

CPC COOPERATIVE PATENT CLASSIFICATION

F MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING

NOTE

Guide to the use of this subsection (classes [F01-F04](#))

The following notes are meant to assist in the use of this part of the classification scheme.

1. In this subsection, subclasses or groups designating "engines" or "pumps" cover methods of operating the same, unless otherwise specifically provided for.
2. In this subsection, the following terms or expressions are used with the meanings indicated:
 - "engine" means a device for continuously converting fluid energy into mechanical power. Thus, this term includes, for example, steam piston engines or steam turbines, per se, or internal-combustion piston engines, but it excludes single-stroke devices. "Engine" also includes the fluid-motive portion of a meter unless such portion is particularly adapted for use in a meter;
 - "pump" means a device for continuously raising, forcing, compressing, or exhausting fluid by mechanical or other means.
 - Thus, this term includes fans or blowers;
 - "machine" means a device which could equally be an engine and a pump, and not a device which is restricted to an engine or one which is restricted to a pump;
 - "positive displacement" means the way the energy of a working fluid is transformed into mechanical energy, in which variations of volume created by the working fluid in a working chamber produce equivalent displacements of the mechanical member transmitting the energy, the dynamic effect of the fluid being of minor importance, and vice versa;
 - "non-positive displacement" means the way the energy of a working fluid is transformed into mechanical energy, by transformation of the energy of the working fluid into kinetic energy, and vice versa;
 - "oscillating-piston machine" means a positive-displacement machine in which a fluid-engaging work-transmitting member oscillates. This definition applies also to engines and pumps;
 - "rotary-piston machine" means a positive-displacement machine in which a fluid-engaging work-transmitting member rotates about a fixed axis or about an axis moving along a circular or similar orbit. This definition applies also to engines and pumps;
 - "rotary piston" means the work-transmitting member of a rotary-piston machine and may be of any suitable form, e.g., like a toothed gear;
 - "cooperating members" means the "oscillating piston" or "rotary piston" and another member, e.g., the working-chamber wall, which assists in the driving or pumping action;
 - "movement of the co-operating members" is to be interpreted as relative, so that one of the "co-operating members" may be stationary, even though reference may be made to its rotational axis, or both may move;
 - "teeth or tooth equivalents" include lobes, projections or abutments;
 - "internal-axis type" means that the rotational axes of the inner and outer co-operating members remain at all times within the outer member, e.g., in a similar manner to that of a pinion meshing with the internal teeth of a ring gear;
 - "free piston" means a piston of which the length of stroke is not defined by any member driven thereby;
 - "cylinders" means positive-displacement working chambers in general. Thus, this term is not restricted to cylinders of circular cross-section;
 - "main shaft" means the shaft which converts reciprocating piston motion into rotary motion or vice versa;
 - "plant" means an engine together with such additional apparatus as is necessary to run the engine. For example, a steam engine plant includes a steam engine and means for generating the steam;
 - "working fluid" means the driven fluid in a pump or the driving fluid in an engine. The working fluid can be in a compressible, gaseous state, called elastic fluid, e.g. steam; in a liquid state; or in a state where there is coexistence of an elastic fluid and liquid phase.
 - "steam" includes condensable vapours in general, and "special vapour" is used when steam is excluded;
 - "reaction type" as applied to non-positive-displacement machines or engines means machines or engines in which pressure/velocity transformation takes place wholly or partly in the rotor. Machines or engines with no, or only slight, pressure/velocity transformation in the rotor are called "impulse type".
3. In this subsection:
 - cyclically operating valves, lubricating, gas-flow silencers or exhaust apparatus, or cooling are classified in subclasses [F01L](#), [F01M](#), [F01N](#), [F01P](#) irrespective of their stated application, unless their classifying features are peculiar to their application, in which case they are classified only in the relevant subclass of classes [F01-F04](#);
 - lubricating, gas-flow silencers or exhaust apparatus, or cooling of machines or engines are classified in subclasses [F01M](#), [F01N](#), [F01P](#) except for those peculiar to steam engines which are classified in subclass [F01B](#).
4. For use of this subsection with a good understanding, it is essential to remember, so far as subclasses [F01B](#), [F01C](#), [F01D](#), [F03B](#), and [F04B](#), [F04C](#), [F04D](#), which form its skeleton, are concerned:
 - the principle which resides in their elaboration

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(continued)

- the classifying characteristics which they call for, and
- their complementarity

i. Principle

This concerns essentially the subclasses listed above. Other subclasses, notably those of class [F02](#), which cover better-defined matter, are not considered here.

Each subclass covers fundamentally a genus of apparatus (engine or pump) and by extension covers equally "machines" of the same kind. Two different subjects, one having a more general character than the other, are thus covered by the same subclass.

Subclasses [F01B](#), [F03B](#), [F04B](#), beyond the two subjects which they cover, have further a character of generality in relation to other subclasses concerning the different species of apparatus in the genus concerned.

This generality applies as well for the two subjects dealt with, without these always being in relation to the same subclasses.

Thus, subclass [F03B](#), in its part dealing with "machines", should be considered as being the general class relating to subclasses [F04B](#), [F04C](#), and in its part dealing with "engines" as being general in relation to subclass [F03C](#).

ii. Characteristics

- a. The principal classifying characteristic of the subclass is that of genera of apparatus, of which there are three possible:

Machines; engines; pumps.

- b. As stated above, "machines" are always associated with one of the other two genera. These main genera are subdivided according to the general principles of operation of the apparatus:

Positive displacement; non-positive displacement.

- c. The positive displacement apparatus are further subdivided according to the ways of putting into effect the principle of operation, that is, to the kind of apparatus:

Simple reciprocating piston; rotary or oscillating piston; other kind.

- d. Another classifying characteristic is that of the working fluid, in respect of which three kinds of apparatus are possible, namely:

Liquid and elastic fluid; elastic fluid; liquid.

iii. Complementarity

This resides in association of pairs of the subclasses listed above, according to the characteristics under consideration in respect of kind of apparatus or working fluid.

The subclasses concerned with the various principles, characteristics and complementarity are shown in the following table:

Kind of displacement	positive reciprocating piston	rotary or oscillating piston	non-positive elastic fluid	Working fluid liquid and elastic fluid	Relations of generality in respect of kind of displacement
<hr/>					
MACHINES					
X	X		X	X	F01B
X		X	X		F01C
X	X	X	F01D		
X		X	F03B		
X		X		X	F04B
X				X	F04C
<hr/>					
ENGINES					
X		X	X	X	F01B
X		X	X		F01C
X	X	X	F01D		
X		X	F03B		
X	X	X		X	F03C
<hr/>					
PUMPS					

F (continued)	X		X		X		X		X	F04B
	X			X		X		X		F04C
	X	X	X		X					F04D

It is seen from the table that :

- For the same kind of apparatus in a given genus, the characteristic of "working fluid" associates:

[F01B](#) and [F04B](#))

[F01C](#) and [F04C](#)) Machines

[F01D](#) and [F03B](#))

[F01B](#) and [F03C](#))

[F01C](#) and [F03C](#)) Engines

[F01D](#) and [F03B](#))

- For the same kind of working fluid, the "apparatus" characteristic relates subclasses in the same way as considerations of relative generality.

ENGINES OR PUMPS

F01 MACHINES OR ENGINES IN GENERAL; ENGINE PLANTS IN GENERAL; STEAM ENGINES

F01B MACHINES OR ENGINES, IN GENERAL OR OF POSITIVE-DISPLACEMENT TYPE, e.g. STEAM ENGINES (of rotary-piston or oscillating-piston type [F01C](#); of non-positive-displacement type [F01D](#); internal-combustion aspects of reciprocating-piston engines [F02B 57/00](#), [F02B 59/00](#); crankshafts, crossheads, connecting-rods [F16C](#); flywheels [F16F](#); gearings for interconverting rotary motion and reciprocating motion in general [F16H](#); pistons, piston rods, cylinders, for engines in general [F16J](#))

NOTES

1. This subclass covers, with the exception of the matter provided for in subclasses [F01C](#) - [F01P](#) :
 - engines for elastic fluids, e.g. steam engines;
 - engines for liquids and elastic fluids;
 - machines for elastic fluids;
 - machines for liquids and elastic fluids.
2. Attention is drawn to the note preceding class [F01](#), especially as regards the definitions of "steam" and "special vapour".

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.

F01C ROTARY-PISTON OR OSCILLATING-PISTON MACHINES OR ENGINES (internal-combustion aspects [F02B 53/00](#), [F02B 55/00](#))

NOTES

1. This subclass covers:
 - rotary-piston or oscillating-piston engines for elastic fluids, e.g. steam;
 - rotary-piston or oscillating-piston engines for liquids and elastic fluids;
 - rotary-piston or oscillating-piston machines for elastic fluids;
 - rotary-piston or oscillating-piston machines for liquids and elastic fluids.
2. In this subclass, the following expression is used with the meaning indicated:
 - "rotary-piston machine" includes the German expressions "Drehkolbenmaschinen", "Kreiskolbenmaschinen" and "Umlaufkolbenmaschinen".
3. Attention is drawn to the Notes preceding class [F01](#), especially as regards the definitions of "rotary-piston machine", "oscillating-piston machine", "rotary piston", "co-operating members", "movement of co-operating members", "teeth or tooth-equivalents" and "internal-axis".

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.

F01D NON-POSITIVE DISPLACEMENT MACHINES OR ENGINES, e.g. STEAM TURBINES (machines or engines for liquids [F03](#); non-positive displacement pumps [F04D](#))

NOTES

1. This subclass covers:
 - non-positive-displacement engines for elastic fluids, e.g. steam turbines;
 - non-positive-displacement engines for liquids and elastic fluids;
 - non-positive-displacement machines for elastic fluids;
 - non-positive-displacement machines for liquids and elastic fluids.
2. Attention is drawn to the Notes preceding class [F01](#), especially as regards the definitions of "reaction type", e.g. with airfoil-like blades, and "impulse type", e.g. bucket turbines.

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.

F01K STEAM ENGINE PLANTS; STEAM ACCUMULATORS; ENGINE PLANTS NOT OTHERWISE PROVIDED FOR; ENGINES USING SPECIAL WORKING FLUIDS OR CYCLES (gas-turbine or jet-propulsion plants [F02](#); nuclear power plants, engine arrangements therein [G21D](#))

NOTE

Attention is drawn to the notes preceding class [F01](#), especially as regards the definitions of "steam" and "special vapour".

