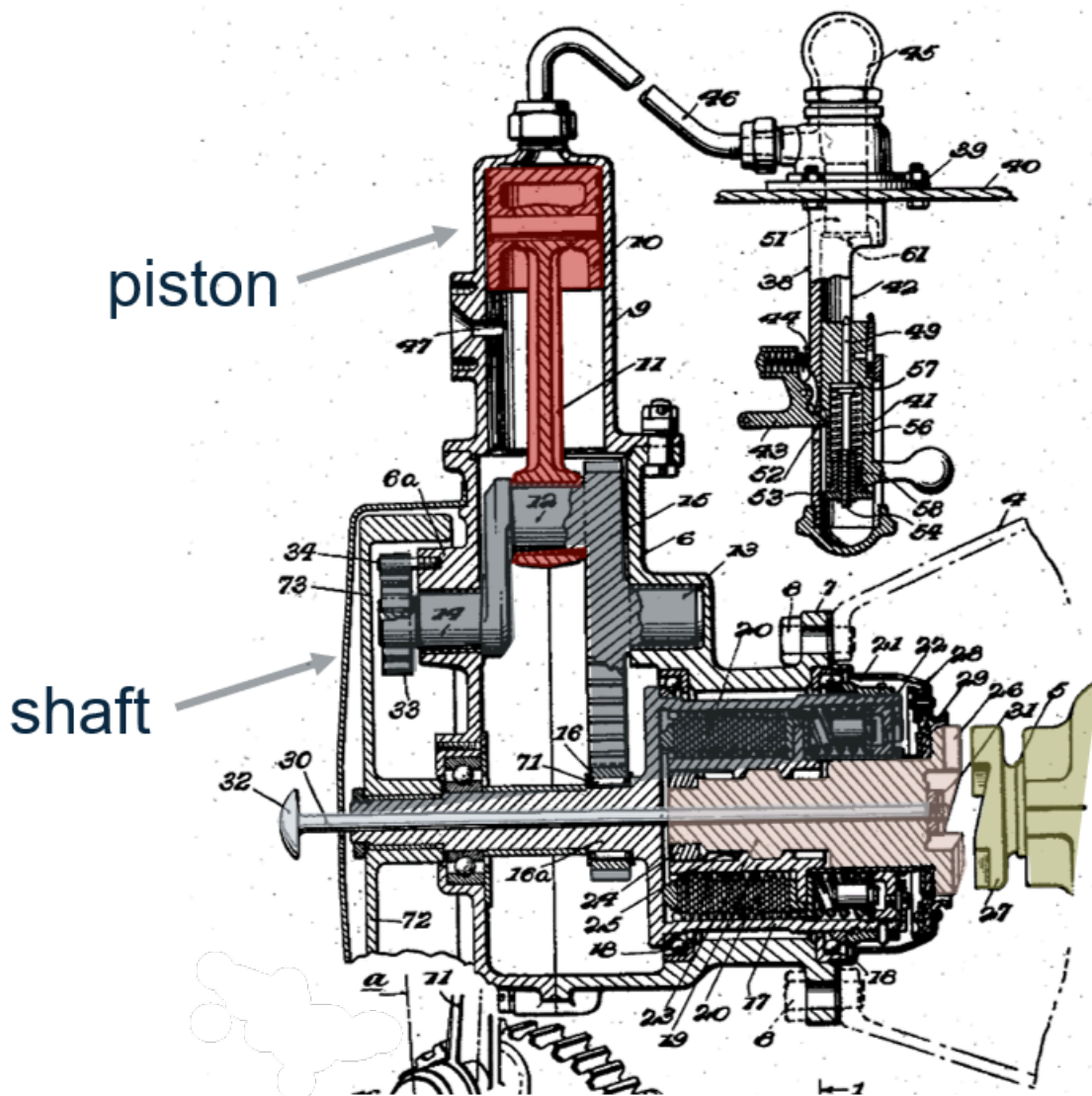
the engines being of reciprocating-piston type (of internal-combustion type
[F02N 7/10](#))

Definition statement

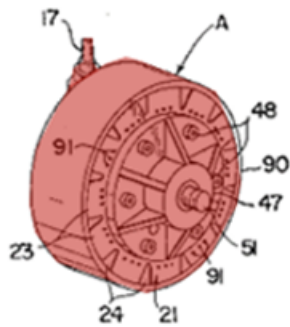
This place covers:

Illustrative examples of subject matter classified in this place:

1.



2a. Small scale engine



2b. Chainsaw with small scale engine

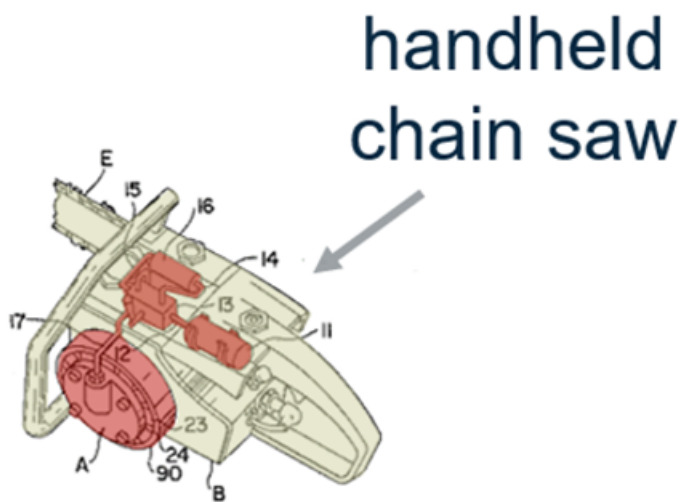


Figure 2b illustrates a chainsaw assembly with an energy cell (11) containing a source of pressurized liquified gas that is supplied to supply and discharge lines (14, 15) via a valve regulator (13) for starting motor (A) shown in figure 2a.

2c. Small scale engine (cross-sectional view)

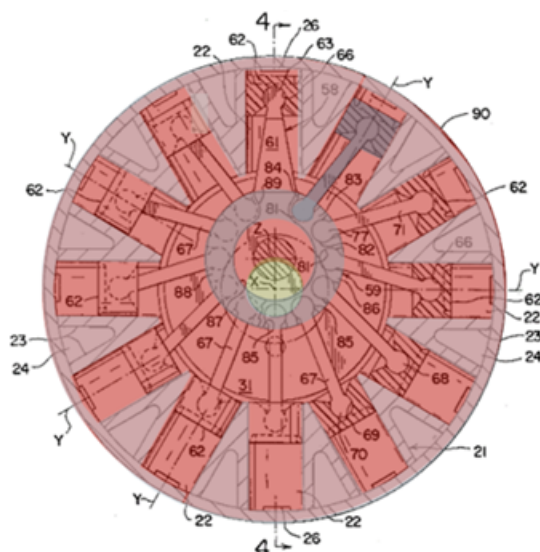


Figure 2c illustrates motor (A) with reciprocating pistons (62).

References

Limiting references

This place does not cover:

Starting apparatus having fluid-driven auxiliary engines or apparatus of combustion type
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F02N 7/10

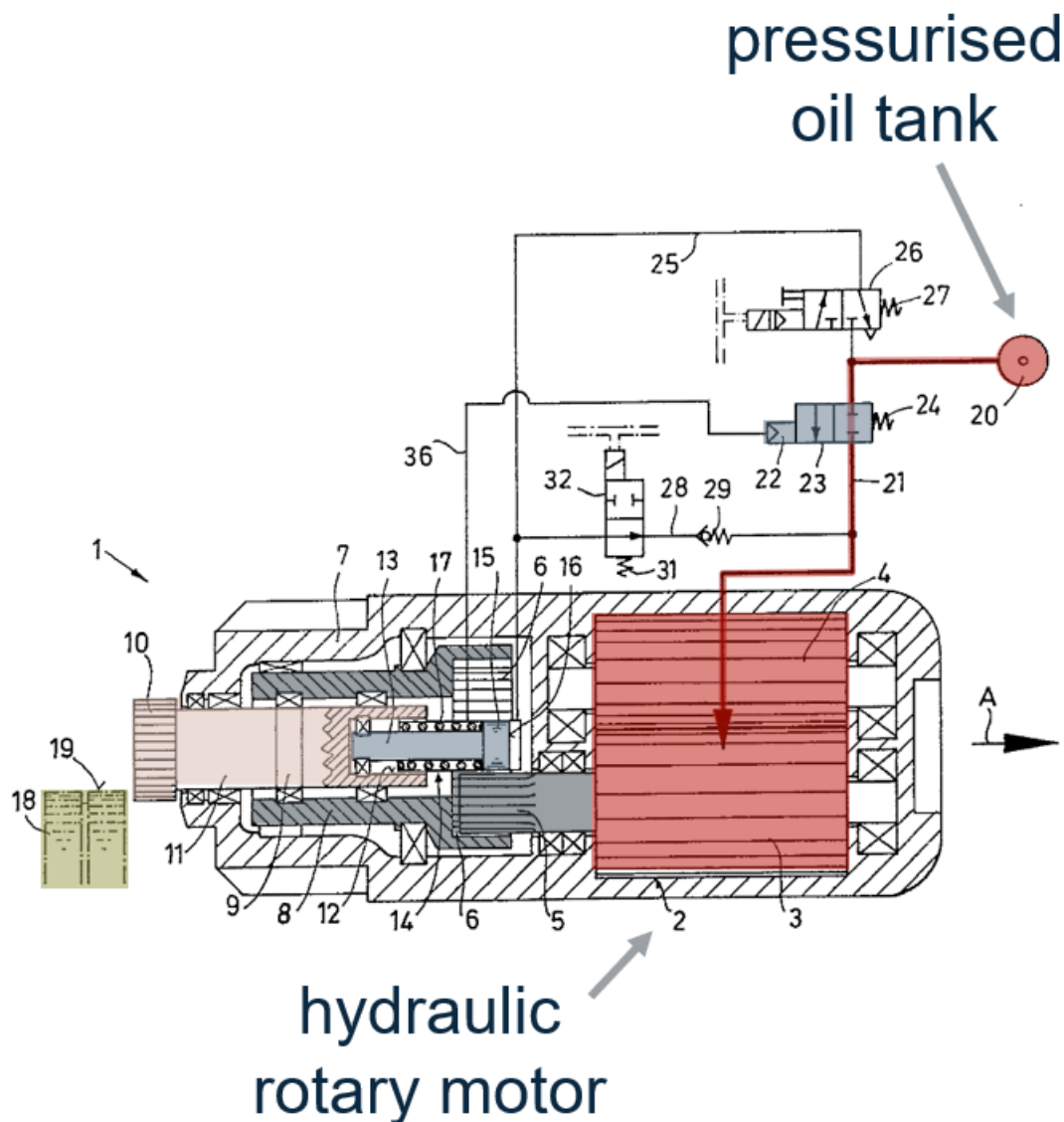
F02N 7/08

the engines being of rotary type

Definition statement

This place covers:

Illustrative example of subject matter classified in this place:



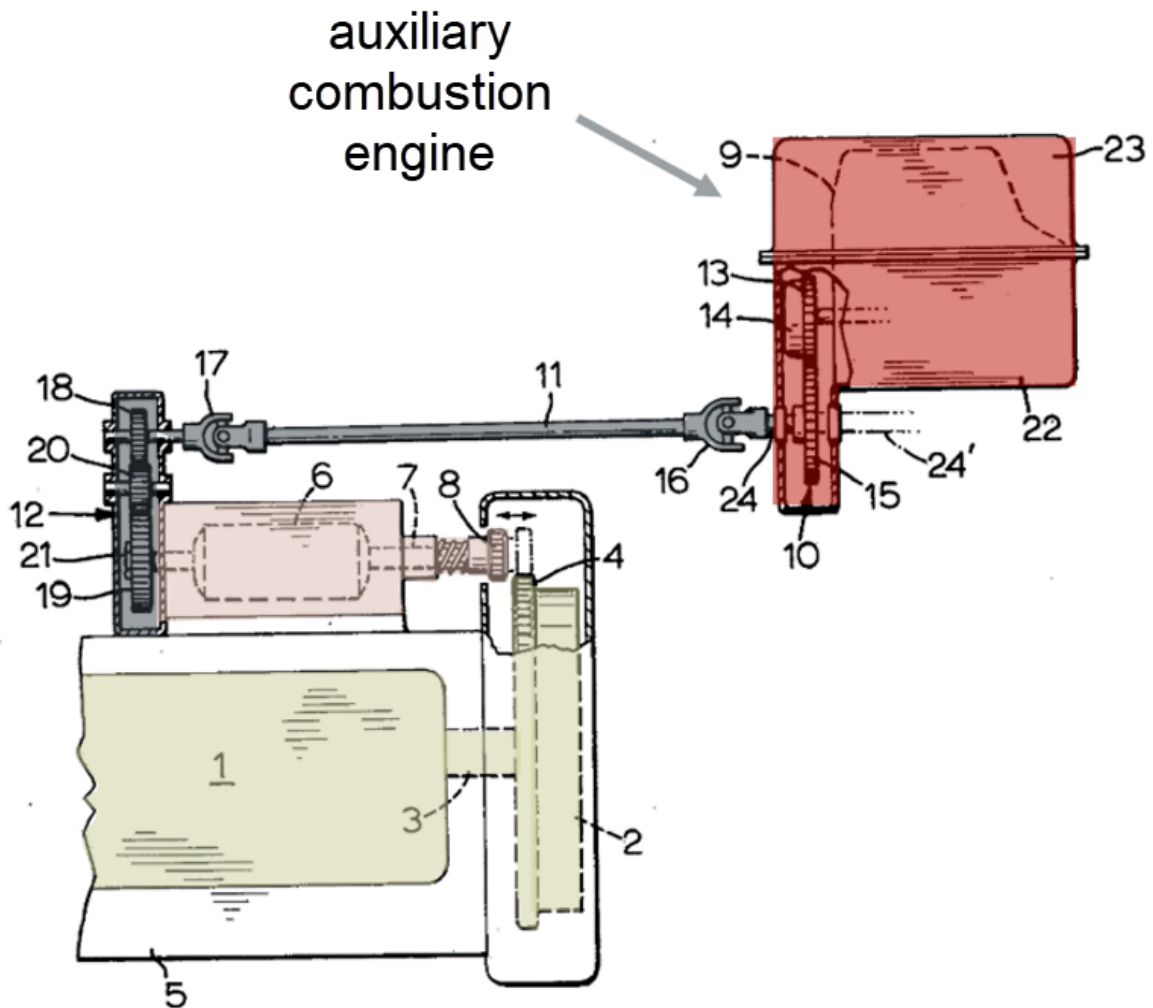
F02N 7/10

characterised by using auxiliary engines or apparatus of combustion type (by using explosive cartridges [F02N 13/00](#))

Definition statement

This place covers:

Illustrative example of subject matter classified in this place:



The Figure illustrates an auxiliary combustion engine (9) connected to a pinion (8) of a starter (6) for starting a combustion engine (1).