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.

F01L CYCLICALLY OPERATING VALVES FOR MACHINES OR ENGINES

NOTES

1. Groups [F01L 1/00](#) - [F01L 13/00](#) cover only valve-gear or valve arrangements without provision for variable fluid distribution.
2. Valve gear or valve arrangements specially adapted for steam engines are covered by groups [F01L 15/00](#) - [F01L 35/00](#).
3. Valve-gear arrangements specially adapted for machines or engines with variable working-fluid distribution are covered by groups [F01L 15/00](#) - [F01L 35/00](#).
4. Attention is drawn to the notes preceding class [F01](#), especially Note (3).
5. As regards the above-mentioned Note (3), attention is drawn to [F01B 3/10](#), [F01B 15/06](#), [F01C 21/18](#), [F02B 53/06](#), [F03C 1/08](#), [F04B 1/18](#), [F04B 7/00](#), [F04B 39/08](#), [F04B 39/10](#), and [F04C 15/06](#), [F04C 29/12](#).

WARNING

The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:

F01L 31/20	covered by	F01L 31/08 - F01L 31/18
F01L 31/22	covered by	F01L 31/08 - F01L 31/18
F01L 31/24	covered by	F01L 31/08 - F01L 31/18

F01M LUBRICATING OF MACHINES OR ENGINES IN GENERAL; LUBRICATING INTERNAL COMBUSTION ENGINES; CRANKCASE VENTILATING

NOTE

Attention is drawn to the notes preceding class [F01](#), specially as regards Note (3).

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.

F01N GAS-FLOW SILENCERS OR EXHAUST APPARATUS FOR MACHINES OR ENGINES IN GENERAL; GAS-FLOW SILENCERS OR EXHAUST APPARATUS FOR INTERNAL COMBUSTION ENGINES ({[evacuation of fumes from the area where they are produced B08B 15/00](#); [arrangement of exhaust or silencing apparatus on percussive tools B25D 17/12](#)} ; [arrangements in connection with gas exhaust of propulsion units in vehicles B60K 13/00](#), {[on ships or other waterborne vessels B63H 21/32](#), [on aircraft B64D 33/04](#); [arrangement of exhaust or silencing apparatus on firearms F41A 21/30](#); [ground installations for reducing aircraft engine or jet noise B64F 1/26](#); [silencers specially adapted for steam engines F01B 31/16](#); [air-intake silencers for gas turbine or jet propulsion plants F02C 7/045](#); [jet pipe or nozzles for jet propulsion plants F02K](#)} ; [combustion-air intake silencers specially adapted for, or arranged on, internal-combustion engines F02M 35/00](#); {[combating noise or silencing in positive displacement machines or pumps F04B 39/0027](#), [in rotary-piston machines or pumps F04C 29/06](#), [in non-positive displacement pumps F04D 29/66](#); [means in valves for absorbing noise F16K 47/02](#); [noise absorbers in pipe system F16L 55/02](#); [conducting smoke or fumes from various locations to the outside F23J 11/00](#); [means for preventing or suppressing noise in air-conditioning or ventilation systems F24F 13/24](#)} ; [protecting against, or damping, noise in general G10K 11/16](#))

NOTE

Attention is drawn to the notes preceding Class [F01](#), especially as regards Note 2(b).

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.

F01P COOLING OF MACHINES OR ENGINES IN GENERAL; COOLING OF INTERNAL-COMBUSTION ENGINES ([arrangements in connection with cooling of propulsion units in vehicles B60K 11/00](#); [heat-transfer, heat-exchange or heat-storage materials C09K 5/00](#); {[cooling of gas-turbine engines F02C 7/12](#)}; [heat exchange in general, radiators F28](#))

NOTES

- In this subclass, the following terms or expressions are used with the meanings indicated:
 - "air" also includes other gaseous cooling fluids;
 - "liquid cooling" also includes cooling where liquid is used as the heat transferring fluid between parts to be cooled and the air, e.g. using radiators;
 - "air cooling" means direct air cooling and thus excludes indirect air cooling occurring in liquid cooling systems as explained herefore;
 - "cooling-air" includes directly or indirectly acting cooling-air.
- Attention is drawn to the notes preceding class [F01](#), especially as regards Note (3).
- Cooling by lubricant is classified in subclass [F01M](#) when the lubrication aspect predominates and in subclass [F01P](#) when the cooling aspect predominates.

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.

F02 COMBUSTION ENGINES; HOT-GAS OR COMBUSTION-PRODUCT ENGINE PLANTS

F02B INTERNAL-COMBUSTION PISTON ENGINES; COMBUSTION ENGINES IN GENERAL ([gas-turbine plants F02C](#); [hot-gas or combustion-product positive-displacement engine plants F02G](#))

NOTES

- In this subclass, the following terms or expressions are used with the meanings indicated:
 - "positive ignition" means ignition by a source external to the working fluid, e.g. by spark or incandescent source;
 - "charging" means forcing air or fuel-air mixture into engine cylinders, and thus includes supercharging;

- F02B
(continued)
- "scavenging" means forcing the combustion residues from the cylinders other than by movement of the working pistons, and thus includes tuned exhaust systems.
2. Attention is drawn to the Notes preceding class [F01](#), especially as regards Note (1).
 3. Engines with specified cycles or number of cylinders are classified in group [F02B 75/02](#) or [F02B 75/16](#), unless other classifying features predominate.

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.}

F02C **GAS-TURBINE PLANTS; AIR INTAKES FOR JET-PROPULSION PLANTS; CONTROLLING FUEL SUPPLY IN AIR-BREATHING JET-PROPULSION PLANTS** (construction of turbines [F01D](#); jet-propulsion plants [F02K](#); construction of compressors or fans [F04](#); generating combustion products of high pressure or high velocity [F23R](#); using gas turbines in compression refrigeration plants [F25B 11/00](#))

NOTES

1. This subclass covers:
 - combustion product or hot gas turbine plants;
 - internal combustion turbines or turbine plants;
 - turbine plants in which the working fluid is an unheated, pressurised gas.
2. This subclass does not cover:
 - steam turbine plants, which are covered by subclass [F01K](#);
 - special vapour plants, which are covered by subclass [F01K](#).
 - { combined cycle plants, which are covered by subclass [F01K 23/00](#) }
3. In this subclass, the following expression is used with the meaning indicated:
 - "gas-turbine plants" covers all the subject matter of Note (1) above and covers also features of jet-propulsion plants common to gas-turbine plants.
4. Attention is drawn to the Notes preceding class [F01](#).

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.

F02D **CONTROLLING COMBUSTION ENGINES** (vehicle fittings, acting on a single sub-unit only, for automatically controlling vehicle speed [B60K 31/00](#); conjoint control of vehicle sub-units of different type or different function, road vehicle drive control systems for purposes other than the control of a single sub-unit [B60W](#))

NOTES

1. In this subclass, the following term or expression is used with the meanings indicated:
 - "fuel injection" means the introduction of a combustible substance into a space, e.g. cylinder, by means of a pressure source, e.g. a pump, continuously or cyclically acting behind the substance;
 - "supercharging" means supplying to the working space, e.g. cylinder, combustion-air pressurised by means of a pressure source, e.g. a pump.
2. Attention is drawn to the Notes preceding class [F01](#).
3. In this subclass, electrical aspects of control arrangements are classified in groups [F02D 41/00](#) - [F02D 45/00](#).

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.}

F02F **CYLINDERS, PISTONS OR CASINGS, FOR COMBUSTION ENGINES; ARRANGEMENTS OF SEALINGS IN COMBUSTION ENGINES**

NOTES

1. Attention is drawn to the notes preceding class [F01](#).
2. In considering the relationship between class [F16](#) and subclass [F02F](#), class [F16](#) will take precedence unless the subject-matter is specific to combustion engines.

F02G HOT GAS OR COMBUSTION-PRODUCT POSITIVE-DISPLACEMENT ENGINE PLANTS (steam engine plants, special vapour plants, plants operating on either hot gas or combustion-product gases together with other fluid [F01K](#); gas-turbine plants [F02C](#); jet-propulsion plants [F02K](#)); **USE OF WASTE HEAT OF COMBUSTION ENGINES; NOT OTHERWISE PROVIDED FOR**

NOTE

Attention is drawn to the notes preceding class [F01](#).

F02K JET-PROPULSION PLANTS (features of jet-propulsion plants common to gas-turbine plants, air intakes or fuel supply control of air-breathing jet-propulsion plants [F02C 7/00](#), [F02C 9/00](#))

NOTES

1. In this subclass, the following expression is used with the meaning indicated:
 - "jet-propulsion plants" means plants using combustion to produce a fluid stream from which a propulsive thrust on the plant is obtained on the reaction principle.
 - {"jet-pipe" means the exhaust duct of a jet engine that carries the exhaust to the nozzle.}
2. Attention is drawn to the notes preceding class [F01](#).

F02M SUPPLYING COMBUSTION ENGINES IN GENERAL WITH COMBUSTIBLE MIXTURES OR CONSTITUENTS THEREOF

NOTES

1. Attention is drawn to the notes preceding class [F01](#).
2. In this subclass the following terms are used with the meanings indicated:
 - "Carburettors" means essentially apparatus for mixing fuel with air, the fuel being brought into mixing contact with the air by lowering the air pressure, e.g. in a venturi;
 - "Fuel injection apparatus" means apparatus for introducing fuel into a space, e.g. engine cylinder, by pressurising the fuel, e.g. by a pump acting behind the fuel, and thus embraces the so-called "solid fuel injection" in which liquid fuel is introduced without any admixture of gas;
 - "Low-pressure fuel injection" means fuel injection in which the fuel-air mixture containing fuel thus injected will be substantially compressed in the compression stroke of the engine;
 - "Pumping element" means a single piston-cylinder unit in a reciprocating-piston fuel-injection pump or the equivalent unit in any other type of fuel-injection pump.

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.}

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.

F02P **IGNITION, OTHER THAN COMPRESSION IGNITION, FOR INTERNAL-COMBUSTION ENGINES; TESTING OF IGNITION TIMING IN COMPRESSION-IGNITION ENGINES** ([{anti-pollution means for internal-combustion engines F02B 17/00}](#); [specially adapted for rotary-piston or oscillating-piston engines F02B 53/12](#); [{ignition of gas turbine plants F02C 7/26}](#); [ignition of jet propulsion plants F02K 9/95](#); [starting of combustion engines F02N 9/00](#)}; [ignition of combustion apparatus in general, glowing plugs F23Q](#); [measuring of physical variables in general G01](#); [controlling in general G05](#); [data processing in general G06](#); [electrical components in general see Section H](#); [{ignition coils H01F 38/12}](#); [sparking plugs H01T 13/00](#))

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.

F03 **MACHINES OR ENGINES FOR LIQUIDS; WIND, SPRING, OR WEIGHT MOTORS; PRODUCING MECHANICAL POWER OR A REACTIVE PROPULSIVE THRUST, NOT OTHERWISE PROVIDED FOR**

F03B **MACHINES OR ENGINES FOR LIQUIDS** ([positive-displacement engines for liquid F03C](#); [machines for liquids and gases F01](#); [positive-displacement machines for liquids F04](#), [rotary fluid gearing of the hydrokinetic type F16H 41/00](#))

NOTES

1. Attention is drawn to the notes preceding Class [F01](#), especially as regards the definition of "reaction type".
2. This subclass comprises:
 - engines, other than of positive-displacement type, driven by liquids;
 - machines, other than of positive-displacement type, for liquids.

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.

F03C **POSITIVE-DISPLACEMENT ENGINES DRIVEN BY LIQUIDS** ([positive- displacement engines for liquids and elastic fluids F01](#); [positive- displacement machines for liquids F04](#); [fluid-pressure actuators F15B](#); [fluid gearing F16H](#))

NOTE

Attention is drawn to the notes preceding class [F01](#), especially as regards the meanings of "positive displacement", "rotary-piston machines", "oscillating-piston machines", "rotary-piston", "co-operating members", "movement of co-operating members", "teeth or tooth-equivalents", and "internal axis".

WARNINGS

1. The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:

F03C 1/253	covered by	F03C 1/06
F03C 1/28	covered by	F03C 1/0406 , F03C 1/0605
F03C 1/30	covered by	F03C 1/0409 , F03C 1/0631 , F03C 1/0668
F03C 1/32	covered by	F03C 1/0415 , F03C 1/0626 , F03C 1/0652
F03C 1/34	covered by	F03C 1/0435 , F03C 1/0615 , F03C 1/0655
F03C 1/36	covered by	F03C 1/0435 , F03C 1/0615 , F03C 1/0655
F03C 1/38	covered by	F03C 1/0435 , F03C 1/0615 , F03C 1/0655
F03C 1/40	covered by	F03C 1/0447 , F03C 1/0678
2. 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.

F03D WIND MOTORS**NOTES**

1. This subclass covers wind motors, i.e. mechanisms for converting the energy of wind into useful mechanical power, and the transmission of such power to its point of use.
2. This subclass does not cover electrical power generation or distribution aspects of wind-power plants, which are covered by section [H](#), e.g. [H02J](#) or [H02P](#).
3. In this subclass, the following terms or expressions are used with the meanings indicated:
 - "rotor" means the wind-engaging parts of the wind motor and the rotary member carrying them;
 - "rotation axis" means the axis of rotation of the rotor.

F03G SPRING, WEIGHT, INERTIA OR LIKE MOTORS; MECHANICAL-POWER PRODUCING DEVICES OR MECHANISMS, NOT OTHERWISE PROVIDED FOR OR USING ENERGY SOURCES NOT OTHERWISE PROVIDED FOR (arrangements in connection with power supply in vehicles from force of nature [B60K 16/00](#); electric propulsion with power supply in vehicles from force of nature [B60L 8/00](#))

NOTE

In this subclass, the following term is used with the meaning indicated:

- "motors" means mechanisms for producing mechanical power from potential energy of solid bodies.

F03H PRODUCING A REACTIVE PROPULSIVE THRUST, NOT OTHERWISE PROVIDED FOR (from combustion products [F02K](#))

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.

F04 POSITIVE - DISPLACEMENT MACHINES FOR LIQUIDS; PUMPS FOR LIQUIDS OR ELASTIC FLUIDS

NOTE

Combinations of positive-displacement and non-positive displacement pumps are classified in subclass [F04B](#) as a general subclass for pumps and in subclasses [F04C](#), [F04D](#) in respect of matter specific to these subclasses.

F04B POSITIVE-DISPLACEMENT MACHINES FOR LIQUIDS; PUMPS (machines for liquids, or pumps, of rotary-piston or oscillating-piston type [F04C](#); non-positive-displacement pumps [F04D](#); pumping of fluid by direct contact of another fluid or by using inertia of fluid to be pumped [F04F](#))

NOTES

1. In this subclass, the following term is used with the meaning indicated:
 - "piston" also covers a plunger.
2. Attention is drawn to the Notes following the titles of class [B81](#) and subclass [B81B](#) relating to "microstructural devices" and "microstructural systems".
3. Attention is drawn to the Notes preceding class [F01](#), especially as regards the definitions of "machines", "pumps", and "positive displacement".
4. Machines, pumps or pumping installations having flexible working members are classified in groups [F04B 43/00](#) or [F04B 45/00](#).

WARNING

The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:

[F04B 35/02](#)

covered by

[F04B 9/08](#)

F04C ROTARY-PISTON, OR OSCILLATING-PISTON, POSITIVE-DISPLACEMENT MACHINES FOR LIQUIDS ([engines F03C](#)); ROTARY-PISTON, OR OSCILLATING-PISTON, POSITIVE-DISPLACEMENT PUMPS

NOTE

Attention is drawn to the notes preceding class [F01](#) especially as regards the definitions of "machines", "pumps", "positive displacement", "rotary-piston machines", "oscillating-piston machines", "rotary piston", "co-operating members", "movement of co-operating members", "teeth or tooth-equivalents" and "internal axis".

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.

F04D NON-POSITIVE-DISPLACEMENT PUMPS ([engine fuel-injection pumps F02M](#); [ion pumps H01J 41/12](#); [electrodynamic pumps H02K 44/02](#))

NOTES

1. This subclass covers non-positive-displacement pumps for liquids, for elastic fluids, or for liquids and elastic fluids whether rotary or not having pure rotation.
2. This subclass does not cover combinations of non-positive-displacement pumps with other pumps, which are covered by subclass [F04B](#), except that the use of such other pumps for priming or boosting non-positive-displacement is covered by this subclass.
3. Attention is drawn to the Notes preceding class [F01](#), especially as regards the definition of "pump".

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.

F04F PUMPING OF FLUID BY DIRECT CONTACT OF ANOTHER FLUID OR BY USING INERTIA OF FLUID TO BE PUMPED {([evacuating by sorption F04B](#))}; SIPHONS {([conveying materials in bulk by flows of gas, liquid of foam B65G 53/00](#))}

NOTES

1. Attention is drawn to the notes preceding class [F01](#).
2. Combinations of pumps belonging to this subclass with other pumps are only classified in this subclass if such other pumps are fore pumps of diffusion pumps.

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.

F05 INDEXING SCHEMES RELATING TO ENGINES OR PUMPS IN VARIOUS SUBCLASSES OF CLASSES [F01-F04](#)

F05B INDEXING SCHEME RELATING TO WIND, SPRING, WEIGHT, INERTIA OR LIKE MOTORS, TO MACHINES OR ENGINES FOR LIQUIDS COVERED BY SUBCLASSES [F03B](#), [F03D](#) AND [F03G](#)

NOTE

This subclass constitutes an internal scheme for indexing only.

F05C INDEXING SCHEME RELATING TO MATERIALS, MATERIAL PROPERTIES OR MATERIAL CHARACTERISTICS FOR MACHINES, ENGINES OR PUMPS OTHER THAN NON-POSITIVE-DISPLACEMENT MACHINES OR ENGINES

NOTE

This subclass constitutes an internal scheme for indexing only.

F05D INDEXING SCHEME FOR ASPECTS RELATING TO NON-POSITIVE-DISPLACEMENT MACHINES OR ENGINES, GAS-TURBINES OR JET-PROPULSION PLANTS

ENGINEERING IN GENERAL

F15 FLUID-PRESSURE ACTUATORS; HYDRAULICS OR PNEUMATICS IN GENERAL

F15B SYSTEMS ACTING BY MEANS OF FLUIDS IN GENERAL; FLUID-PRESSURE ACTUATORS, e.g. SERVO MOTORS; DETAILS OF FLUID-PRESSURE SYSTEMS, NOT OTHERWISE PROVIDED FOR

NOTE

In this subclass, the following terms are used with the meaning stated:

- "Telemotor" means a system or device in which a substantially constant amount of fluid is trapped between an input member and an output member to act as a fluid link;
- "Servomotor" means a fluid-pressure actuator, e.g. a piston and cylinder, directly controlled by a valve or other device which is responsive to operation of an initial controlling member; "Servomotor" does not cover a telemotor. The initial controlling member may be adjacent to the servomotor or at a distance, and may be, for example a hand lever.

F15C FLUID-CIRCUIT ELEMENTS PREDOMINANTLY USED FOR COMPUTING OR CONTROL PURPOSES (transducers [F15B 5/00](#), {[F15B 21/00](#)}; fluid dynamics in general [F15D](#); computer comprising fluid elements [G06D](#), [G06G](#); {electric control by means of electro-hydraulic or electro-pneumatic amplifiers [G05B 7/02](#)})

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.

F15D FLUID DYNAMICS, i.e. METHODS OR MEANS FOR INFLUENCING THE FLOW OF GASES OR LIQUIDS

NOTE

This subclass comprises boundary-layer control and other arrangements and methods, not provided for in other classes, for influencing the flow of fluids relative to constraining surfaces and after leaving these surfaces, e.g. producing or removing turbulence, deflecting jets, guiding flow through bends in conduits, affecting distribution of fluid in a conduit, reducing fluid friction.

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.