References**Limiting references**

This place does not cover:

Starting of engines by use of explosives, e.g. stored in cartridges	F02N 13/00
---	----------------------------

F02N 9/00

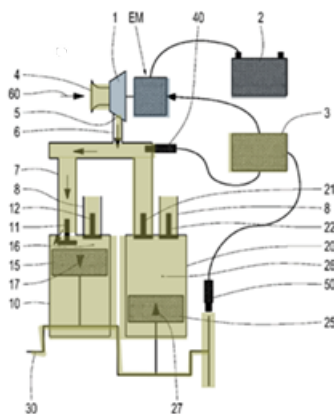
Starting of engines by supplying auxiliary pressure fluid to their working chambers

Definition statement

This place covers:

Supply of high-pressure fluid to the engine's working chambers to achieve engine start.

Illustrative example of subject matter classified in this place:



The Figure illustrates a system comprising a compressor (1) connected to cylinders (10, 20) through air flow passage (7), where the compressor delivers compressed air into cylinder (10) upon opening of an intake valve (11) to drive a piston (15) downwards for starting an engine.

Special rules of classification

Air or combustible mixtures introduced in the working chamber solely to be combusted for starting the engine is classified in group [F02N 99/00](#).

F02N 9/02

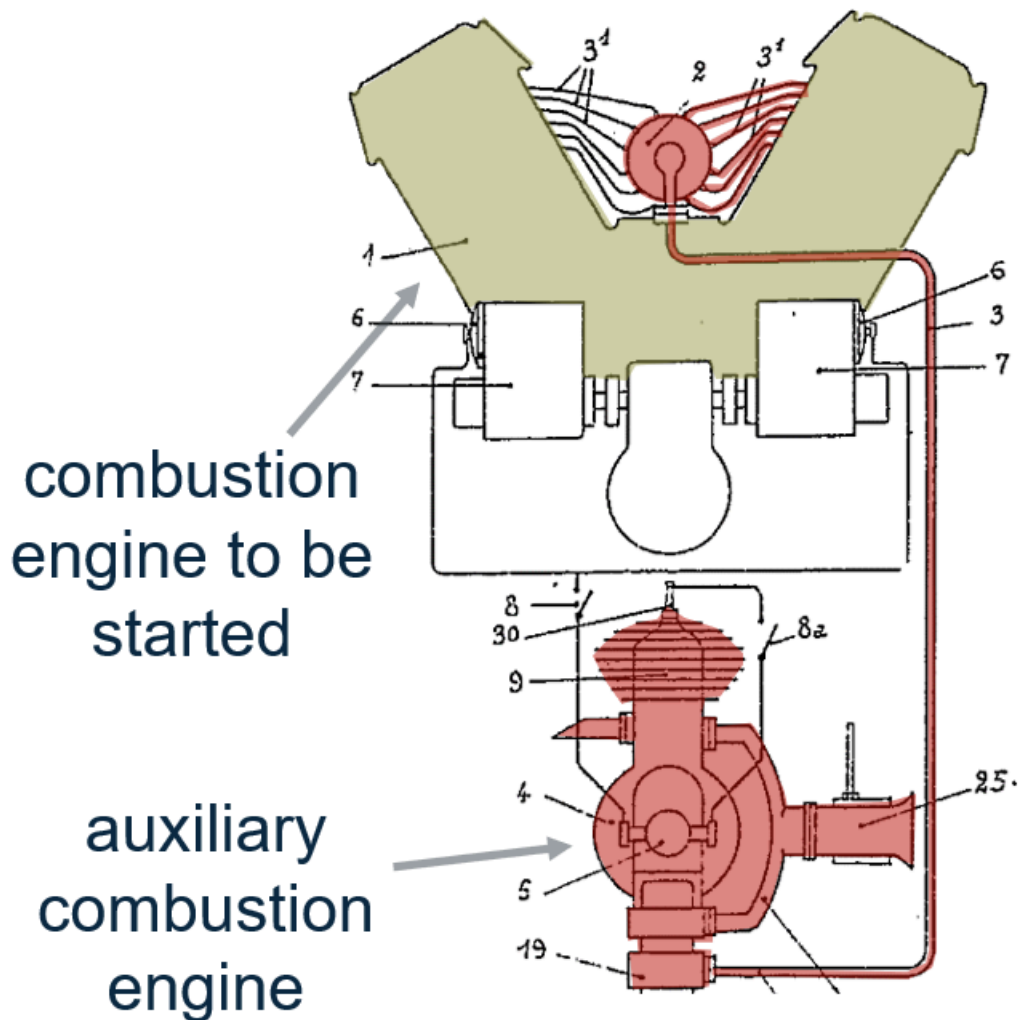
the pressure fluid being generated directly by combustion (by using explosive cartridges [F02N 13/00](#))

Definition statement

This place covers:

Starting of engines by generating pressure fluid directly by combustion, e.g. in an external combustion chamber, and supplying said pressure fluid to the working chambers of the engines.

Illustrative example of subject matter classified in this place:



References

Limiting references

This place does not cover:

Starting of engines by use of explosives, e.g. stored in cartridges

F02N 13/00

F02N 9/04

the pressure fluid being generated otherwise, e.g. by compressing air

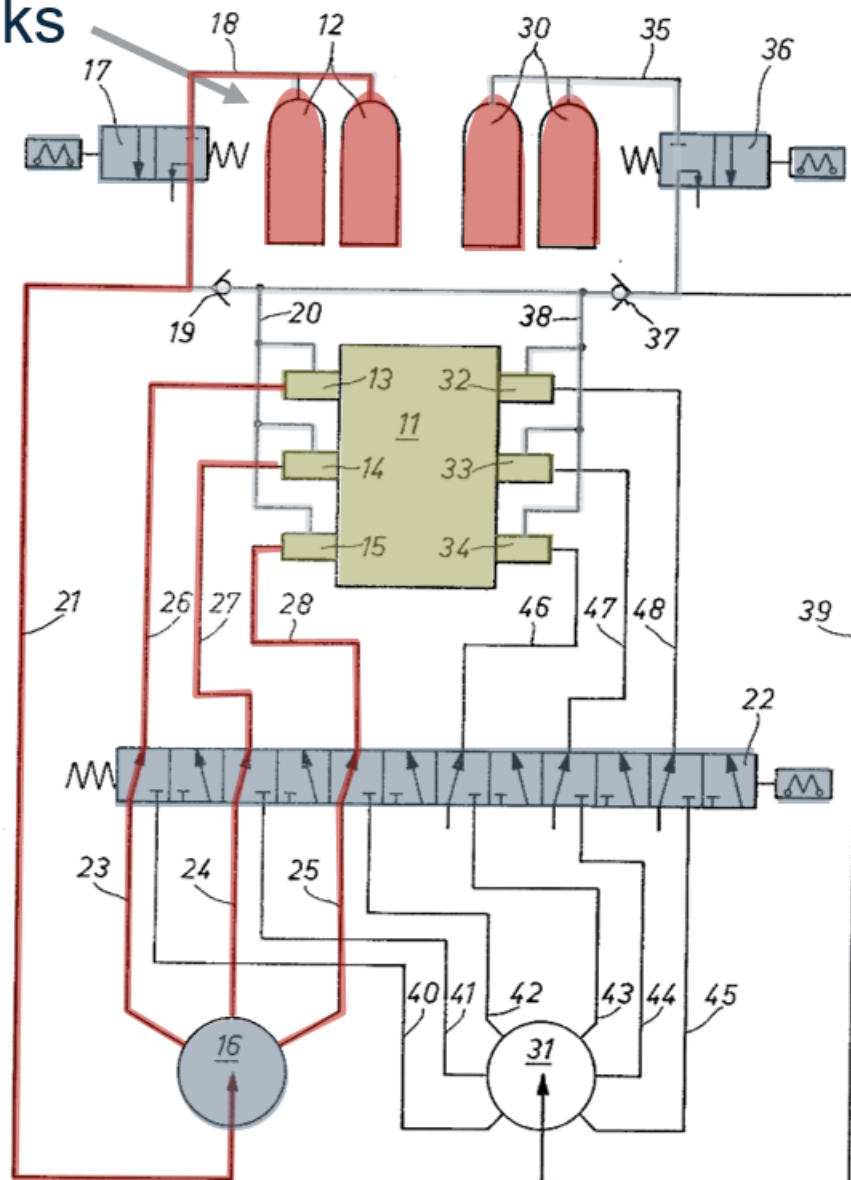
Definition statement

This place covers:

Illustrative example of subject matter classified in this place:

pressurised air

tanks



F02N 11/00**Starting of engines by means of electric motors****References****Informative references**

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

Arrangement or mounting of prime-movers consisting of electric motors and internal combustion engines for mutual or common propulsion	B60K 6/20
---	---------------------------

Special rules of classification

Control means specially adapted for starting of engines by means of electric motors are classified in [F02N 11/08](#) and subgroups.

F02N 11/003

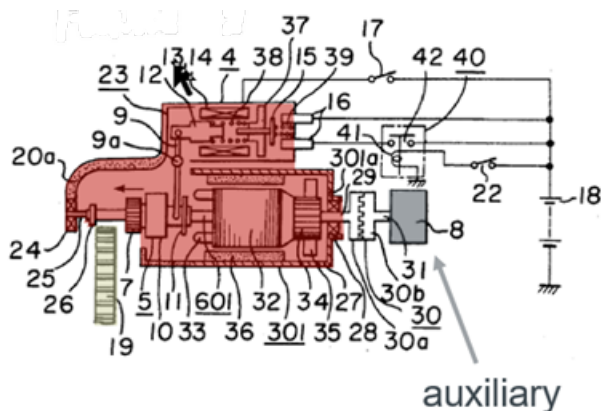
{said electric motor being also used as a drive for auxiliaries, e.g. for driving transmission pumps or fuel pumps during engine stop}

Definition statement

This place covers:

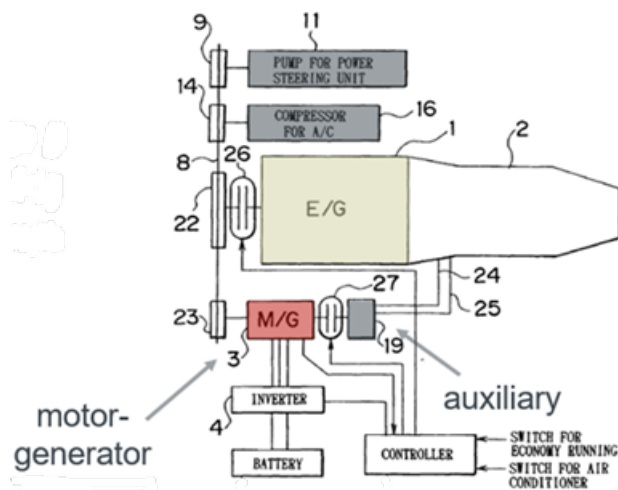
Illustrative examples of subject matter classified in this place:

1.



Definition statement

2.



References

Informative references

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

Mechanical integration of starter with other accessories, e.g. fuel pump or compressor	F02N 15/00
--	----------------------------

F02N 11/006

{using a plurality of electric motors}

Definition statement

This place covers:

Starting of engines using a plurality of electric motors, whereby said electric motors can be used simultaneously or alternatively for driving and starting the combustion engine.

Illustrative examples of subject matter classified in this place:

1.

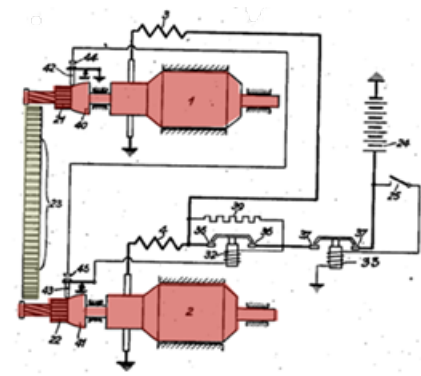


Figure 1 illustrates two starter armatures (1, 2) used to start an engine via a flywheel (23).

Definition statement

2.

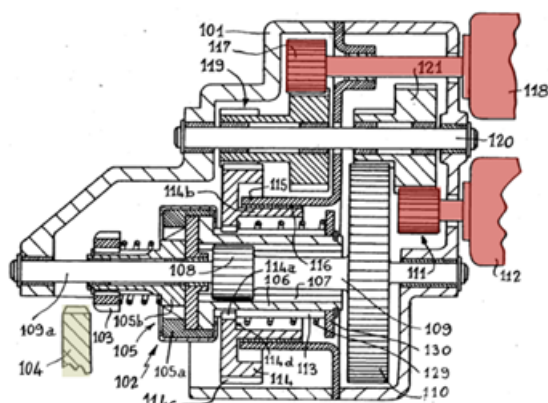


Figure 2 illustrates two starter motors (112, 118) connected to a pinion (103) for operation of a crown wheel (104) used to start a combustion engine.

3.

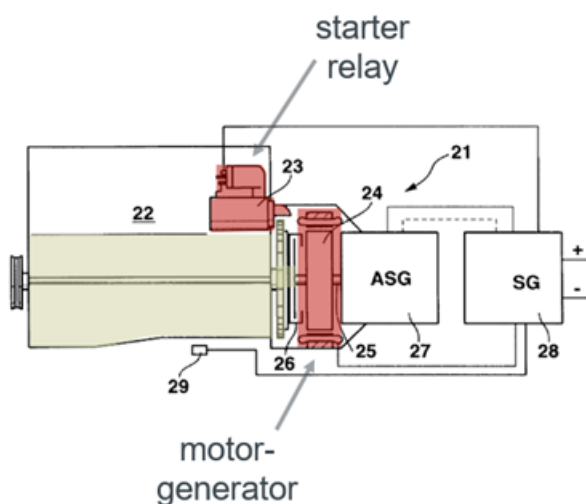


Figure 3 illustrates a conventional starter (23) and a starter generator (24) used to start a combustion engine (22).