F16 ENGINEERING ELEMENTS AND UNITS; GENERAL MEASURES FOR PRODUCING AND MAINTAINING EFFECTIVE FUNCTIONING OF MACHINES OR INSTALLATIONS; THERMAL INSULATION IN GENERAL

F16B DEVICES FOR FASTENING OR SECURING CONSTRUCTIONAL ELEMENTS OR MACHINE PARTS TOGETHER, e.g. NAILS, BOLTS, CIRCLIPS, CLAMPS, CLIPS OR WEDGES; JOINTS OR JOINTING (couplings for transmitting rotation [F16D](#))

NOTES

1. Attention is drawn to:

- a. the Note following group [E04B 1/38](#);
- b. the following places:

[A44B](#)
[A47G 3/00](#)

Buckles, slide fasteners
Ornamental heads for nails, screws, or the like

- F16B
(continued)
- | | |
|------------------------------|---|
| B42F 3/00 | Means, not using staples, for attaching sheets temporarily together |
| {C14B 17/08} | {Fastening devices, e.g. clips for leather-stretching used in apparatus or machines for manufacturing or treating skins, hides, leathers or furs} |
| E01B 9/10 | Screws or bolts for railway sleepers |
| E01B 11/00 | Rail joints |
| E04 | Connections for building |
| E04D 13/08 | Clamping means for down pipes for roof drainage |
| E04G 5/04 | Fastening scaffolds against buildings |
| E04G 7/00 | Scaffolding couplings |
| E05C | Bolts for fasteners for wings, specially for doors or windows |
| F16C 29/10 | Locking bearings for parts moving only linearly |
| F16G 17/00 | Hooks as integral parts of chains |
| F16L | Pipe joints |
| F16L 3/00 | Supports for pipes, cables or protective tubing, e.g. hangers, holders, clamps, cleats, clips, brackets |
| F16L 33/02 | Clips for connecting hoses to rigid members |
| H01F 7/00 | Magnetic holding devices |
| H02N 13/00 | Electrostatic holding devices. |
- Groups [F16B 2/00](#) - [F16B 47/00](#) take precedence over group [F16B 1/00](#).
 - {In this main group, it is desirable to add the indexing codes of [F16B 2200/00](#)}

WARNINGS

- The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:

F16B 7/08	covered by	F16B 5/12 , F16B 7/04 , F16L 3/00
F16B 7/12	covered by	F16B 7/105
F16B 13/13	covered by	F16B 13/002 , F16B 13/12
F16B 25/02	covered by	F16B 25/103
F16B 25/04	covered by	F16B 25/00 , F16B 25/106
F16B 25/06	covered by	F16B 25/00 , F16B 25/106
F16B 25/08	covered by	F16B 25/00 , F16B 25/106
F16B 37/10	covered by	F16B 37/0842 , F16B 37/0871
- {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.}

F16C **SHAFTS; FLEXIBLE SHAFTS; ELEMENTS OR CRANKSHAFT MECHANISMS; ROTARY BODIES OTHER THAN GEARING ELEMENTS; BEARINGS**

NOTES

- In this subclass the following expression is used with the meaning indicated:
 - "rotary bodies other than gearing elements" covers any element which rotates so far as its features are affected only by the fact that it rotates.
- Attention is drawn to the following places:

A01B 71/04	Bearings for agricultural machines
B21B 31/07	Adaptation of roll bearings for metal-rolling mills
B61C 17/10	Connecting-rods, bearings for driving wheels of railway locomotives
B61F 15/00	Axle-boxes for railway vehicles
B62K 21/06	Bearings for steering heads
E06B 9/174 , E06B 9/50	Bearings specially adapted for roller shutters or for roller blinds
E21B 10/22	Bearings for drill bits
F01C 21/02	Arrangement of bearings in rotary-piston machines or engines
F01D 25/16	Arrangement of bearings in non-positive displacement machines or engines
F02C 7/06	Arrangement of bearings in gas-turbine plants
G01C 19/16	Bearings for gyroscopes
G01D 11/02	Bearings or suspensions for moving parts of measuring instruments
G01G 21/02	Arrangements of bearings in weighing apparatus
G01R 1/10	Arrangements of bearings in instruments for measuring electric variables
G01R 11/12	Arrangements of bearings for apparatus for measuring time integral of electric power or current
G02C 5/22	Hinges for spectacles
G04B 31/00	Bearings for clockwork
H02N 15/00	Magnetic levitation devices.

F16C

(continued) **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.

F16D COUPLINGS FOR TRANSMITTING ROTATION; CLUTCHES; BRAKES

NOTE

Attention is drawn to the following places:

A01D 69/08 , A01D 69/10	Clutches or brakes of harvesting machines for grass or cereals;
A61C 1/18	Clutches in dental machines for boring or cutting;
B21B 35/14	Drive couplings for metal-rolling mills;
B30B 15/10	Brakes specially adapted for presses;
B30B 15/12	Clutches specially adapted for presses;
B41J 33/52	Braking devices for ribbon-feed devices in selective printing mechanisms;
B60K 17/00	Arrangement or location of clutches in vehicles;
B61H	Brakes peculiar to rail vehicles;
B62B 5/04	Braking mechanisms for hand carts;
B62B 9/08	Braking mechanisms for children's carriages or perambulators;
B62C 7/00	Braking mechanisms for animal-drawn vehicles;
B62L	Cycle brakes;
B66D 5/00	Braking devices for lifting or hoisting gear;
E21B 17/02	Couplings for drilling rods;
H02P 3/04	Brakes for electric motors, generators, dynamo-electric converters;
H04L 13/04	Clutches for apparatus for transmission of coded digital information.

WARNINGS

- The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:

F16D 3/19	covered by	F16D 3/50 ;
F16D 3/27	covered by	F16D 3/265 ;
F16D 27/07	covered by	F16D 27/06 , F16D 27/14 ;
F16D 48/12	covered by	B60K 23/0808 .
- 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.

F16F SPRINGS; SHOCK-ABSORBERS; MEANS FOR DAMPING VIBRATION

NOTES

- This subclass covers:
 - springs, shock-absorbers or vibration-dampers;
 - their arrangement in, or adaptation for, particular apparatus if not provided for in the subclasses covering said apparatus.
- This subclass does not cover inventions concerning the arrangement or adaptation of springs, shock-absorbers or vibration-dampers in, or for, particular apparatus, if provided for in the subclasses concerning the said apparatus, e.g.

A47C 23/00 - A47C 27/00	Spring mattresses
A61F 2/00	{Prostheses}
A63C 5/075	Vibration dampers in skis
B60G	Vehicle suspensions
B60R 19/24	Mounting of bumpers on vehicles
B61F	Rail vehicle suspensions
B61G 11/00	Buffers for railway or tramway vehicles
B62D 21/15	Vehicle chassis frames having impact absorbing means
B62J 1/02	Resiliently mounted saddles on cycles
B62K 21/08	Steering dampers
B63H 21/30	Anti-vibration mounting of marine propulsion plant in ships
B64C 25/58	Arrangement of shock-absorbers or springs in aeroplane alighting gear
B65D 81/02	Containers, packing elements or packages with shock-absorbing means
D06F 37/20	Resilient mountings in washing machines
D06F 49/06	Resilient mountings in domestic spin-dryers
E04B 1/98	{Protection of buildings against vibrations or shocks}
E05D 7/086	Braking devices structurally combined with hinges
F03G 1/00	Spring motors
F16L 3/20	{Pipe or cable supports}
F21V 15/04	Resilient mounting of lighting devices
F41A 25/00	Gun cradles to permit recoil
F41B 5/1426	Vibration dampers for archery bows
G01D 11/00	Indicating or recording in connection with measuring

- F16F
(continued)
- | | |
|-----------------------------|---|
| G01G 21/10 | Weighing apparatus, e.g. arrangement of shock-absorbers in weighing apparatus |
| G04B | Clocks, watches |
| G12B 3/08 | Damping of movements in instruments |
| G21C 7/20 | Disposition of shock-absorbing devices for displaceable control elements in nuclear reactors. |
| {H02G 7/14} | {Arrangements or devices for damping mechanical oscillations of power lines} |
- Mention of "steel" or "metal" in groups [F16F](#), unless specific mention is made otherwise, should be seen in the light of the title of group [F16F 1/00](#), i.e. material having low internal friction. This normally includes composite materials such as fibre-reinforced plastics.
 - Mention of "rubber" or "plastics" in group [F16F](#), unless specific mention is made otherwise, should be seen in the light of the title of group [F16F 1/36](#), i.e. material having high internal friction. This normally does NOT include composite materials such as fibre-reinforced plastics except in the case of groups [F16F 1/366](#) - [F16F 1/3686](#) and [F16F 15/305](#).

WARNINGS

- The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:

F16F 3/07	covered by	F16F 13/00
F16F 9/24	covered by	F16F 9/22
F16F 9/40	covered by	F16F 9/00 - F16F 9/50
F16F 9/508	covered by	F16F 9/512
F16F 11/00	covered by	F16F 7/00 , F16F 9/00 , F16F 15/00
F16F 13/12	covered by	F16F 13/08
- 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.

F16G BELTS, CABLES, OR ROPES, PREDOMINANTLY USED FOR DRIVING PURPOSES; CHAINS; FITTINGS PREDOMINANTLY USED THEREFOR**NOTE**

Attention is drawn to the following places:

B63B 21/04	Fastening equipment for chains, ropes or the like for ships
B63B 21/20	Adaptations of chains, ropes or the like for ships
B65G 15/30	Endless conveyor belts
B65G 17/38 , B65G 19/20	Traction chains for conveyors
F16H	Gearings using flexible members
F16H 9/24	Chains specially adapted for gearings with variable ratio
H05F	Preventing or carrying-off electrostatic charges.

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.

F16H GEARING**NOTES**

- Combinations including mechanical gearings are classified in groups [F16H 37/00](#) or [F16H 47/00](#), unless they are provided for in groups [F16H 1/00](#) - [F16H 35/00](#).
- In this subclass, sets of rigidly-connected members are regarded as single members.
- In this subclass, the following terms or expressions are used with the meanings indicated:
 - "toothed gearing" includes worm gearing and other gearing involving at least one wheel or sector provided with teeth or the equivalent, EXCEPT gearing with chains or toothed belts, which is treated as friction gearing;
 - "conveying motion" includes transmitting energy, and means that the applied and resultant motions are of the same kind, though they may differ in, e.g. speed, direction extent;
 - "rotary" implies that the motion may continue indefinitely;
 - "oscillating" means moving about an axis to an extent which is limited by the construction of the gearing, and which may exceed one revolution, the movement being alternately forwards and backwards during continued operation of the gearing;
 - "reciprocating" means moving substantially in a straight line, the movement being alternately forwards and backwards during continued operation of the gearing;
 - "reversing" or "reversal" means that an applied movement in one direction may produce a resultant movement in either of two opposed directions at will;
 - "central gears" includes any gears whose axis is the main axis of the gearing.
- Attention is drawn to the following places:

A01D 69/06	Gearings in harvesting machines
A63H 31/00	Gearing for toys
B21B 35/12	Toothed-wheel gearing for metal-rolling mills

F16H (continued)	B60K	Arrangement of transmissions in vehicles
	B61C 9/00	Transmissions for railway locomotives
	B62D 3/00	Vehicle steering gears
	B62M	Transmissions for cycles
	B63H 23/00	Transmissions for marine propulsions
	B63H 25/00	Marine steering gears
	{ B64C 27/12 , B64C 27/58 }	{ Transmissions for helicopters }
	{ B64D 35/00 }	{ Transmissions for aircraft }
	F01-F04	Machines, engines, pumps
	F15B 15/00	Gearings associated with fluid-actuated devices
	G01D 5/04	Gearing used in indicating or recording apparatus in connection with measuring devices
	H03J 1/00	Driving arrangements for tuning resonant circuits
	H04L 13/04	Driving mechanisms for apparatus for transmission of coded digital information.

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.}

F16J PISTONS {(specially adapted for dampers [F16F 9/32](#)); CYLINDERS; SEALINGS**NOTE**

Attention is drawn to the following places:

A47J 27/08	Pressure cookers
E04B 1/68	Sealing building joints
E05C 9/00	Multi-point fastening of wings in general
F01B	Machines or engines in general or of reciprocating type, e.g. cylinders peculiar to steam engines
F01B 31/28	
F02F 1/00	Cylinders for combustion engines
F02F 3/00	Pistons for combustion engines
F04D 29/08	Sealings of non-positive displacement pumps
F17B 1/04	Sealing devices for sliding parts of gas holders of variable capacity
F28F 9/04	Arrangements for sealing elements into header boxes or end plates of heat-exchangers.

WARNINGS

- The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:
[F16J 15/53](#) covered by [F16J 15/43](#)
- 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.

F16K VALVES; TAPS; COCKS; ACTUATING-FLOATS; DEVICES FOR VENTING OR AERATING {(devices for emptying and evacuating the excess liquid in valves or conduits [F16L 55/07](#))}**NOTE**

Attention is drawn to the following places:

A47J 27/09	Safety devices for pressure cookers
A47J 31/46	Dispensing spouts, drain valves or like beverage-making apparatus
A61B 5/0235	Valves specially adapted for measuring pressure in heart or blood vessels
A61F 2/24	Heart valves
A61M 16/20	Valves specially adapted for medical respiratory devices
A61M 39/00	Tube connectors, tube couplings, valves or branch units specially adapted for medical use in general
A62B 9/02	Valves for respiratory apparatus
A62B 18/10	Valves for breathing masks or helmets
A62C	Fire extinguishers
{ B01D 35/04 }	{ Plug, tap, or cock filters }
B05B	Nozzles, spray heads or other discharge apparatus for spraying or atomising
B60C 29/00	Arrangements of tyre-inflating valves relative to tyres or wheel rims; Connection of valves to wheel rims, tyres or other inflatable elastic bodies
B60G 17/048	Valves specially adapted for adjusting vehicle fluid-spring characteristics
B60T	Valves specially adapted for vehicle brake control systems
B62D 5/08	Vehicle power-assisted steering characterised by the type of valve used
B63B 7/00 , B63C 9/00	Arrangement of inflating valves for floatable life-saving equipment

F16K

(continued)

B65D 47/04	Container closures with discharging valves
B65D 90/32	Safety valves for large containers
B65D 90/54	Gates or closures on large containers
B67C 3/28	Flow control devices for bottling liquids
B67D	Dispensing, delivering or transferring liquids
{C21B 9/12}	{Hot-blast valves for blast furnaces}
E02B 8/00	Details, e.g. valves, of barrages or weirs
E02B 13/02	Closures for irrigation conduits
{E03C 1/04}	{Water-basin installations specially adapted for wash-basins or baths}
{E03C 1/05}	{Arrangements on wash-basins for the remote control of taps}
E03D	Flushing valves for water-closets or urinals
{E03F 7/04}	{Valves for preventing return flow in sewer systems}
E05F 3/12	Valve arrangements in door closers
E21B 21/10	Valve arrangements in drilling-fluid circulation systems
E21B 34/00	Valve arrangements for boreholes or wells
{E21D 15/51}	{Arrangement of relief valves in hydraulic mine props}
F01B 25/10	Working-fluid valves for controlling machines or engines in general or of positive-displacement type
F01D 17/10	Final actuators for controlling non-positive displacement machines or engines
F01L	Cyclically operated valves for machines or engines
F02D 9/08	Throttle valves for controlling combustion engines
F02K 9/58	Propellant feed valves for rocket-engines
F02M	Carburettors, fuel injection
F02M 59/46	Valves for fuel injection pumps
F04	Pumps
F16F 9/34	Valves for shock absorbers
F16L 29/00 , F16L 37/28	Pipe joints or quick-acting couplings with fluid cut-off means
F16L 55/00	Arrangement of valves in pipes
F16L 55/055	Valves specially adapted to prevent or minimise the effect of water hammer
F16L 55/46	Launching devices for pigs or moles
F16N 23/00	Check valves for lubrication systems
{F16T}	{Draining-off liquids from steam traps}
F17C 13/04	Arrangement of valves in pressure vessels
F22B 37/44	Arrangement of safety valves on steam boilers
F22D 5/34	Application of valves to automatic water-feed in boiler
F23L 13/00	Valves for air supply control to burners
{F23Q 2/16}	{Valves for lighters with gaseous fuel and adjustable flame}
F24C 3/12 , F24C 5/16	Arrangement of valves on stoves or ranges
F24F	Air conditioning; Ventilation
F25B 41/20	Disposition of fluid circulation valves in refrigeration machines
G05D	Controlling non-electric variables
G10B 3/06	Valves for organs
G10D 9/04	Valves for other wind-actuated musical instruments
{G21C 9/06}	{Safety valves structurally associated with nuclear reactors}
{H01M 50/30}	{Vent plugs in batteries or cells}

WARNINGS

- The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:

F16K 31/11	covered by	F16K 31/06 , F16K 31/08 , F16K 31/10
F16K 31/64	covered by	F16K 31/002 , G05D 23/00
F16K 31/66	covered by	F16K 31/06 , G05D 23/00
F16K 31/68	covered by	F16K 31/001 , G05D 23/00
F16K 31/70	covered by	F16K 31/002 , G05D 23/08
F16K 31/72	covered by	F16K 31/00

- 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.

F16L PIPES; JOINTS OR FITTINGS FOR PIPES; SUPPORTS FOR PIPES, CABLES OR PROTECTIVE TUBING; MEANS FOR THERMAL INSULATION IN GENERAL

NOTES

- In this subclass, the following terms are used with the meanings indicated:
 - "pipe" means a conduit of closed cross-section, which is specially adapted to convey fluids, materials or objects;
 - "hose" means a pipe, as defined above, which has flexibility as an essential characteristic.
- Attention is drawn to the following places:

F16L (continued)	A61M 39/00 B05B 1/20 {B60T 17/04} B63B 35/03 B64D 39/04 {B65G 51/00} {B65G 53/00} B67D 7/38 E01D 19/10 E03B E03D 11/17 E03D 11/18 E03F 3/04 E04D 13/08 E04F 17/00 E21F 1/04 E21F 17/02 F01N {F16B 7/00} F16N 21/00 F17C 3/02 {F17D} F22B 37/10 F23J 13/04 F24H 9/12 F28F 9/04 G21C 15/22 H02G 3/04 H02G 3/26	Tube connectors, tube couplings or branch units, specially adapted for medical use Perforated pipes {Arrangement of piping or air hoses in brake systems} Pipe-laying vessels Adaptation of hose constructions for refuelling aircraft during flight {Conveying articles through pipes or tubes by fluid flow or pressure} {Conveying materials in bulk through pipes or tubes} Arrangements of hoses in apparatus for transferring liquids, e.g. fuel, from bulk to vehicles or portable containers Fastening of pipes or cables to bridges Water supply installations Means for connecting water-closet bowls to the flushing pipe Siphons for water-closets Pipes or fittings specially adapted to sewers Down pipes for roof drainage; Clamping means therefor Vertical ducts, channels in buildings, e.g. chimneys Air ducts for ventilation of mines or tunnels; Connections therefor Suspension devices for tubes or the like in mines or tunnels Gas flow silencers or exhaust apparatus for machines or engines {Connections of rods or tubes} Conduits, junctions for lubrication systems Thermal insulation of vessels not under pressure for storing liquefied or solidified gases, e.g. Dewar flask {Pipe-line systems, pipe-lines} Water tubes of steam boilers Joints, connections for chimneys or flues Connecting circulation pipes to heaters Arrangements for sealing elements into header boxes or end plates of heat-exchangers Structural association of coolant tubes with headers or other pipes in nuclear reactors Protective tubing or conduits for electric cables Installations of electric cables or lines, or protective tubing on or in walls, ceilings or floors.
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WARNINGS

- The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:

F16L 19/03	covered by	F16L 19/0212 ;
F16L 59/05	covered by	F16L 59/021 .
F16L 101/14	covered by	F16L 2101/10
- {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.}

F16M **FRAMES, CASINGS OR BEDS OF ENGINES, MACHINES OR APPARATUS, NOT SPECIFIC TO ENGINES, MACHINES OR APPARATUS PROVIDED FOR ELSEWHERE; STANDS; SUPPORTS**

NOTE

Attention is drawn to the following places:

B21B 31/02	Metal-rolling stand frames
G01D 11/30	Supports specially adapted for indicating or recording instruments.

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.

F16N **LUBRICATING**

NOTE

Attention is drawn to the following places:

A01D 69/12	Lubrication of harvesters;
B21J 3/00	Lubricating during forging or pressing;
B25D 17/26	Lubricating of portable power-driven percussive tools;
B60R 17/00	Arrangements or adaptations of lubricating; systems or devices in vehicles;
B61C 17/08	Lubrication systems for railway locomotives;
B62D 55/092	Vehicle endless-track units with lubrication means;
D04B 35/28	Devices for lubricating knitting machine parts;

F16N (continued)	E05B 17/08 E05D 11/02 E21B 10/22	Lubricating devices for locks; Lubricating arrangements for hinges; Lubricating details of roller drill bits for earth; drilling.
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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.