F02N 11/04

the motors being associated with current generators

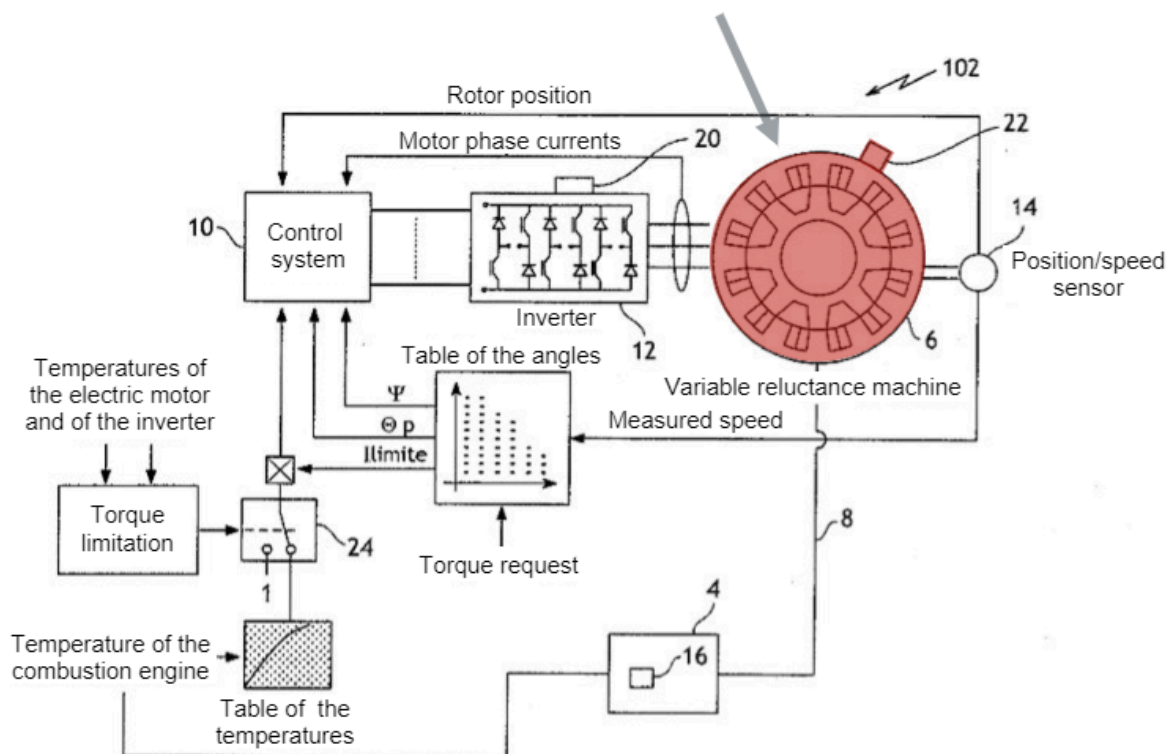
Definition statement

This place covers:

Starter motors also used as generators, e.g. for mild hybrid vehicles.

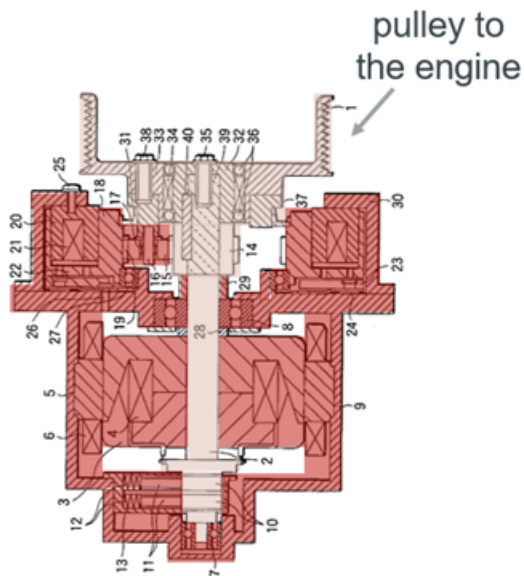
Illustrative examples of subject matter classified in this place:

motor-
generator



A schematic diagram of a motor-generator set. It shows a large green component labeled '22' (the motor) connected to a smaller green component labeled '25' (the generator, with 'ASG' inside). A red component labeled '24' (the starter relay) is positioned between them. A transmission, labeled '21', is connected to the generator. A generator set, labeled 'SG', is also connected to the system. Various other components are labeled with numbers: 23, 26, 27, 28, and 29. The diagram is titled 'several starters'.

3.



References

Informative references

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

Arrangement or mounting of plural diverse prime-movers for mutual or common propulsion, the prime-movers consisting of electric motors and internal combustion engines, e.g. Hybrid Electric Vehicles [HEVs]	B60K 6/20
Structural association of a motor or generator with the drive train of a motor vehicle	H02K 7/006

F02N 11/06

and with ignition apparatus

Definition statement

This place covers:

Starter generators associated with ignition apparatus.

F02N 11/08

Circuits specially adapted for starting of engines

Definition statement

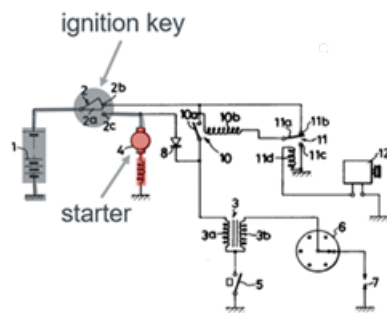
This place covers:

- Circuits, control means or control methods specially adapted for starting of engines;
- Circuits, control means or control methods specially adapted for stopping of engines in such a way as to facilitate their restart.

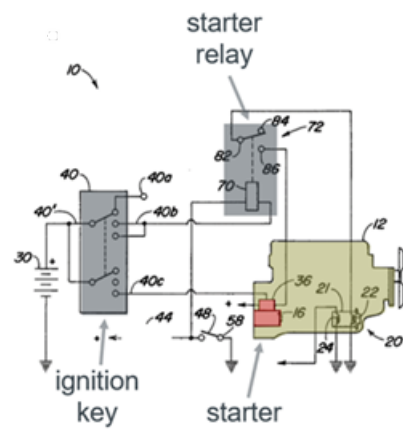
Illustrative examples of subject matter classified in this place:

Definition statement

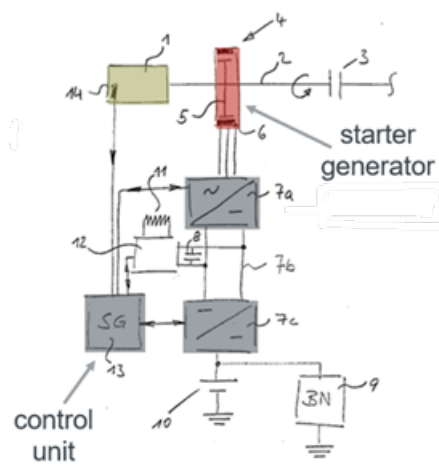
1.



2.

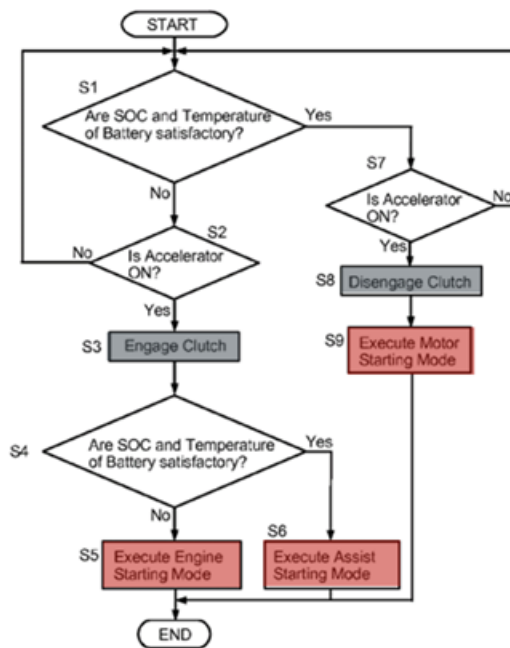


3.

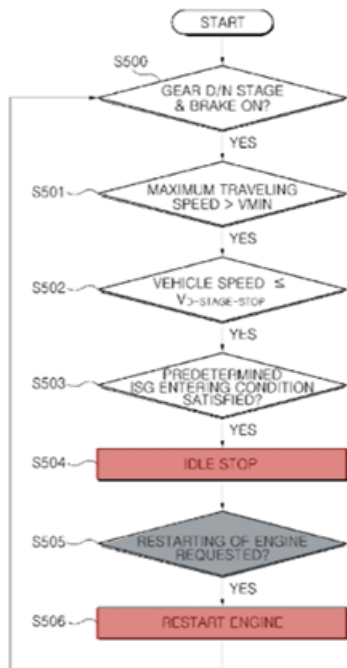


Definition statement

4.



5.

**F02N 11/0803**

{characterised by means for initiating engine start or stop ([F02N 11/0814](#) takes precedence)}

Definition statement

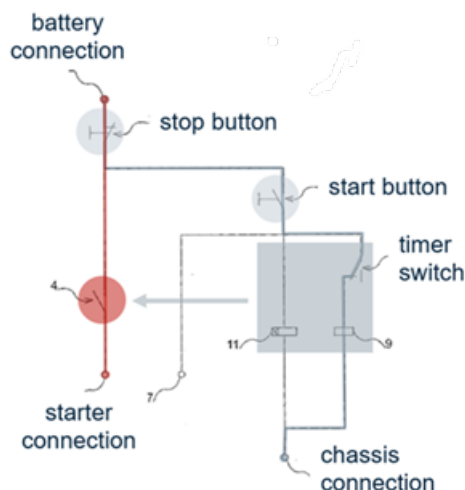
This place covers:

- Arrangements for initiating engine start related to ignition switches;
- Arrangements for initiating automatic restart at engine stall;

Definition statement

- Arrangements for initiating engine start based on temperature measurements, e.g. in driver cabin (for trucks) or in engine;
- Arrangements for automatically stopping the engine at extended idling;
- Arrangements for automatically stopping the engine after the engine has been automatically started.

Illustrative example of subject matter classified in this place:



References

Limiting references

This place does not cover:

Arrangements for controlling automatic idle-start-stop	F02N 11/0814
--	------------------------------

Informative references

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

Key-operated switches	H01H 27/06
-----------------------	----------------------------

F02N 11/0807

{Remote means}

Definition statement

This place covers:

Automatic engine start using a remote, e.g. 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;

Definition statement

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

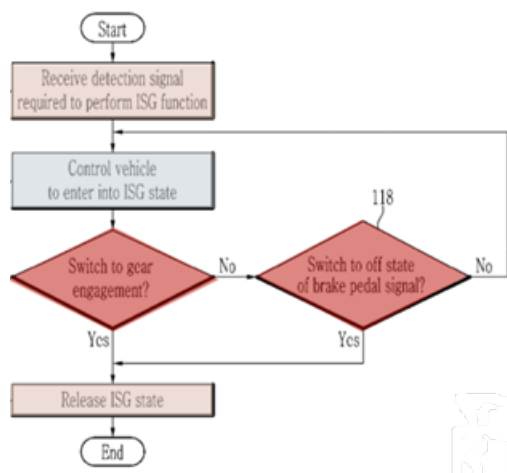
F02N 11/0818

{Conditions for starting or stopping the engine or for deactivating the idle-start-stop mode}

Definition statement

This place covers:

Illustrative example of subject matter classified in this place:

**References****Informative references**

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

Parameters used for control of starting apparatus	F02N 2200/00
Problems related to engine starting or engine's starting apparatus	F02N 2250/00
Control related aspects of engine starting	F02N 2300/00

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 preventing automatic engine stop if restart cannot be guaranteed, e.g. in case of 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 preventing automatic engine stop when engine running is required for other engine-related reasons, e.g. for adaptation, cleaning of catalysts or purging of fuel vapours.

F02N 11/084

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

Definition statement

This place covers:

Control of automatic engine start or preventing engine stop for periods when 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:

Conditions for starting or stopping the engine or for deactivating the idle-start-stop mode, related to special engine control	F02N 11/0829
--	------------------------------

F02N 11/0844

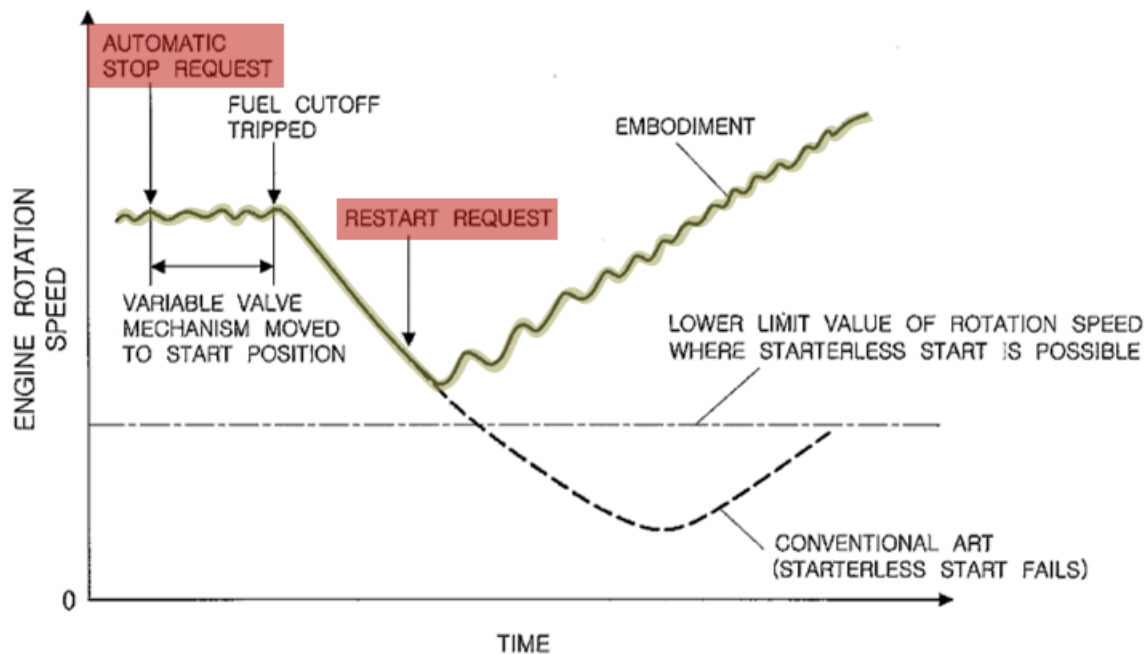
{with means for restarting the engine directly after an engine stop request, e.g. caused by change of driver mind}

Definition statement

This place covers:

Means for restarting engine when engine is still rotating.