F16P SAFETY DEVICES IN GENERAL; {SAFETY DEVICES FOR PRESSES}**NOTE**

Attention is drawn to the following places:

A01D 75/18	Harvesting machines
A01F 21/00	Threshing machines or baling presses
B02C 23/04	Crushing or disintegrating machines
B21B 33/00	Rolling of metal
B21D 55/00	Working sheet metal or tubes, rods or profiles without essentially removing material
B23B 25/04	Turning-machines
B23Q 11/00	Machine tools
B24B 55/00	Grinding or polishing machines
B25J 19/06	Manipulators
B26D 7/22	Cutting machines
B27G 19/00	Wood saws
B65B 57/00	Packaging machines or apparatus
B65G 43/00	Conveyors
B65H 26/00	Web-advancing mechanisms
B65H 63/00	Handling or winding of thin or filamentary material
D01G 31/00	Treatment of fibres
D01H 13/14	Spinning or twisting
D05B 83/00	Sewing machines
F21V 25/00	Lighting devices.

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.

F16S CONSTRUCTIONAL ELEMENTS IN GENERAL; STRUCTURES BUILT-UP FROM SUCH ELEMENTS, IN GENERAL**NOTE**

This subclass does not cover similar elements and structures, restricted to use in the building art, which are covered by subclass [E04C](#).

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.

F16T STEAM TRAPS OR LIKE APPARATUS FOR DRAINING-OFF LIQUIDS FROM ENCLOSURES PREDOMINANTLY CONTAINING GASES OR VAPOURS**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.

F17 STORING OR DISTRIBUTING GASES OR LIQUIDS

F17B GAS-HOLDERS OF VARIABLE CAPACITY (self-acting gas cut-off devices [A47J 27/62](#), [G05D](#); flame traps [A62C 4/00](#); gas mixers [B01F](#), [F16K 11/00](#), [G05D 11/00](#); construction or assembling of bulk storage containers employing civil-engineering techniques [E04H 7/00](#), gas compressors [F04](#); valves [F16K](#); damping pulsations in valves or pipes [F16K](#), [F16L](#); pipes [F16L](#); stopping devices for gas mains [F16L 55/10](#); vessels adapted for storing compressed, liquefied, or solidified gases [F17C](#); gas distribution systems [F17D 1/04](#); detecting leakage [F17D 5/02](#), [G01M](#); supervising or alarm devices [F17D 5/02](#), [G08B](#); control of combustion in burners [F23N](#); gas flow or pressure regulators [G05D](#))

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.

F17C VESSELS FOR CONTAINING OR STORING COMPRESSED, LIQUEFIED OR SOLIDIFIED GASES; FIXED-CAPACITY GAS-HOLDERS; FILLING VESSELS WITH, OR DISCHARGING FROM VESSELS, COMPRESSED, LIQUEFIED, OR SOLIDIFIED GASES (storing fluids in natural or artificial cavities or chambers in the earth [B65G 5/00](#); construction or assembling of bulk storage containers employing civil-engineering techniques [E04H 7/00](#); variable-capacity gas-holders [F17B](#); liquefaction or refrigeration machines, plants, or systems [F25](#))

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.

F17D PIPE-LINE SYSTEMS; PIPE-LINES (pumps or compressors [F04](#); fluid dynamics [F15D](#); valves or the like [F16K](#); pipes, laying pipes, supports, joints, branches, repairing, work on the entire line, accessories [F16L](#); steam traps or the like [F16T](#); fluid-pressure electric cables [H01B 9/06](#))

NOTE

In this subclass, pipe-line systems are interpreted as systems described in flow sheets as well as arrangements of co-operating elements, the elements *per se* being covered in the relevant subclasses.

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.

LIGHTING; HEATING**F21 LIGHTING****NOTE**

{In this class, the following terms are used with the meanings indicated:

- "Portable" means "intended to be carried personally"
- "Non-portable" means "not intended to be carried personally, even if capable of being moved from place to place"
- "Lighting" means "the purpose of illumination using visible light" }

F21H INCANDESCENT MANTLES; OTHER INCANDESCENT BODIES HEATED BY COMBUSTION**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.

F21K NON-ELECTRIC LIGHT SOURCES USING LUMINESCENCE; LIGHT SOURCES USING ELECTROCHEMILUMINESCENCE; LIGHT SOURCES USING CHARGES OF COMBUSTIBLE MATERIAL; LIGHT SOURCES USING SEMICONDUCTOR DEVICES AS LIGHT-GENERATING ELEMENTS; LIGHT SOURCES NOT OTHERWISE PROVIDED FOR

NOTE

In this subclass, it is desirable to add the indexing codes of subclasses [F21W](#) and [F21Y](#).

WARNING

The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:

F21K 5/04	covered by	G03B 15/0457 ;
F21K 5/06	covered by	G03B 15/0442 ;
F21K 5/08	covered by	F21K 5/02 , G03B 15/0442 ;
F21K 5/10	covered by	G03B 15/0442 ;
F21K 5/12	covered by	F21K 5/023 ;
F21K 5/14	covered by	F21K 5/026 , G03B 15/0489 ;
F21K 5/16	covered by	G03B 15/0452 ;
F21K 5/18	covered by	G03B 15/0452 ;
F21K 5/20	covered by	G03B 15/0447 ;
F21K 5/22	covered by	G03B 15/0442 .

F21L LIGHTING DEVICES OR SYSTEMS THEREOF, BEING PORTABLE OR SPECIALLY ADAPTED FOR TRANSPORTATION

NOTES

1. This subclass covers devices or systems designed or specially adapted to be carried, e.g. by hand, or otherwise transported from place to place, e.g. on wheeled supports, in order to provide illumination as and where required.
2. This subclass does not cover devices or systems intended for fixed installation, e.g. vehicle lighting, or for use essentially at a permanent location, which are covered by subclass [F21S](#).
3. Non-electric lighting devices are classified in groups [F21L 17/00-F21L 26/00](#) only if a special adaptation related to the use of a non-electric light source is of interest.

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.

F21S NON-PORTABLE LIGHTING DEVICES; SYSTEMS THEREOF; VEHICLE LIGHTING DEVICES SPECIALLY ADAPTED FOR VEHICLE EXTERIORS

NOTES

1. This subclass covers:
 - devices or systems intended for fixed installation or for use at a permanent location, e.g. free-standing floor- or table-lamps.
 - aspects related to the optical, mechanical, thermal or electrical arrangement of elements in vehicle illuminating devices specially adapted for vehicle exterior, e.g. headlamps.
 - aspects related to the optical, mechanical, thermal or electrical arrangement of elements in vehicle light signalling devices specially adapted for vehicle exterior, e.g. brake lamps or direction indicator lights.
2. This subclass does not cover:
 - devices or systems specially adapted for transportation, which are covered by subclass [F21L](#).
 - aspects related to the vehicles in which lighting devices are arranged, e.g. the arrangement or operation of lighting devices on vehicles, which are covered by [B60Q](#).
 - control of vehicle lighting devices in relation to the vehicle as a whole, e.g. for levelling, swivelling or aiming. Such arrangements are covered by group [B60Q 1/06](#), even if the movement of the lighting device occurs inside the lamp housing.
3. Non-electric lighting devices or systems are classified in groups [F21S 11/00](#) - [F21S 15/00](#) only if a special adaptation related to the use of a non-electric light source is of interest.
4. In this subclass, it is desirable to add the indexing codes of subclasses [F21W](#) and [F21Y](#).

F21S
(continued) **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.

F21V FUNCTIONAL FEATURES OR DETAILS OF LIGHTING DEVICES OR SYSTEMS THEREOF; STRUCTURAL COMBINATIONS OF LIGHTING DEVICES WITH OTHER ARTICLES, NOT OTHERWISE PROVIDED FOR

NOTES

1. Groups [F21V 1/00-F21V 14/00](#) cover aspects related to light emission or distribution. Groups [F21V 15/00-F21V 31/00](#) cover aspects not related to light emission or distribution.
2. Details of non-electric lighting devices or systems are classified in groups [F21V 35/00-F21V 37/00](#) only if a special adaptation related to the use of a non-electric light source is of interest.
3. In this subclass, it is desirable to add the indexing codes of subclasses [F21W](#) and [F21Y](#)

WARNINGS

1. The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:
[F21V 8/00](#) covered by [G02B 6/00](#)
2. 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.

F21W INDEXING SCHEME ASSOCIATED WITH SUBCLASSES [F21K](#), [F21L](#), [F21S](#) and [F21V](#), RELATING TO USES OR APPLICATIONS OF LIGHTING DEVICES OR SYSTEMS

NOTE

This subclass constitutes an indexing scheme associated with subclasses [F21K](#), [F21L](#), [F21S](#) and [F21V](#), relating to uses or applications of lighting devices or systems.

F21Y INDEXING SCHEME ASSOCIATED WITH SUBCLASSES [F21K](#), [F21L](#), [F21S](#) and [F21V](#), RELATING TO THE FORM OR THE KIND OF THE LIGHT SOURCES OR OF THE COLOUR OF THE LIGHT EMITTED

NOTE

This subclass constitutes an indexing scheme associated with subclasses [F21K](#), [F21L](#), [F21S](#) and [F21V](#), relating to the form or the kind of the light sources, or of the colour of the light emitted.

F22 STEAM GENERATION

NOTE

In this class the following term is used with the meaning indicated:

- "steam" covers also other condensable vapours, e.g. mercury, diphenyl, diphenyl oxide.

F22B METHODS OF STEAM GENERATION; STEAM BOILERS (steam engine plants where engine aspects predominate [F01K](#); domestic central-heating systems using steam [F24D](#); heat exchange or heat transfer in general [F28](#); generation of vapour in the cores of nuclear reactors [G21](#))

NOTE

This subclass covers only methods of, or apparatus for, the generation of steam under pressure for heating or power purposes

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.

F22D PREHEATING, OR ACCUMULATING PREHEATED, FEED-WATER FOR STEAM GENERATION; FEED-WATER SUPPLY FOR STEAM GENERATION; CONTROLLING WATER LEVEL FOR STEAM GENERATION; AUXILIARY DEVICES FOR PROMOTING WATER CIRCULATION WITHIN STEAM BOILERS

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.

F22G SUPERHEATING OF STEAM ([steam separating arrangements in boilers F22B 37/26](#))

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.

F23 COMBUSTION APPARATUS; COMBUSTION PROCESSES

NOTE

In this class, the following terms are used with the meanings indicated:

- "combustion" means a heat-producing sequence of chemical reactions between a burnable substance and molecular oxygen, e.g. in air, in most cases generating light in the form of flames or a glow;
- "combustion chamber" means a chamber in which fuel is burned to establish a self-supporting fire or flame and which surrounds that fire or flame;
- "burner" means a device by which fluent fuel is passed to a combustion space where it burns to produce a self-supporting flame;
- "air" means a mixture of gases containing free oxygen and able to promote or support combustion.

F23B METHODS OR APPARATUS FOR COMBUSTION USING ONLY SOLID FUEL ([for combustion of fuels that are solid at room temperatures, but burned in melted form, e.g. candle wax, C11C 5/00, F23C, F23D; using solid fuel suspended in air F23C, F23D 1/00; using solid fuel suspended in liquids F23C, F23D 11/00; using solid fuel and fluent fuel simultaneously or alternately F23C, F23D 17/00; burning of low grade fuel F23G; grates F23H; feeding solid fuel to combustion apparatus F23K; combustion chambers, not otherwise provided for F23M; domestic apparatus F24; central heating boilers F24D; package boilers F24H](#))

NOTES

1. This subclass only covers combustion wherein the main body of fuel is either essentially stationary during combustion or mechanically transported, as opposed to pneumatically transported or suspended in air, during combustion.
2. In this subclass, the first place priority rule is applied, i.e. at each hierarchical level, in the absence of an indication to the contrary, classification is made in the first appropriate place.
3. In this subclass, methods are classified in the groups that cover the apparatus used. Methods that are not related to a particular type of apparatus are classified in group [F23B 90/00](#).
4. In this subclass, it is desirable to add the indexing codes of groups [F23B 2101/00](#) - [F23B 2900/00](#).

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.

F23C METHODS OR APPARATUS FOR COMBUSTION USING FLUID FUEL OR SOLID FUEL SUSPENDED IN {A CARRIER GAS OR} AIR ([burners F23D](#))

NOTE

In this subclass, methods are classified in the groups that cover the apparatus used.

WARNINGS

1. The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:

F23C 101/00	covered by	F23C 2206/101
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2. 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.

F23D BURNERS**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.

F23G CREMATION FURNACES; CONSUMING WASTE PRODUCTS BY COMBUSTION**NOTE**

This subclass covers also the burning of low-grade fuel of solid, liquid, or gaseous nature.

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.

**F23H GRATES (inlets for fluidisation air for fluidised bed combustion apparatus [F23C 10/20](#));
CLEANING OR RAKING GRATES****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.

**F23J REMOVAL OR TREATMENT OF COMBUSTION PRODUCTS OR COMBUSTION
RESIDUES; FLUES (combustion apparatus for consuming smoke or fumes, e.g. exhaust
gases, [F23G 7/06](#))****NOTE**

This subclass covers the cleaning of external surfaces of water tubes of boilers

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.}

**F23K FEEDING FUEL TO COMBUSTION APPARATUS (fuel feeders specially adapted for
fluidised bed combustion apparatus [F23C 10/22](#))****F23L SUPPLYING AIR OR NON-COMBUSTIBLE LIQUIDS OR GASES TO COMBUSTION
APPARATUS IN GENERAL ({air-supply arrangements for fluent fuels [F23C](#);}
firebridges with means for feeding air or steam [F23M 3/04](#); baffles or shields with air
supply passages [F23M 9/04](#)); VALVES OR DAMPERS SPECIALLY ADAPTED FOR
CONTROLLING AIR SUPPLY OR DRAUGHT IN COMBUSTION APPARATUS
{(dampers and throat restrictors for open fire-places [F24](#); air inlet valves for open fire
fronts [F24](#))}; INDUCING DRAUGHT IN COMBUSTION APPARATUS; TOPS FOR
CHIMNEYS OR VENTILATING SHAFTS; TERMINALS FOR FLUES****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.

**F23M CASINGS, LININGS, WALLS OR DOORS SPECIALLY ADAPTED FOR
COMBUSTION CHAMBERS, e.g. FIREBRIDGES; DEVICES FOR DEFLECTING AIR,
FLAMES OR COMBUSTION PRODUCTS IN COMBUSTION CHAMBERS; SAFETY
ARRANGEMENTS SPECIALLY ADAPTED FOR COMBUSTION APPARATUS;
DETAILS OF COMBUSTION CHAMBERS, NOT OTHERWISE PROVIDED FOR****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.}

F23N **REGULATING OR CONTROLLING COMBUSTION** (control devices specially adapted for combustion apparatus in which combustion takes place in a fluidised bed of fuel or other particles [F23C 10/28](#); condition responsive controls for regulating combustion in domestic stoves with open fires for solid fuel [F24B 1/187](#))

F23Q **IGNITION** (devices or installations peculiar to internal-combustion engines [F02P](#); of cigarettes or tobacco [A24F](#); compositions therefor, chemical igniters [C06C](#)); **EXTINGUISHING-DEVICES**

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.

F23R **GENERATING COMBUSTION PRODUCTS OF HIGH PRESSURE OR HIGH VELOCITY, e.g. GAS-TURBINE COMBUSTION CHAMBERS** (fluidised bed combustion apparatus specially adapted for operation at superatmospheric pressures [F23C 10/16](#))

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.

F24 **HEATING; RANGES; VENTILATING**

NOTE

In this class, the following terms are used with the meanings indicated:

- "stove" includes apparatus which may have an open fire, e.g. fireplace;
- "range" means an apparatus for cooking having elements that perform different cooking operations or cooking and heating operations.

F24B **DOMESTIC STOVES OR RANGES FOR SOLID FUELS** (for solid fuels in combination with gaseous fuels, liquid fuels or other kinds of energy supply [F24C 1/02](#)); **IMPLEMENTS FOR USE IN CONNECTION WITH STOVES OR RANGES**

F24C **DOMESTIC STOVES OR RANGES** (exclusively for solid fuels [F24B](#)); **DETAILS OF DOMESTIC STOVES OR RANGES, OF GENERAL APPLICATION**

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.}

F24D **DOMESTIC- OR SPACE-HEATING SYSTEMS, e.g. CENTRAL HEATING SYSTEMS; DOMESTIC HOT-WATER SUPPLY SYSTEMS; ELEMENTS OR COMPONENTS THEREFOR** (using steam or condensate extracted or exhausted from steam engine plants for heating purposes [F01K 17/02](#))

NOTE

In this subclass, the following expression is used with the meaning indicated:

- "Central heating system" means a system in which heat is generated or stored at central sources and is distributed by means of a transfer fluid to the spaces or areas to be heated.

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.}

F24F AIR-CONDITIONING; AIR-HUMIDIFICATION; VENTILATION; USE OF AIR CURRENTS FOR SCREENING (removing dirt or fumes from areas where they are produced [B08B 15/00](#); vertical ducts for carrying away waste gases from buildings [E04F 17/02](#); tops for chimneys or ventilating shafts, terminals for flues [F23L 17/02](#))

NOTES

1. This subclass covers treatment, e.g. purification, of air supplied to human living or working spaces in air conditioning systems or in room units.
2. In this subclass:
 - air-humidification as auxiliary treatment in air-conditioning, i.e. in units wherein the air is also either cooled or heated, is covered by groups [F24F 1/00](#) or [F24F 3/14](#);
 - air-humidification per se, e.g. "room humidifiers", is covered by group [F24F 6/00](#).
3. In this subclass, the following terms or expressions are used with the meanings indicated:
 - "air-conditioning" means the supply of air to or the treatment of air in rooms or spaces by means of cooling or a combination of cooling and a further kind of air treatment, e.g. humidification, heating or air purification;
 - "ventilation" means the supply of air to, or its extraction from, rooms or spaces, and systems for circulating air within rooms or spaces, but does not cover the mere treatment of air being supplied to, extracted from, or circulated within, rooms or spaces.
4. In this subclass, control or safety arrangements are classified in group [F24F 11/00](#). In order to indicate the type of air-treatment system in which these arrangements are used, further classification may be made in groups [F24F 1/00](#) - [F24F 9/00](#).

F24H FLUID HEATERS, e.g. WATER OR AIR HEATERS, HAVING HEAT-GENERATING MEANS, e.g. HEAT PUMPS, IN GENERAL (steam generation [F22](#))

NOTES

1. The distinguishing feature of the air heaters covered by this subclass is that the heat is predominantly released to the air by convection, mostly by forced circulation of the air. The domestic stoves or ranges covered by subclasses [F24B](#), [F24C](#) may also be fired or electric air heaters but they release their heat to a considerable extent by radiation and only to some extent by natural convection.
2. In this subclass, the following terms are used with the meanings indicated:
 - "water" includes other liquids and means always the liquid to be heated;
 - "air" includes other gases or gas mixtures and means always the gas to be heated;
 - "furnace tubes" means tubes inside the heater wherein combustion is performed;
 - "fire tubes" means tubes inside the heater through which flue-gases flow from a combustion chamber located outside the tubes;
 - "heater" means apparatus including both heat generating means and means for transferring the generated heat to water or air.
3. All storage heaters are classified in group [F24H 7/00](#).

F24S SOLAR HEAT COLLECTORS; SOLAR HEAT SYSTEMS (for producing mechanical power from solar energy [F03G 6/00](#))

NOTE

In this subclass, the following terms or expressions are used with the meanings indicated:

- "solar heat collector modules", often referred to simply as "modules", covers:
 - a. whole solar heat collectors
 - b. elements of solar heat collectors, e.g. reflectors, lenses or heat storage elements.
- "absorbing elements" covers elements for absorbing solar-rays and converting it into heat.
- "solar heat systems" covers systems having solar heat collectors as their components and using the collected heat

F24T GEOTHERMAL COLLECTORS; GEOTHERMAL SYSTEMS

F24V COLLECTION, PRODUCTION OR USE OF HEAT NOT OTHERWISE PROVIDED FOR

F25 REFRIGERATION OR COOLING; COMBINED HEATING AND REFRIGERATION SYSTEMS; HEAT PUMP SYSTEMS; MANUFACTURE OR STORAGE OF ICE; LIQUEFACTION SOLIDIFICATION OF GASES

F25B REFRIGERATION MACHINES, PLANTS OR SYSTEMS; COMBINED HEATING AND REFRIGERATION SYSTEMS; HEAT PUMP SYSTEMS**F25C PRODUCING, WORKING OR HANDLING ICE****NOTE**

In this subclass, the following term is used with the meaning indicated:

- "ice" means any frozen liquid and also covers frozen semiliquids or pasty substances.