Illustrative example of subject matter classified in this place:



The Figure illustrates a mapping used in an automatic stop and start control system for determining whether a starterless start is possible following an automatic stop request based on engine rotation speed at the time of the restart request.

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	F02N 11/0855
---	------------------------------

F02N 11/0848

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

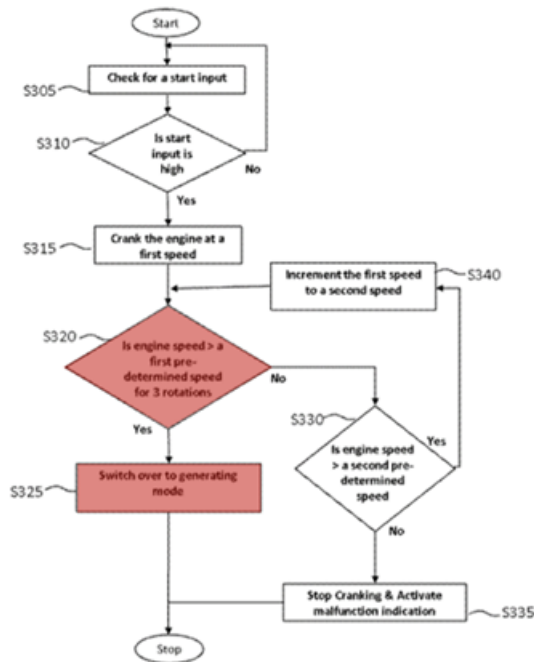
Definition statement

This place covers:

- Arrangements for detecting successful engine start for stopping starter;
- Arrangements for detecting successful engine start for disengaging starter;
- Arrangements for detecting successful engine start for other engine control;
- Arrangements for detecting unsuccessful engine start for trying new start attempt.

Definition statement

Illustrative example of subject matter classified in this place:



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:

- Arrangements for controlling the engagement or disengagement between engine and starter, e.g. meshing of pinion into engine ring gear;
- Arrangements for controlling clutch between engine and starter-generator;
- Control or circuit aspects for connecting the starter and the engine, mainly for starters using pinions.

Illustrative examples of subject matter classified in this place:

Definition statement

1.

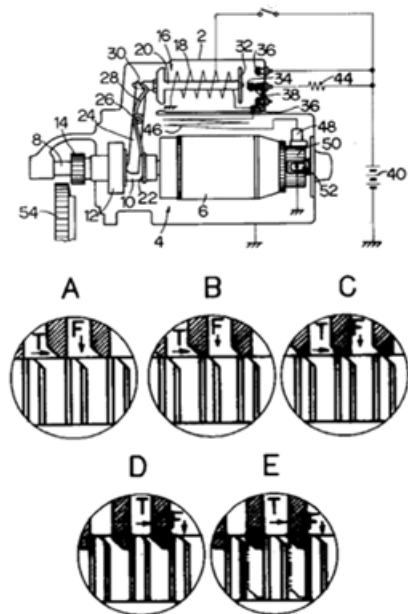
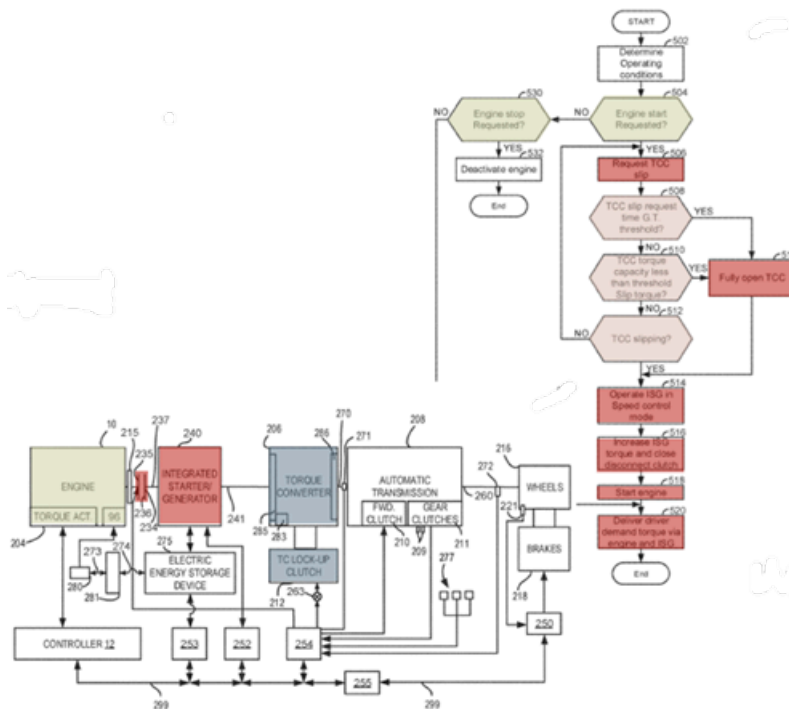


Figure 1 illustrates an electromagnetic system for controlling an axially displaceable pinion (14) via an electromagnetic core (20) and coil (18) to move the pinion (14) into engagement with a ring gear (54) used to start an engine. (A-E) depict a rotation direction (T) and a movement of the pinion (F) during operation.

2.



References

Informative references

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

Mechanical aspects concerning the connection between the engine and the starter	F02N 15/02
---	----------------------------

F02N 11/0855

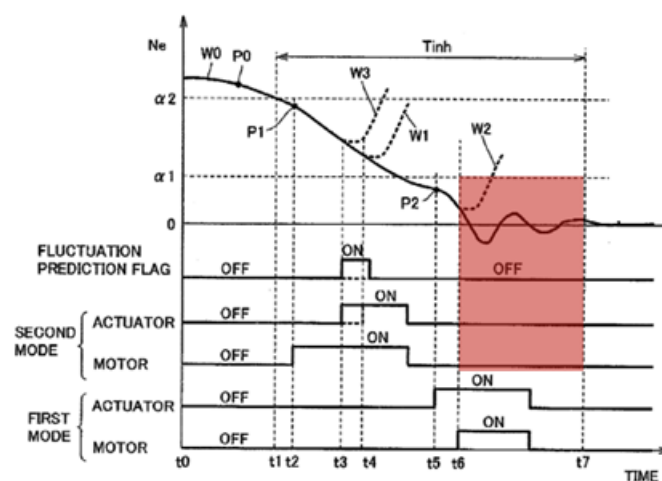
{during engine shutdown or after engine stop before start command, e.g. pre-engagement of pinion}

Definition statement

This place covers:

- Engagement of the pinion while the engine is still rotating, e.g. by first accelerating the starter and thereafter engaging the pinion with the engine gear;
- Engagement of the pinion when the engine has stopped but no engine start request has been detected. This can be done when future engine start is likely, e.g. based on vehicle door opening.

Illustrative example of subject matter classified in this place:



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. inverter circuits.

Illustrative examples of subject matter classified in this place:

1. Commutator structure

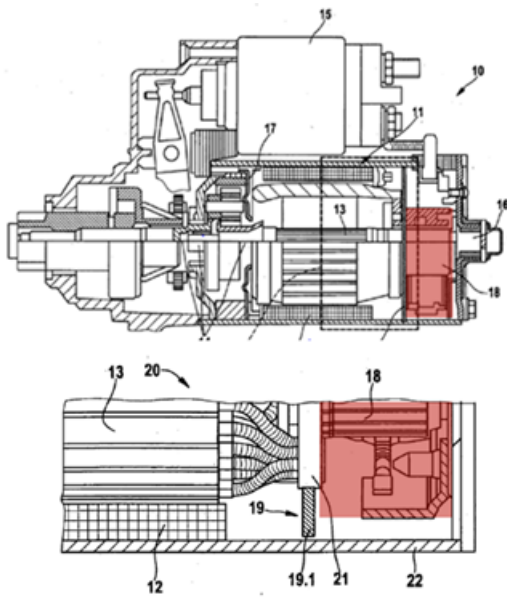


Figure 1 illustrates a particular commutator structure (18).

2. Starter winding connections

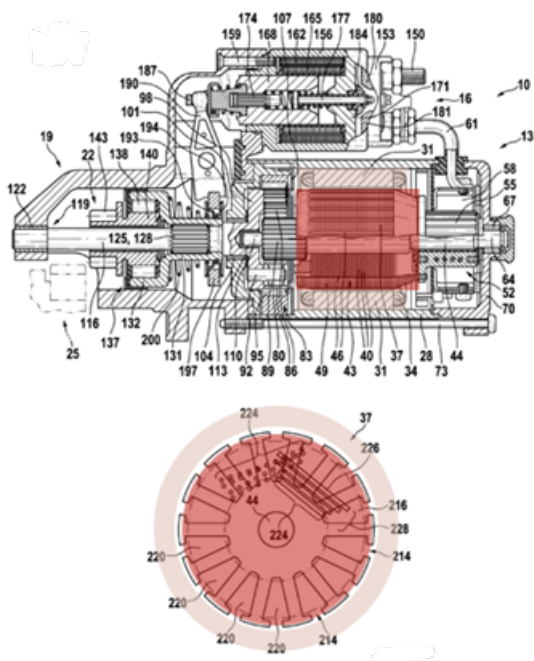


Figure 2 illustrates a starter armature (37) having a winding (49) comprising a wire (226) wound around armature anchor teeth (224).

3. Integrated circuits in a starter

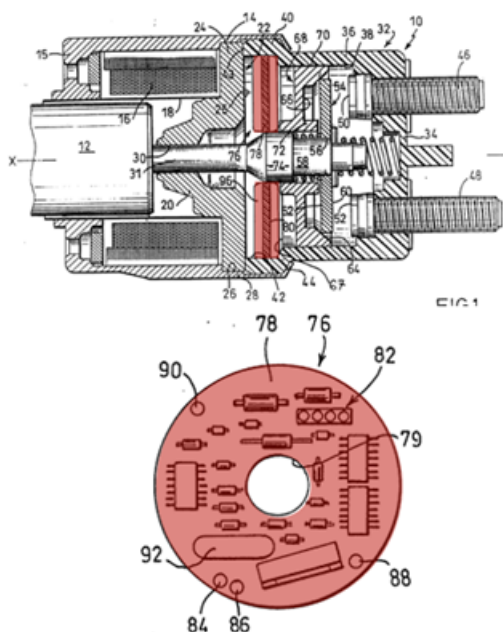


Figure 3 illustrates an electronic control circuit (76) integrated into a starter motor assembly (10).

References

Informative references

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

Starter/generators	F02N 11/04
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F02N 11/0862

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

Definition statement

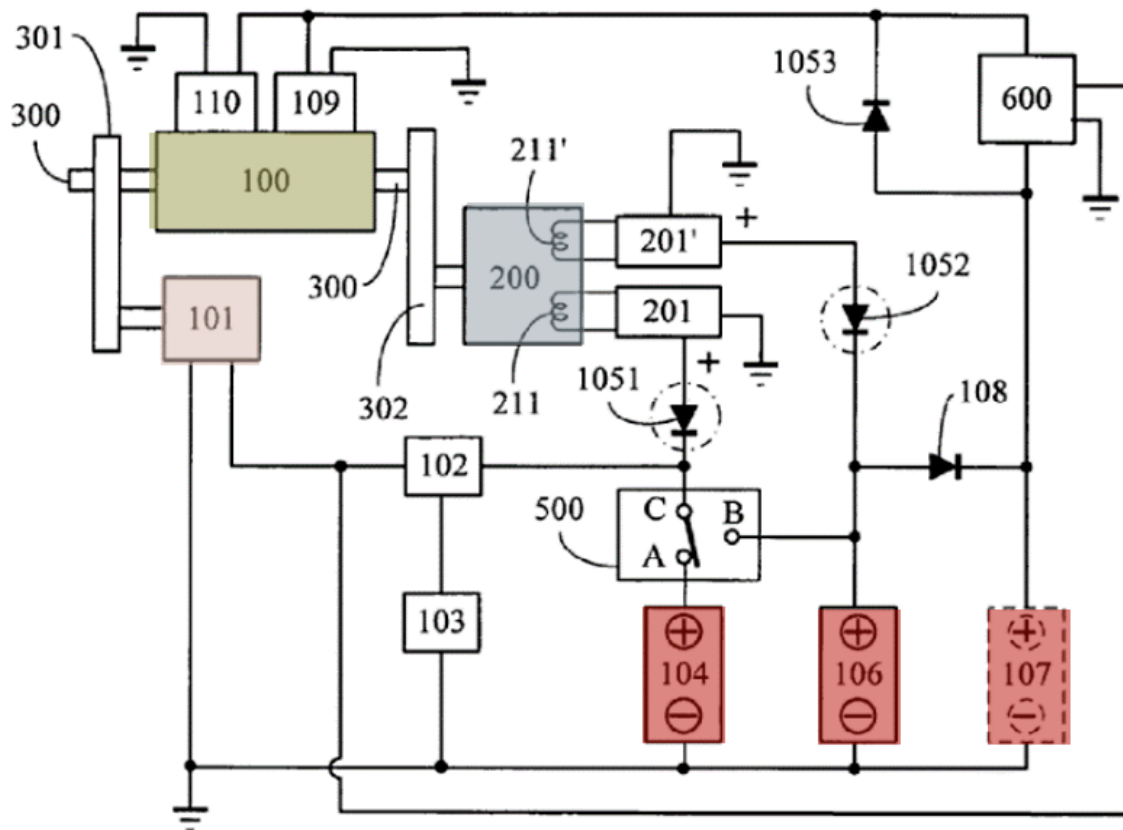
This place covers:

Aspects relating to the battery or to other arrangements for supplying energy for starting, e.g.:

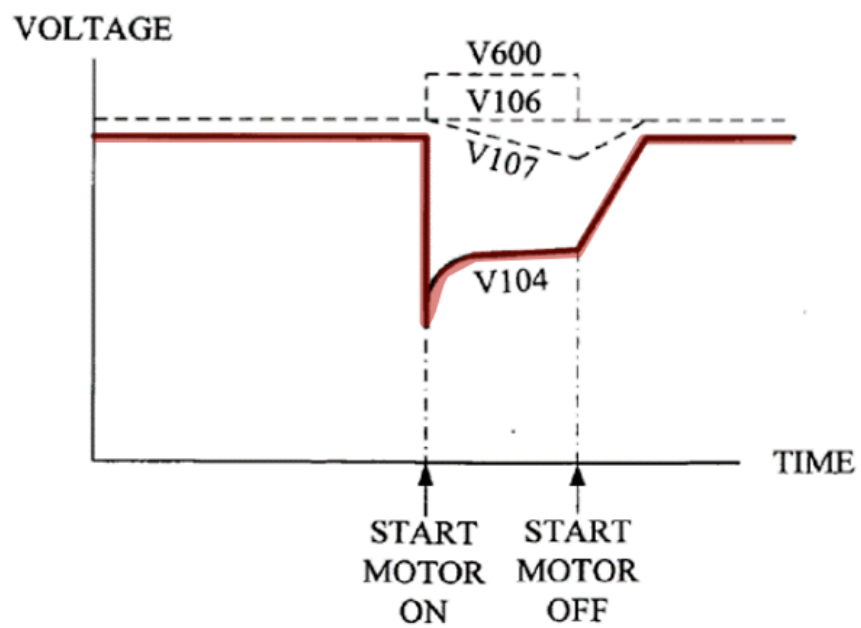
- Special power supply connections;
- Special control of supply at start, for instance controlling starting voltage;
- Combinations of power supplies.

Illustrative example of subject matter classified in this place:

1a.



1b.



F02N 11/0866

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

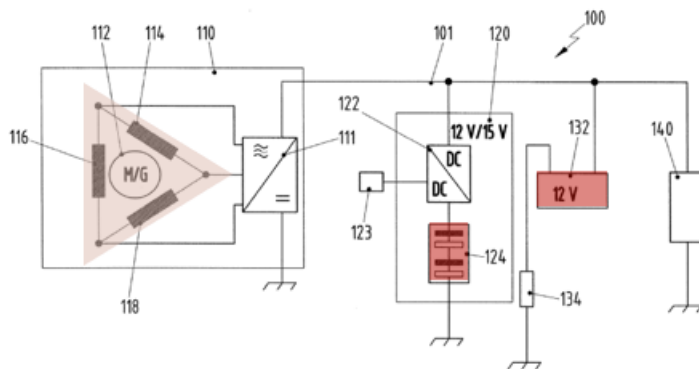
Definition statement

This place covers:

Aspects relating to the use of two batteries or power supplies in a vehicle in relation to starting:

- Choice of battery;
- One battery for starting and one battery for accessories;
- Capacitor charging, e.g. before engine start.

Illustrative example of subject matter classified in this place:

**F02N 11/087**

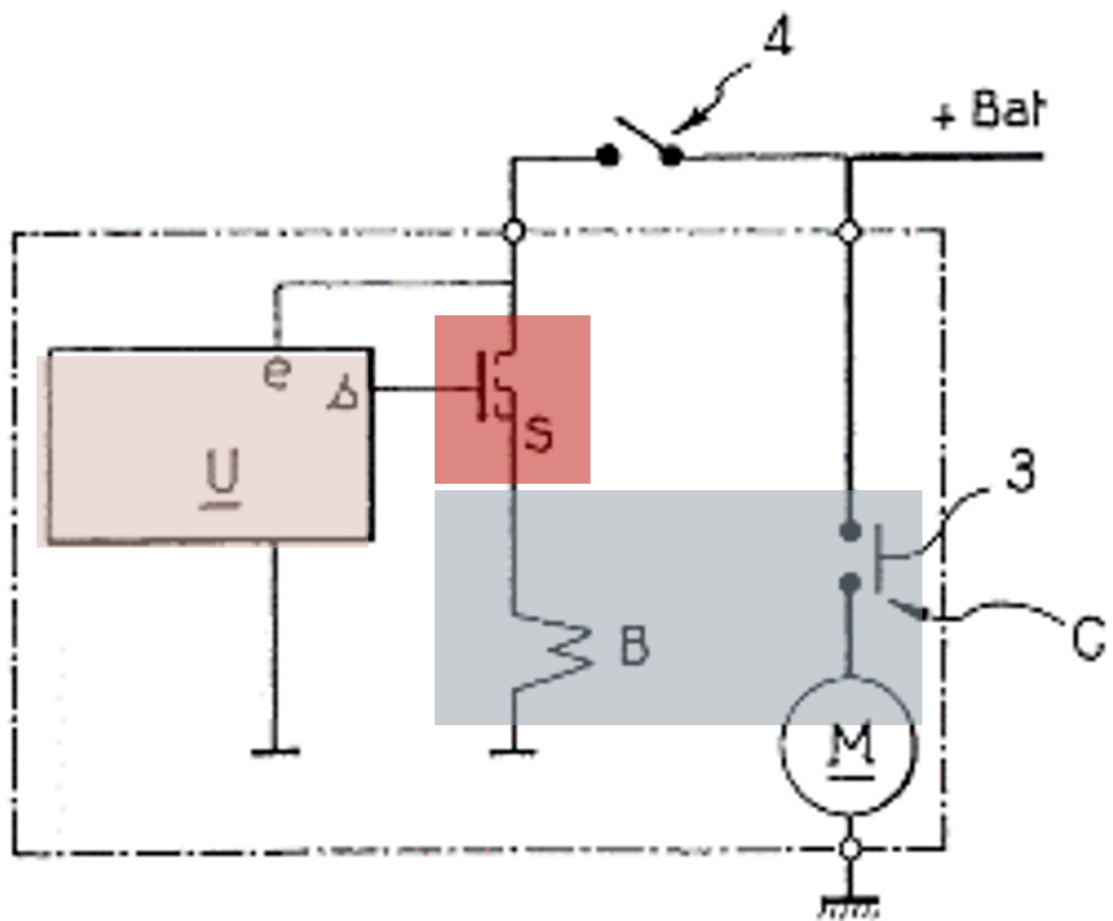
{Details of the switching means in starting circuits, e.g. relays or electronic switches}

Definition statement

This place covers:

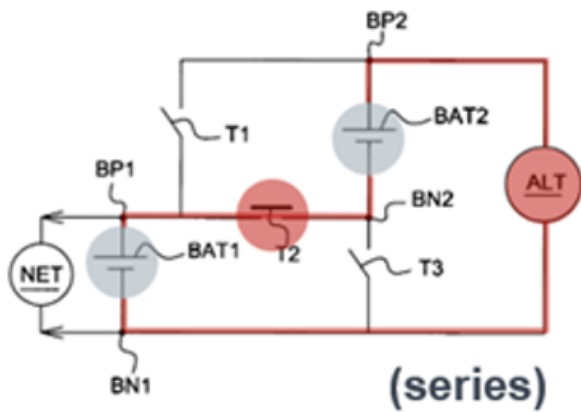
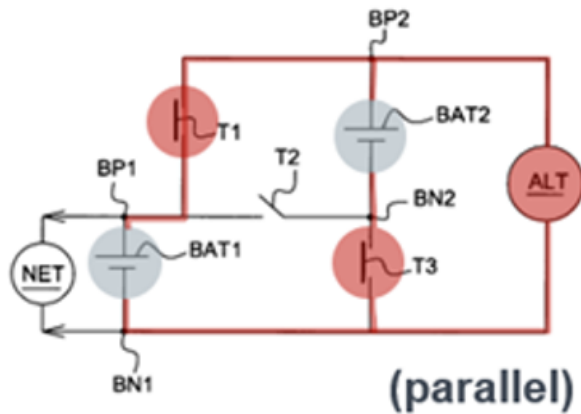
Illustrative examples of subject matter classified in this place:

1.



Definition statement

2.



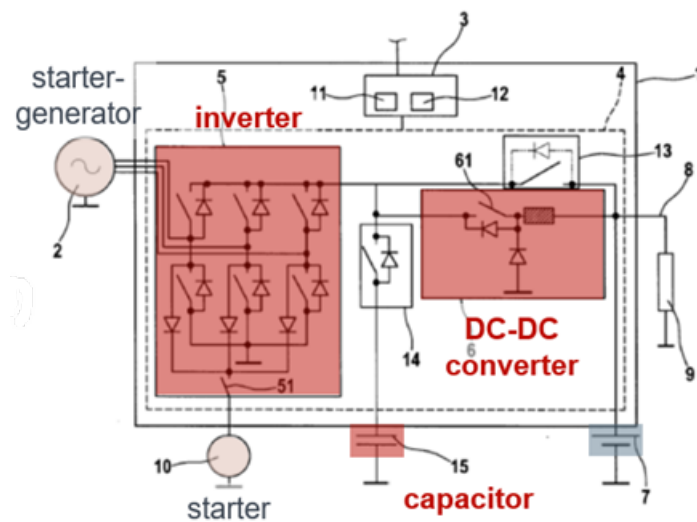
F02N 2011/0881

{Components of the circuit not provided for by previous groups}

Definition statement

This place covers:

Illustrative example of subject matter classified in this place:



F02N 11/10

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

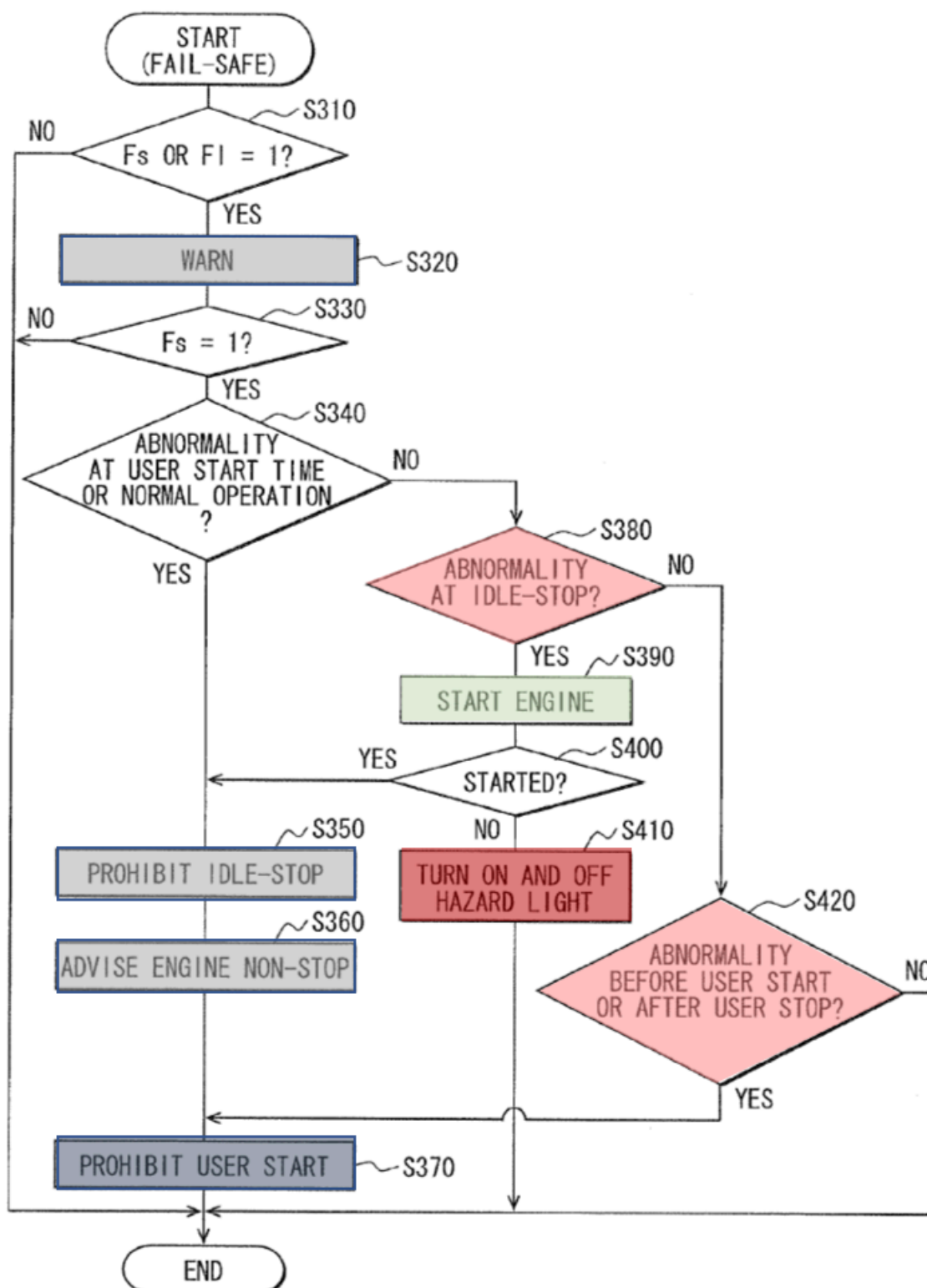
Definition statement

This place covers:

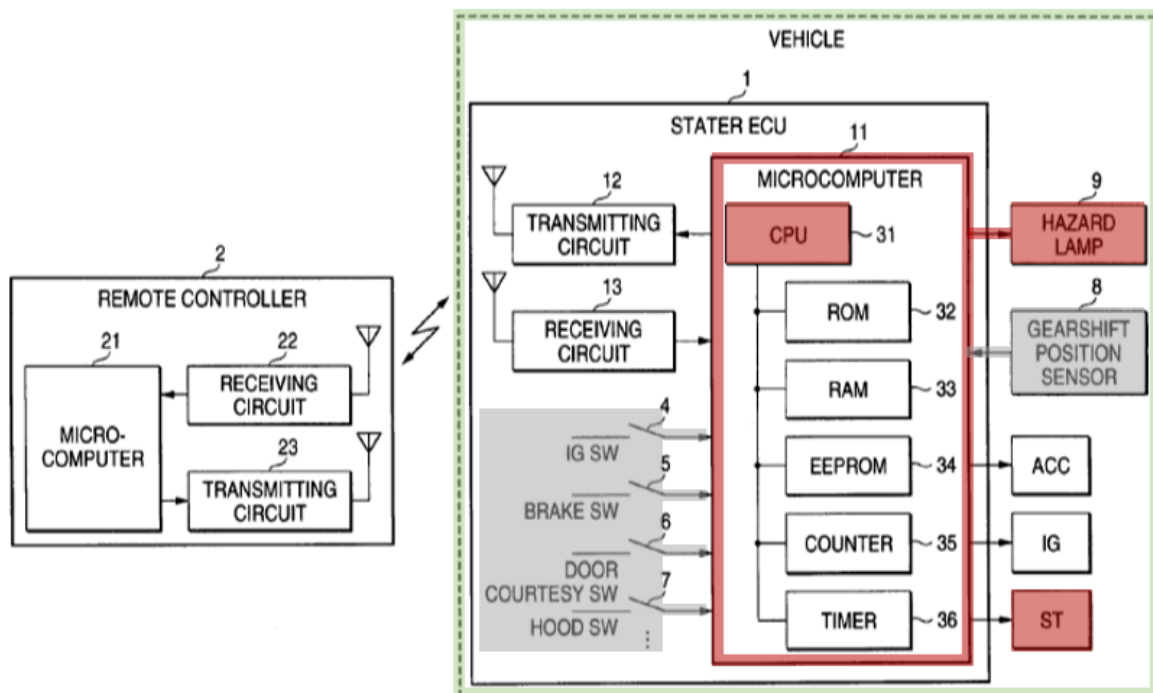
- Safety devices for protecting the system and avoiding hazardous situations;
- Diagnosis of starters.

Illustrative examples of subject matter classified in this place:

1.



2.



References

Limiting references

This place does not cover:

Circuits or control means specially adapted for starting of engines	F02N 11/08
---	----------------------------

F02N 11/101

{for preventing engine starter actuation or engagement}

Definition statement

This place covers:

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

Illustrative example of subject matter classified in this place:

Definition statement

1a.

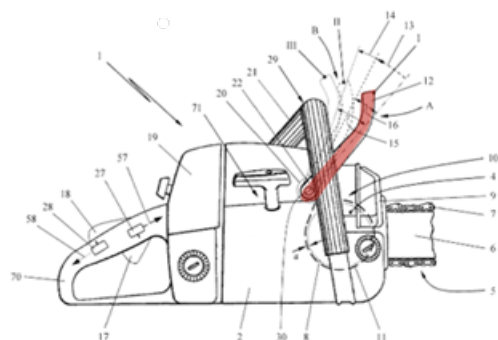


Figure 1a illustrates a chainsaw (1) comprising an actuation lever (12) that is moved between a start disabled position (A) and a start enabled position (B) to enable starting of motor.

1b.

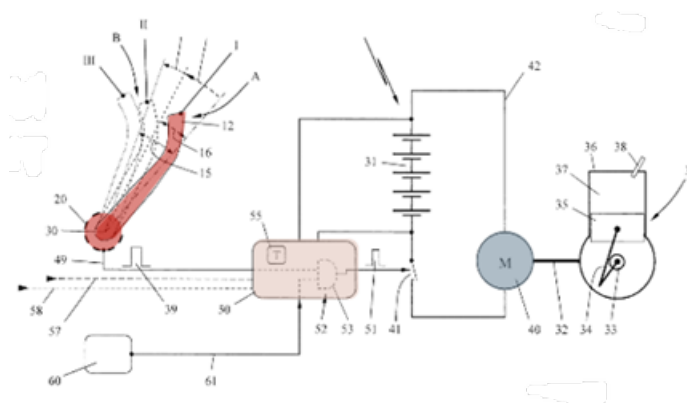


Figure 1b illustrates a circuit with electronic locking device (52) for enabling or disabling starting of the chain saw (1) based on the position of the lever (12).

References

Informative references

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

Fittings or systems for preventing unauthorised use or theft of vehicles, said fittings or systems operating on the propulsion system, e.g. on the engine or drive motor
--

B60R 25/04

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:

Circuits or control means specially adapted for starting of engines with means for detecting successful engine start

[F02N 11/0848](#)

F02N 11/106

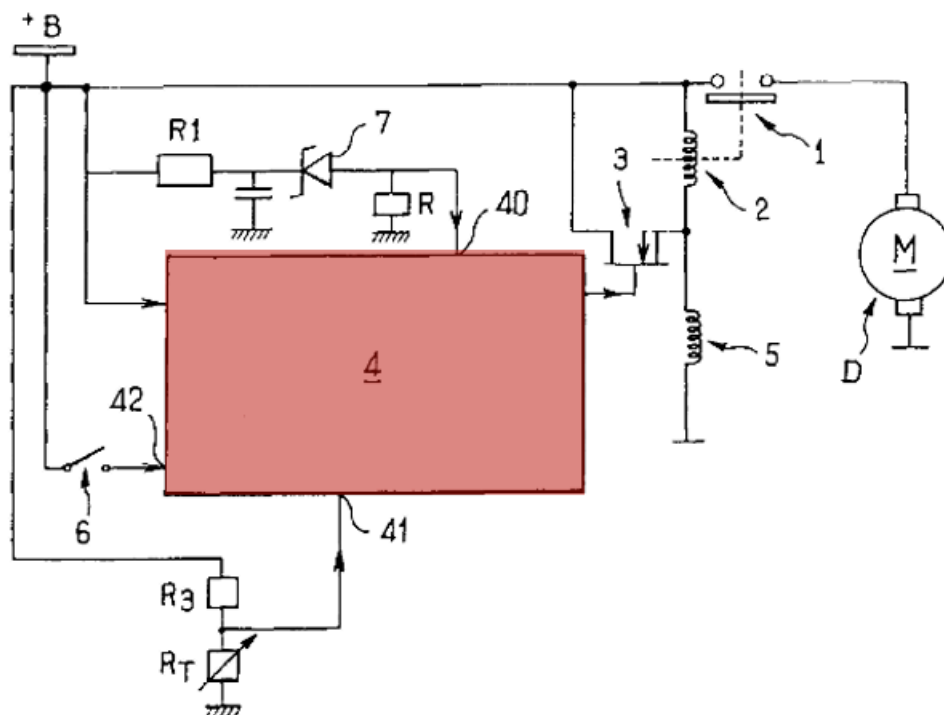
{for stopping or interrupting starter actuation}

Definition statement

This place covers:

Illustrative example of subject matter classified in this place:

1a.



Definition statement

1b.

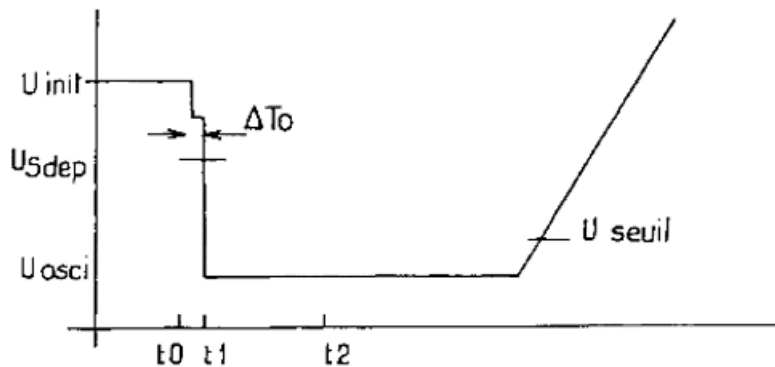


Figure 1a and Figure 1b illustrate a device for switching off an engine starter (M) when the measured supply voltage (41) of the starter (M) reaches a threshold value (U_{seuil}). The control unit (4) receives the measured supply voltage (41), compares it with the threshold value (U_{seuil}) and produces an output signal that triggers the transistor (3), so that the relay (1+2) opens and interrupts the power supply from the power line (+B) to the starter (M).

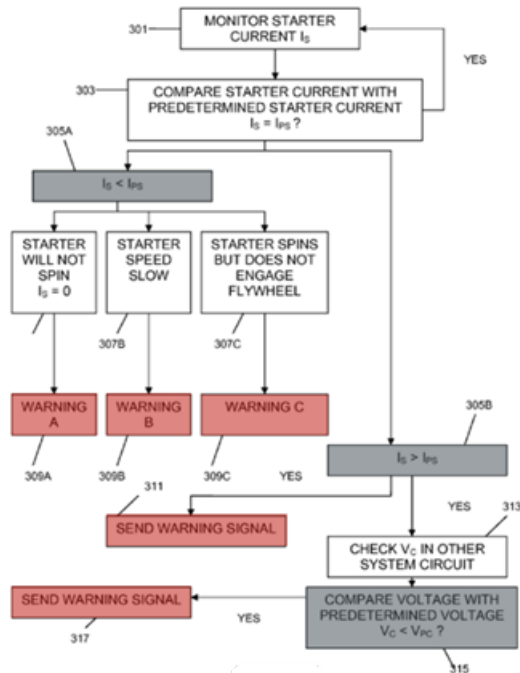
F02N 11/108

{for diagnosis of the starter or its components}

Definition statement

This place covers:

Illustrative example of subject matter classified in this place:



F02N 11/12

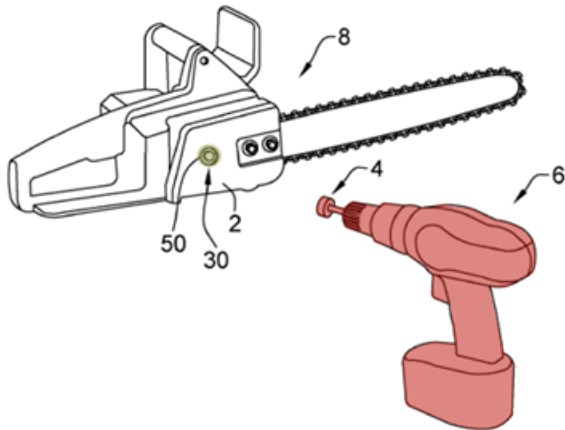
Starting of engines by means of mobile, e.g. portable, starting sets

Definition statement

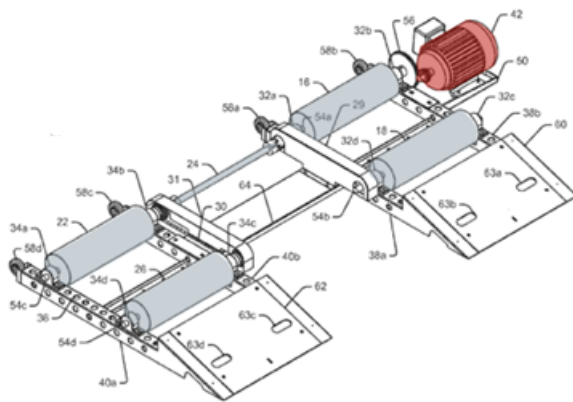
This place covers:

Illustrative examples of subject matter classified in this place:

1.



2.



F02N 11/14

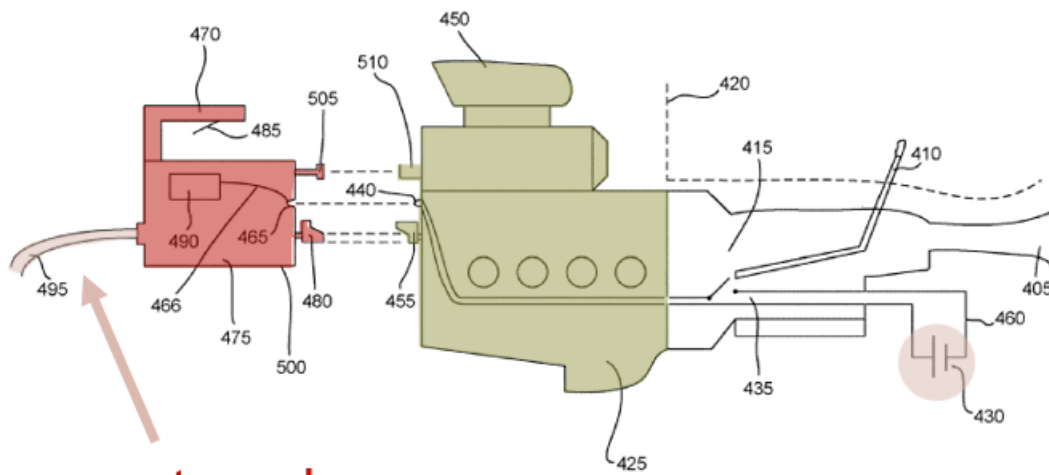
Starting of engines by means of electric starters with external current supply
(F02N 11/12 takes precedence)

Definition statement

This place covers:

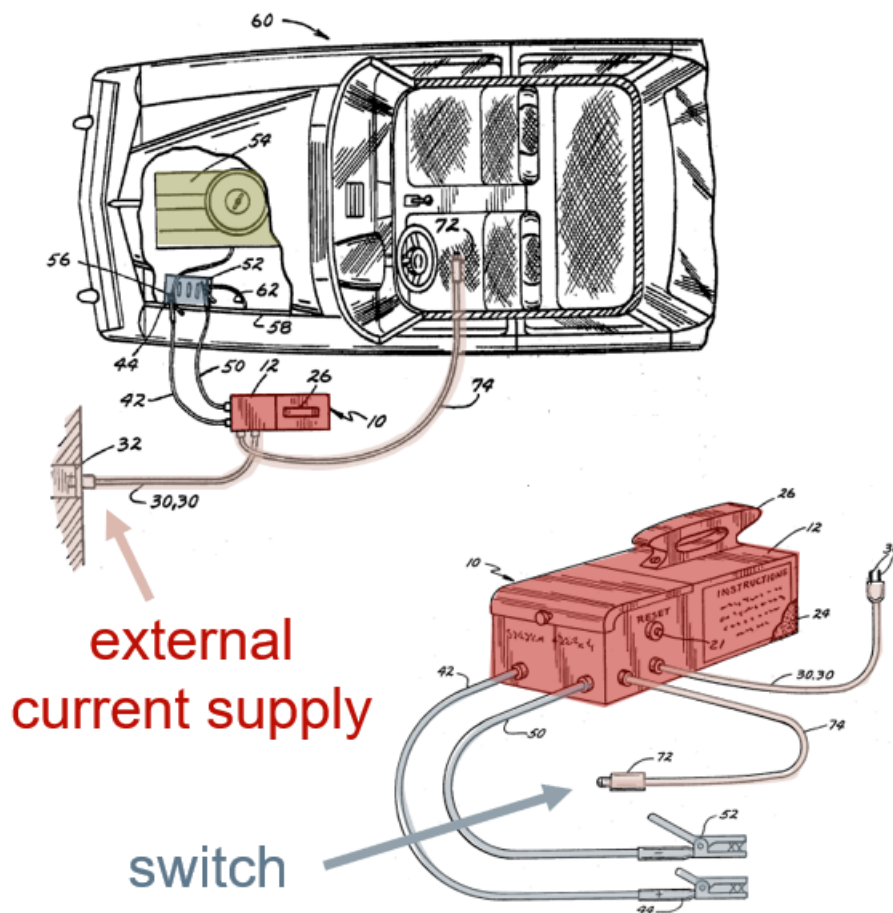
Illustrative examples of subject matter classified in this place:

1.



external
current supply

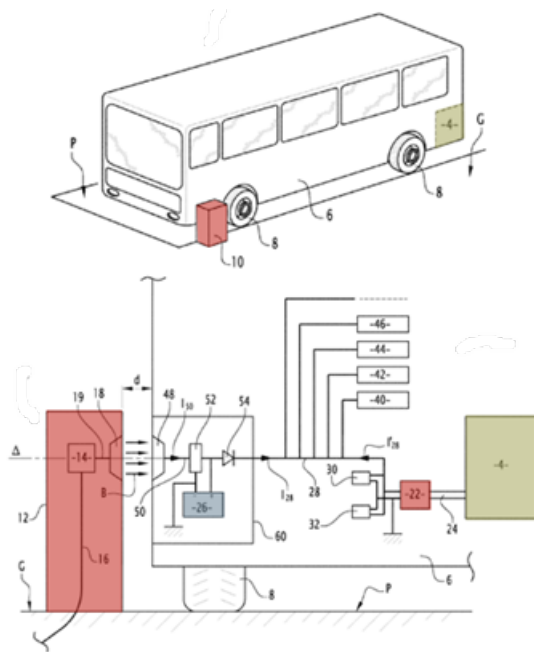
2.



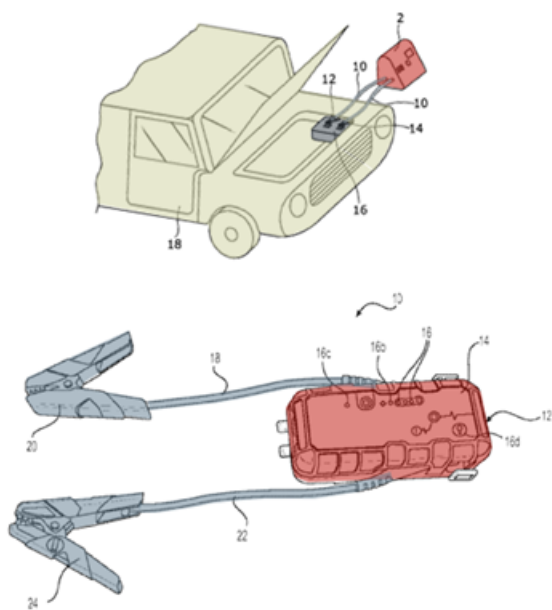
external
current supply

switch

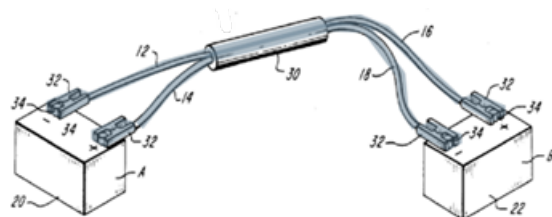
3.



4.



5.



References

Limiting references

This place does not cover:

Starting of engines by means of mobile, e.g. portable, starting sets	F02N 11/12
--	----------------------------

Informative references

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

Provisions for temporary connection of DC sources of essentially the same voltage, e.g. jumpstart cables	H02J 1/122
Parallel operation in networks using both storage and other DC sources, the other DC source being a battery actively interacting with the first one, i.e. battery to battery charging	H02J 7/342

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. The systems could be either portable or structurally fixed to the engine.

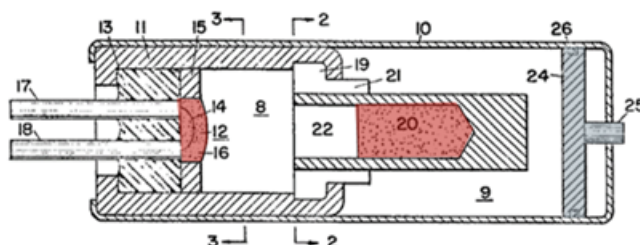
F02N 13/02

Cartridges specially adapted therefor

Definition statement

This place covers:

Illustrative example of subject matter classified in this place:



The Figure illustrates a controlled burning cartridge comprising a first stage incendiary propellant (12) and second stage incendiary propellant (20) for delivering pressurized gas via a conduit (21) to start piston motor (24).

References

Informative references

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

Gas cartridges in general	F42B 3/04
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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:

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

F02N 15/003

{Starters comprising a brake mechanism}

Definition statement

This place covers:

- Components for producing a braking action on the starter rotation;
- Components of the starter producing a braking action on the engine rotation.

Illustrative examples of subject matter classified in this place:

1.

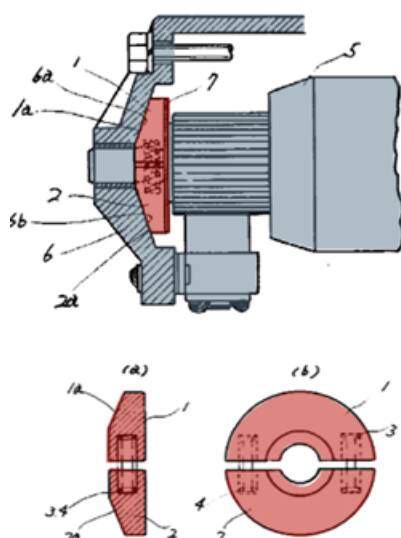


Figure 1 illustrates friction brake elements (1, 2) with springs (3, 4) for pressing tapered braking surfaces (1a, 2a) against end frame (6).

Definition statement

2.

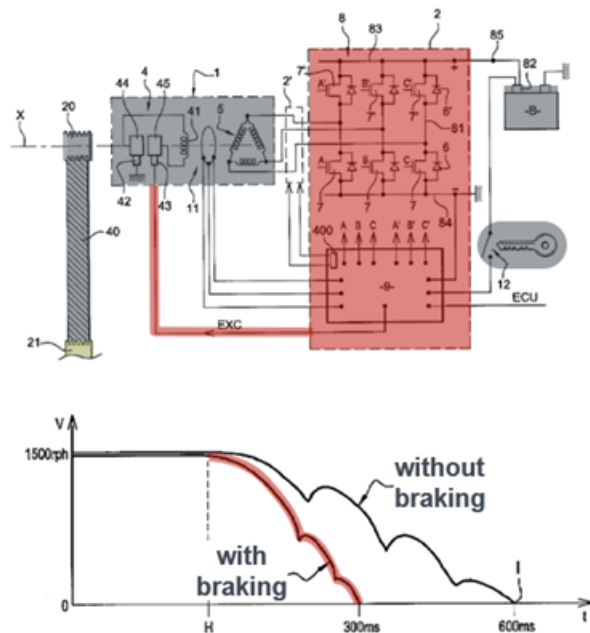


Figure 2 illustrates a power control unit (2) with a wired connection (EXC) to an alternator stator (1) for regulating a voltage (V) used to perform electro-magnetic induced braking within the alternator starter (1).

3.

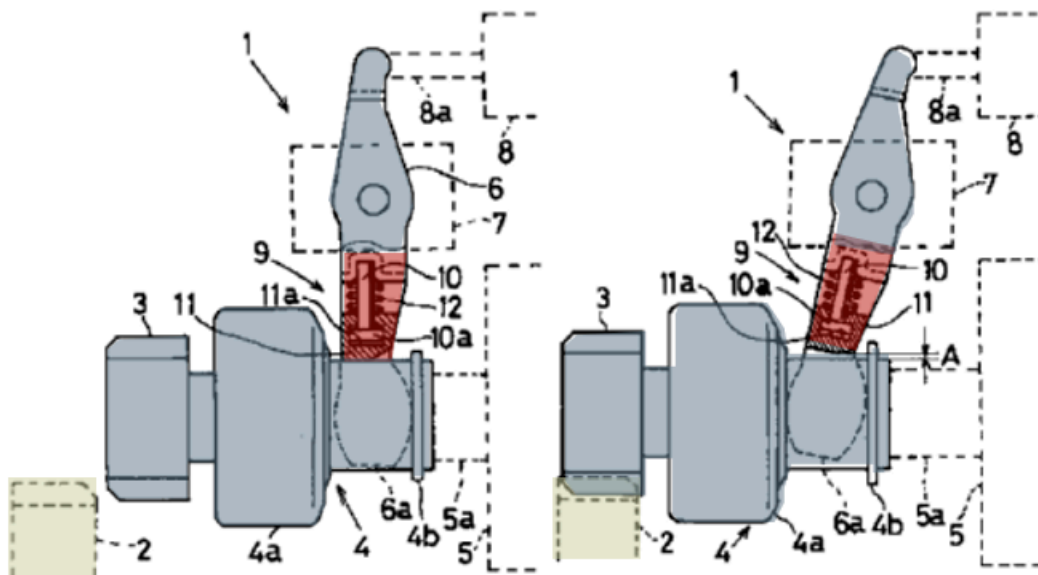


Figure 3 illustrates a brake device (9) comprising a brake member (11) that presses against an outer surface of clutch (4) to stop inertial rotation of pinion (3), clutch (4) and starter motor (5) when the pinion (3) is disengaged from a ring gear (2) used to start an engine.

References

Informative references

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

Vehicle brake control systems or parts thereof; Brake control systems or parts thereof, in general	B60T
Brakes per se	F16D

Special rules of classification

Starters that brake the engine during engine stopping are classified in group [F02N 11/00](#).

Resistors or impedances that dissipate the starter current produced by the inertial rotation of the starter after the engine starts are classified in group [F02N 11/087](#).

Brakes that actually block the starter drive are classified in group [F02N 15/065](#).

F02N 15/02

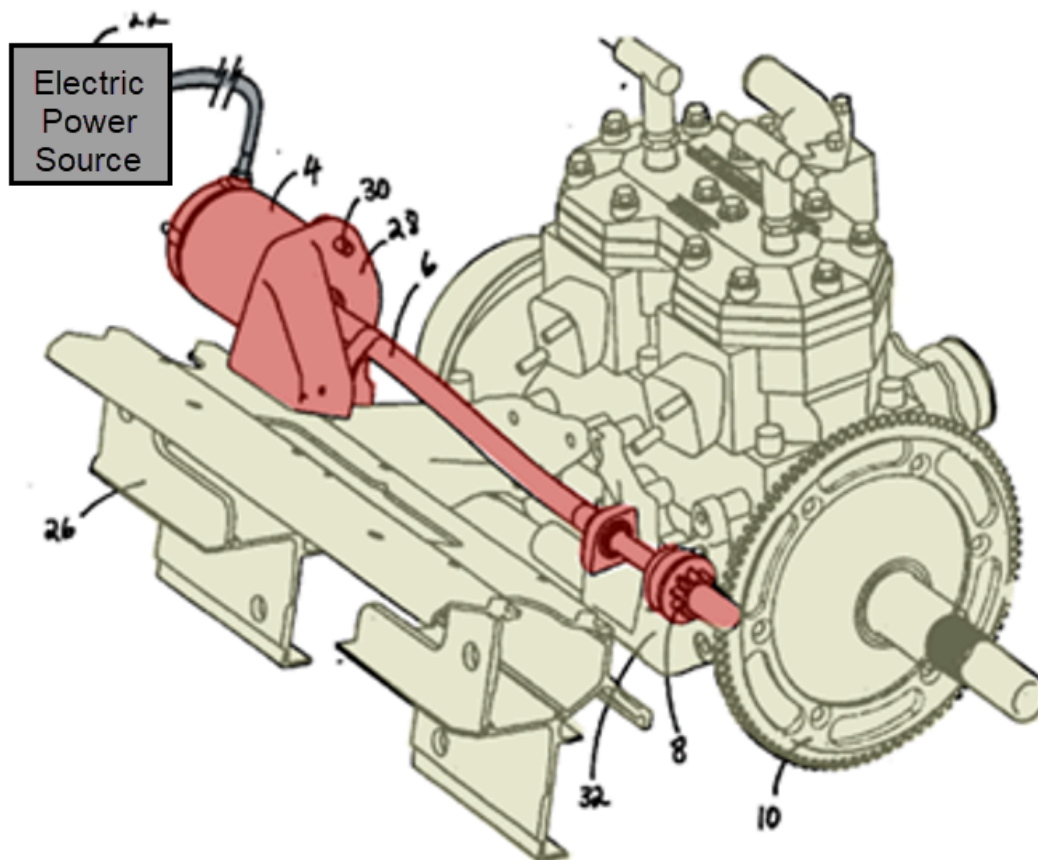
Gearing between starting-engines and started engines; Engagement or disengagement thereof

Definition statement

This place covers:

Connections between the engine and the starting means. The starter does not have to be an electric starter.

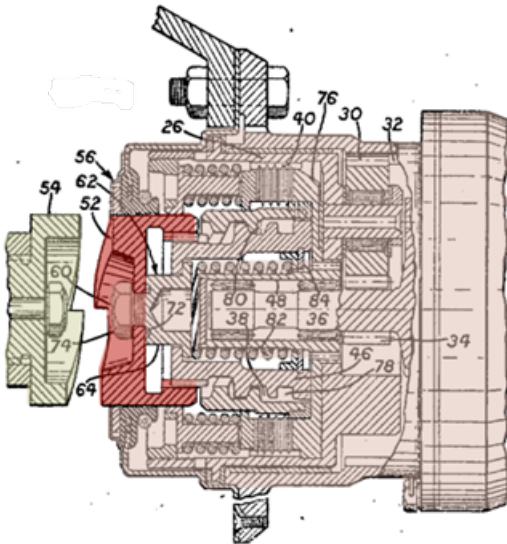
Illustrative example of subject matter classified in this place:



The Figure illustrates a flexible shaft starter system comprising a starter motor (4), a flexible torsion shaft (6) and a pinion gear (8) that start an internal combustion engine via a starter gear (10) connected to a clutch.

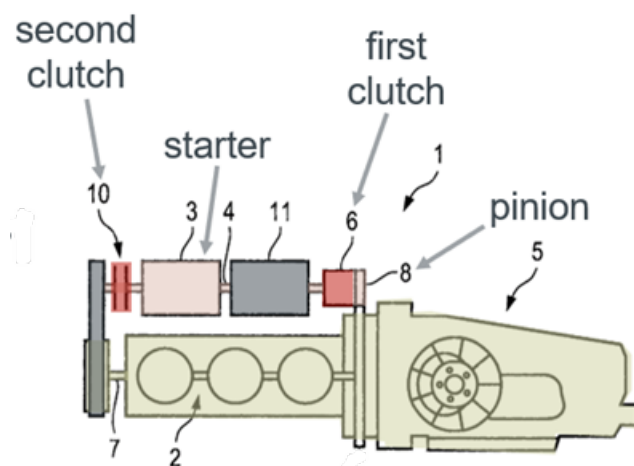
F02N 15/021**{the gearing including disengaging starter jaws}****Definition statement***This place covers:*

Illustrative example of subject matter classified in this place:

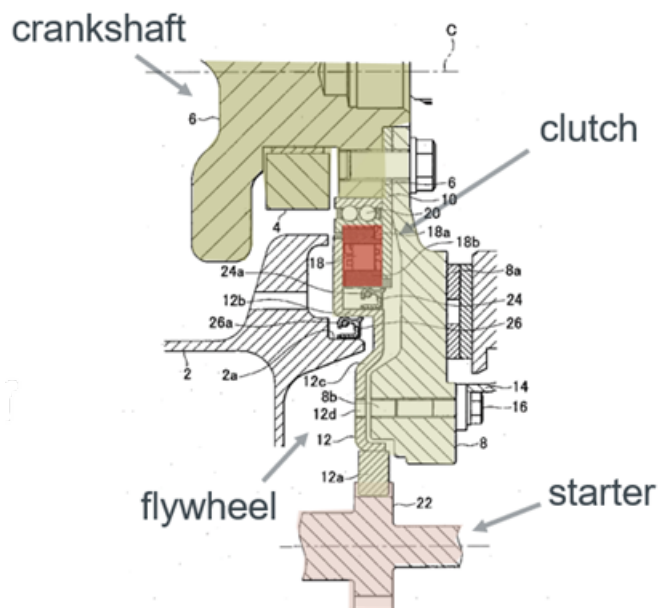
**F02N 15/022****{the starter comprising an intermediate clutch}****Definition statement***This place covers:*

Illustrative examples of subject matter classified in this place:

1.



2.



3.

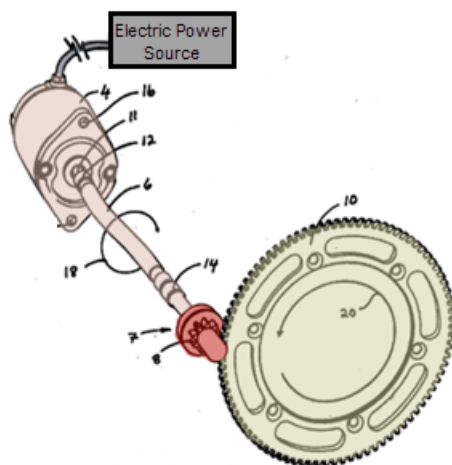


Figure 3 illustrates a flexible shaft starter system comprising a starter motor (4), a flexible torsion shaft (6) and a pinion drive assembly (7) that start an internal combustion engine via a starter gear (10) connected to a clutch.

References

Informative references

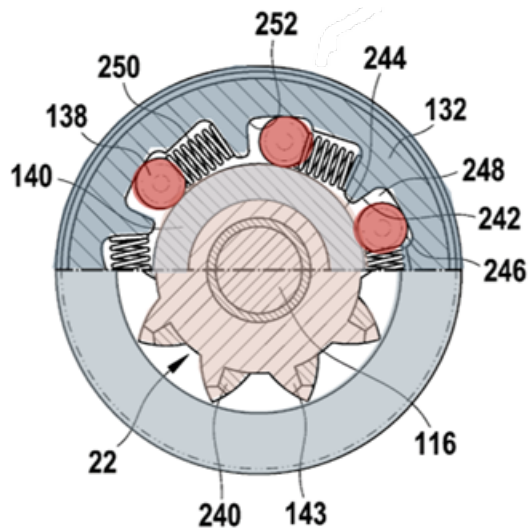
Attention is drawn to the following places, which may be of interest for search:

Couplings for transmitting rotation; Clutches; Brakes	F16D
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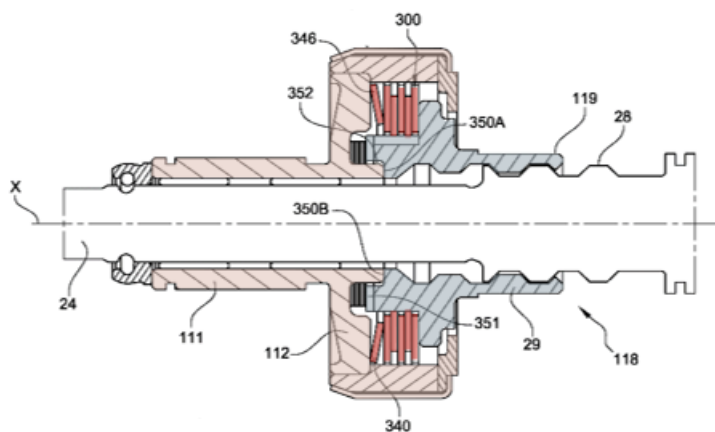
F02N 15/023**{of the overrunning type}****Definition statement***This place covers:*

Starter comprising intermediate clutches of the overrunning or freewheel type.

Illustrative example of subject matter classified in this place:

**F02N 15/025****{of the friction type}****Definition statement***This place covers:*

Illustrative example of subject matter classified in this place:



F02N 15/04**the gearing including disengaging toothed gears****Definition statement***This place covers:*

Disengaged gearing between engine and starting means, e.g. starter.

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 between engine and starter and circuits therefor	F02N 11/0851
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F02N 15/06**the toothed gears being moved by axial displacement****Definition statement***This place covers:*

Illustrative example of subject matter classified in this place:

1a.

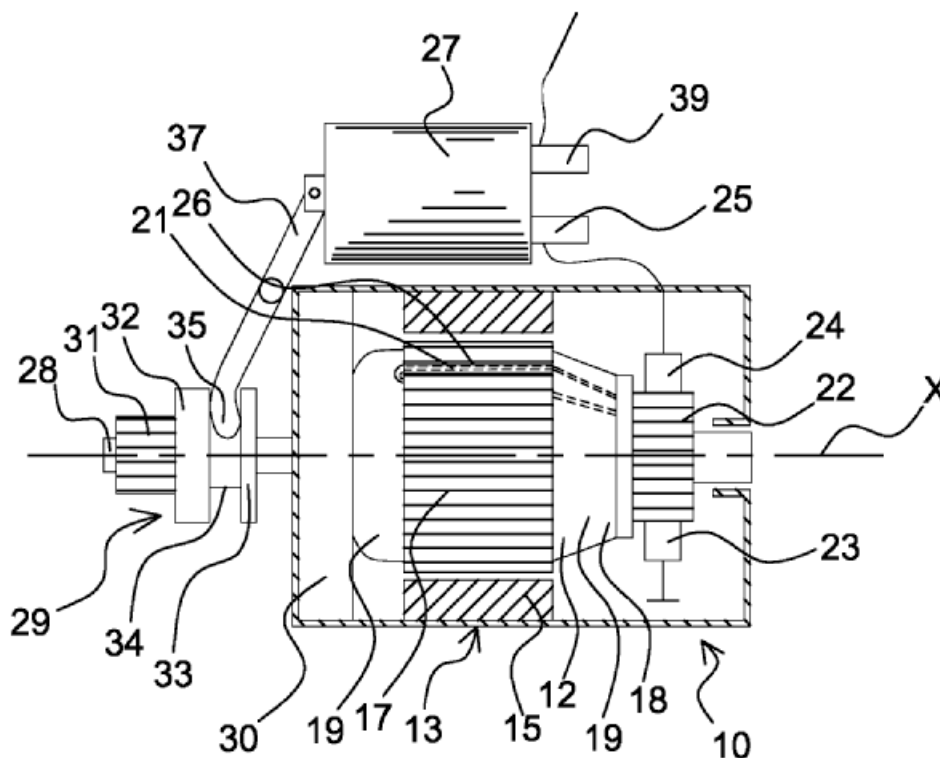


Figure 1a illustrates a control lever (37) pushing pinion (31) and moving it axially outwards.

1b.

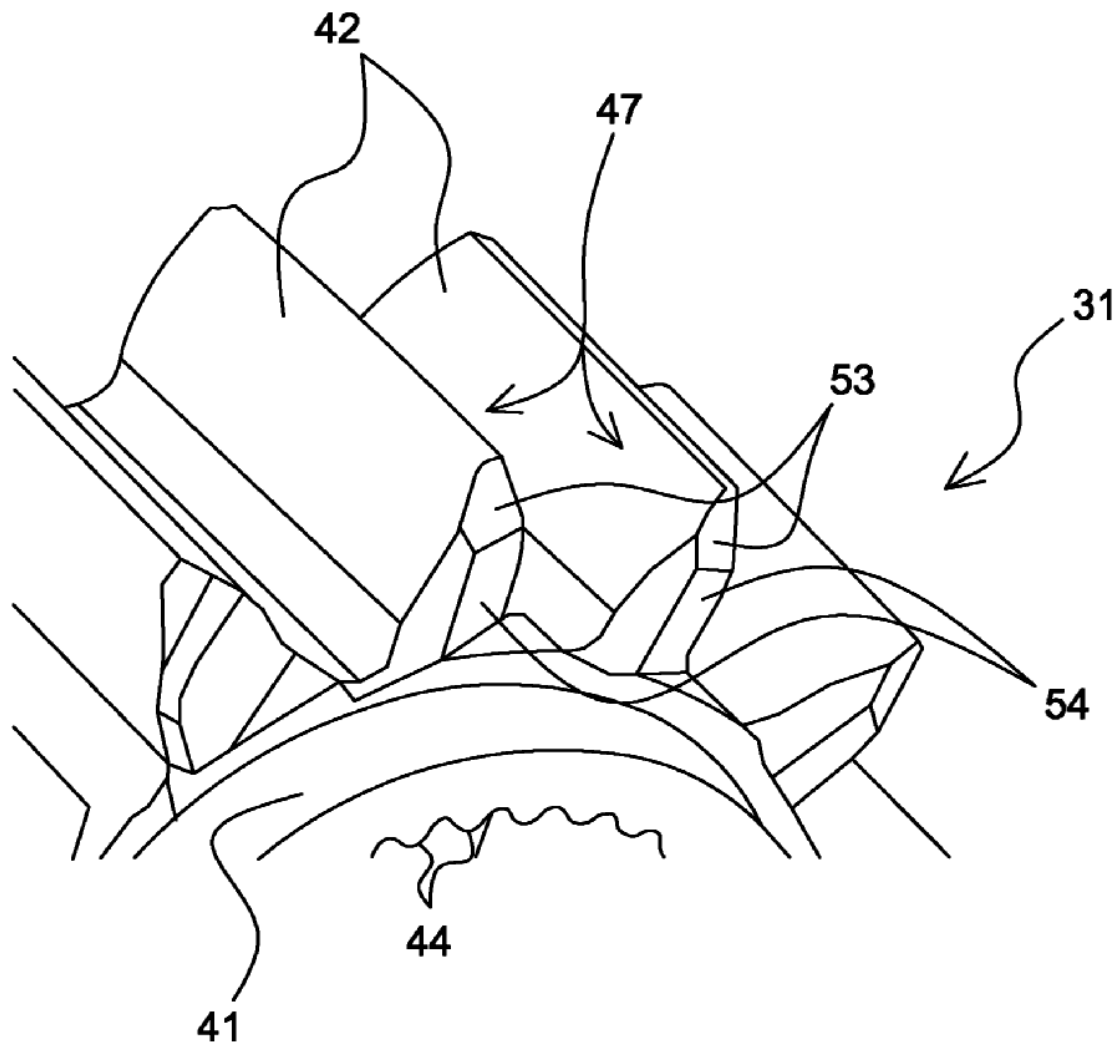


Figure 1b illustrates the pinion (31) of figure 1a with gear teeth (42).

F02N 15/065

{with blocking means}

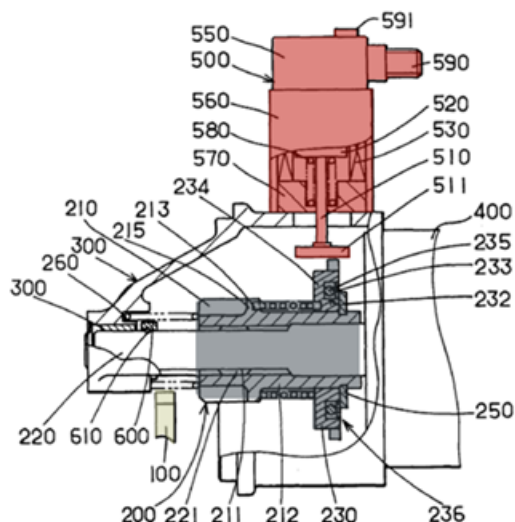
Definition statement

This place covers:

Starter drives with blocking means which prevent the retracting movement of the starter drive back into the disengaged position or which maintain the pinion in the engaged position. The blocking means may not necessarily include an electro-magnetic relay.

Definition statement

Illustrative example of subject matter classified in this place:



The Figure illustrates a starter assembly comprising a regulation member (510, 511) used to move a pinion gear (210) of a pinion assembly (200) into engagement with a ring gear (100) used to start an engine, while blocking backward movement of the pinion assembly (200) via the regulation member (510, 511).

F02N 15/08

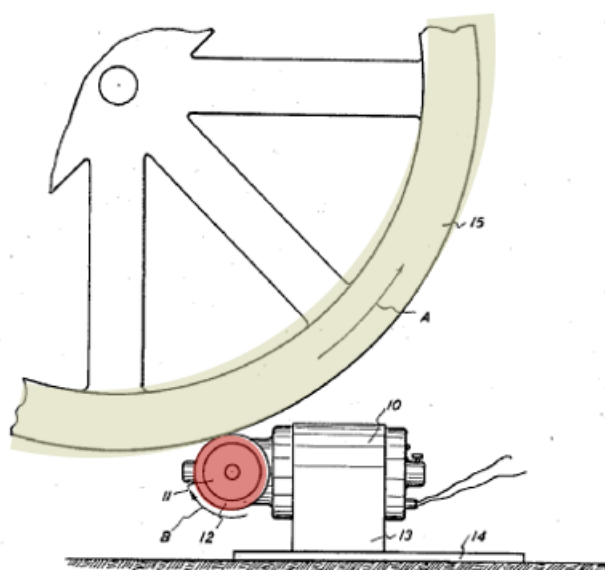
the gearing being of friction type

Definition statement

This place covers:

Friction-type connections between starter and combustion engine, e.g. starters with pulley-belt connection (for instance belt-integrated starter-generators).

Illustrative example of subject matter classified in this place:



References

Informative references

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

Starter/generators	F02N 11/04
Gearings for conveying rotary motion by endless flexible members, in general	F16H 7/00

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

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:

Aiding engine start by using electrically-heated glowing plugs	F02P 19/02
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F02N 19/04**by heating of fluids used in engines****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Heating of lubricants	F01M 5/02
-----------------------	---------------------------

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.