F25D REFRIGERATORS; COLD ROOMS; ICE-BOXES; COOLING OR FREEZING APPARATUS NOT OTHERWISE PROVIDED FOR (refrigerated showcases [A47F 3/04](#); thermally-insulated vessels for domestic use [A47J 41/00](#); refrigerated vehicles, see the appropriate subclasses of classes [B60](#) - [B64](#); containers with thermal insulation in general [B65D 81/38](#); heat-transfer, heat-exchange or heat-storage materials, e.g. refrigerants, or materials for the production of heat or cold by chemical reactions other than by combustion [C09K 5/00](#); thermally-insulated vessels for liquefied or solidified gases [F17C](#); air-conditioning or air-humidification [F24F](#); refrigeration machines, plants, or systems [F25B](#); cooling of instruments or comparable apparatus without refrigeration [G12B](#))

NOTES

1. In this subclass, the following term is used with the meaning indicated:

- "device" means an enclosed space to be cooled; such devices being associated either with refrigerating machinery, e.g. in a refrigerator, or with other cold sources, e.g. in an ice-box.

2. Attention is drawn to Note (2) following the title of subclass [F24F](#).

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.

F25J LIQUEFACTION, SOLIDIFICATION OR SEPARATION OF GASES OR GASEOUS {OR LIQUEFIED GASEOUS} MIXTURES BY PRESSURE AND COLD TREATMENT {OR BY BRINGING THEM INTO THE SUPERCRITICAL STATE (cryogenic pumps [F04B 37/08](#); gas storage vessels, gas holders [F17](#); filling vessels with, or discharging from vessels, compressed, liquefied or solidified gases [F17C](#); refrigeration machines, plants, or systems [F25B](#))}

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.

F26 DRYING

F26B DRYING SOLID MATERIALS OR OBJECTS BY REMOVING LIQUID THEREFROM (racks for drying fruit and vegetables [A01F 25/12](#); drying foodstuffs [A23](#); drying hair [A45D 20/00](#); body-drying implements [A47K 10/00](#); drying household articles [A47L](#), {e.g. drying footwear [A47L 23/20](#); } drying gases and vapours [B01D](#); chemical and physical processes for dewatering or like separating liquids from solids [B01D 43/00](#); centrifugal apparatus [B04](#); drying ceramics [C04B 33/30](#); drying yarns and fabrics in association with some other form of treatment [D06C](#); drying frames for laundry without heating or positive air circulation, domestic and like spin-dryers, wringing and hot pressing laundry [D06F](#); furnaces, kilns, ovens [F27](#); {treatment including a drying step of semiconductor substrates, e.g. wafers, [H01L 21/67028](#)})

WARNINGS

1. The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:

[F26B 11/06](#)

covered by

[F26B 11/0486](#)

F26B
(continued)

[F26B 13/02](#)
[F26B 13/04](#)
[F26B 13/20](#)
[F26B 23/08](#)

covered by
covered by
covered by
covered by

[F26B 13/10](#)
[F26B 13/10](#)
[F26B 13/104](#)
[F26B 3/343](#), [F26B 3/347](#)

2. 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.

F27 FURNACES; KILNS; OVENS; RETORTS

NOTES

1. This class deals with furnaces, kilns, ovens, retorts, open sintering apparatus, and details or accessories therefor, in general. It includes the arrangement of electrical heating elements in or on furnaces, but not the elements themselves. It is not concerned with the processes carried on within the furnaces.
2. In this class, where appropriate, the term "furnaces" is to be understood as covering kilns, ovens, or retorts.

F27B FURNACES, KILNS, OVENS, OR RETORTS IN GENERAL; OPEN SINTERING OR LIKE APPARATUS

NOTE

Attention is drawn to the Notes following the title of class [F27](#).

WARNINGS

1. The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:

F27B 1/09	covered by	F27B 1/08
F27B 5/05	covered by	F27B 5/04
F27B 14/16 , F27B 14/18	covered by	F27B 14/0806
F27B 21/08 - F27B 21/14	covered by	F27D 3/00 , F27D 21/00
2. 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.

F27D DETAILS OR ACCESSORIES OF FURNACES, KILNS, OVENS, OR RETORTS, IN SO FAR AS THEY ARE OF KINDS OCCURRING IN MORE THAN ONE KIND OF FURNACE (combustion apparatus [F23](#))

NOTE

Attention is drawn to the Notes following the title of class [F27](#).

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.

F27M INDEXING SCHEME RELATING TO ASPECTS OF THE CHARGES OR FURNACES, KILNS, OVENS OR RETORTS

NOTE

This subclass constitutes an internal scheme for indexing only.

F28 HEAT EXCHANGE IN GENERAL

NOTES

1. Apparatus using heat exchange or heat transfer (as defined below) for specific purposes is classified either in subclass [F28B](#) or in the appropriate subclasses of, for example, classes [F22](#), [F24](#), [F25](#), [F26](#); if no such other subclass is appropriate, such apparatus is to be classified in [F28C](#) or [F28D](#).
2. In this class the following terms are used with the meanings indicated:
 - "Heat exchange" means the heating or cooling of a fluid or fluent solid by direct or indirect contact with a heated or cooled fluid or fluent solid;
 - "Heat transfer" means the heating or cooling of a fluid or fluent solid by direct contact with a heated or cooled surface or body.

F28B STEAM OR VAPOUR CONDENSERS (condensation of vapours [B01D 5/00](#); steam engine plants having condensers [F01K](#); liquefaction of gases [F25J](#); details of heat-exchange and heat-transfer arrangements of general application [F28F](#))

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.

F28C HEAT-EXCHANGE APPARATUS, NOT PROVIDED FOR IN ANOTHER SUBCLASS, IN WHICH THE HEAT-EXCHANGE MEDIA COME INTO DIRECT CONTACT WITHOUT CHEMICAL INTERACTION (safety devices in general [F16P](#); fluid heaters having heat generating means [F24H](#); with an intermediate heat-transfer medium coming into direct contact with heat-exchange media [F28D 15/00](#) - [F28D 19/00](#); details of heat-exchange apparatus of general application [F28F](#))

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.

F28D HEAT-EXCHANGE APPARATUS, NOT PROVIDED FOR IN ANOTHER SUBCLASS, IN WHICH THE HEAT-EXCHANGE MEDIA DO NOT COME INTO DIRECT CONTACT (fluid heaters having heat generating means and heat transferring means [F24H](#); furnaces [F27](#); details of heat-exchange apparatus of general)

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.

F28F DETAILS OF HEAT-EXCHANGE AND HEAT-TRANSFER APPARATUS, OF GENERAL APPLICATION (water and air traps, air venting [F16](#))

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.

F28G CLEANING OF INTERNAL OR EXTERNAL SURFACES OF HEAT-EXCHANGE OR HEAT-TRANSFER CONDUITS, e.g. WATER TUBES OR BOILERS (cleaning pipes or tubes in general [B08B 9/02](#); devices or arrangements for removing water, minerals, or sludge from boilers while the boiler is in operation, or which remain in position while the boiler is in operation, or are specifically adapted to boilers without any other utility [F22B 37/48](#); removal or treatment of combustion products or combustion residues [F23J](#); removing ice from heat-exchange apparatus [F28F 17/00](#))

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.

WEAPONS; BLASTING

F41 WEAPONS

NOTES

1. This class covers also means for practice and training which may cover also means for practice and training which may have aspects of simulation, e.g. in apparatus for so-called "military games", although simulators are generally covered by class [G09](#).
2. In this class, the following terms or expressions are used with the meanings indicated:
 - "smallarm" means a firearm which is generally held with one or both hands for firing, but this term also includes a light machine-gun which may be supported on a tripod or the like during firing;

F41

(continued)

- "gun" means any weapon having a barrel and a trigger or firing mechanism for projecting a missile; it may be a piece of ordnance or a smallarm. It may use combustible or explosive propellant charges, air pressure, electromagnetism or other propulsive forces;
 - "revolver-type gun" means a gun having a revolving drum magazine, the chambers of which are used successively as firing chamber;
 - "revolver" means a revolver-type pistol;
 - "semi-automatic firearm" means a firearm from which one shot is fired after actuation of the trigger and which then returns to a condition for firing a subsequent shot upon renewed actuation of the trigger;
 - "automatic gun" means a gun which will continue firing so long as the initial firing pressure is maintained on the trigger;
 - "sighting" means bringing into visual coincidence a direction of a target;
 - "aiming" means bringing a weapon to a direction differing from the sighting direction by corrections in order that the projectile may hit the target;
 - "laying" means setting a weapon in the correct position for hitting a mark.
3. Attention is drawn to the definitions of "projectile", "missile" and "rocket" given in Note 2 following the title of class [F42](#).

F41A FUNCTIONAL FEATURES OR DETAILS COMMON TO BOTH SMALLARMS AND ORDNANCE, e.g. CANNONS; MOUNTINGS FOR SMALLARMS OR ORDNANCE

NOTES

1. This subclass covers those features or details which are considered to be of a kind generally applicable to, or to be concerned with intrinsic functions common to, both smallarms and ordnance.
2. Such features or details are classified in this subclass, even if they are stated to be applied only to smallarms or only to ordnance.
3. Attention is drawn to the definitions given in Note (2) following the title of class [F41](#).

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.

F41B WEAPONS FOR PROJECTING MISSILES WITHOUT USE OF EXPLOSIVE OR COMBUSTIBLE PROPELLANT CHARGE; WEAPONS NOT OTHERWISE PROVIDED FOR (projectiles for fishing, e.g. fish-spears, [A01K 81/00](#); sports implements for throwing [A63B 65/00](#), e.g. boomerangs [A63B 65/08](#); stationary apparatus for projecting sports balls, e.g. tennis balls, [A63B 69/40](#); throwing or slinging toys [A63H 33/18](#); knives, axes [B26B](#); projectiles or missiles other than those incorporating springs as projecting means [F42B 6/00](#))

WARNINGS

1. The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:

F41B 5/16	covered by	F41B 5/1473
F41B 5/18	covered by	F41B 5/1469
F41B 5/20	covered by	F41B 5/1426
F41B 5/22	covered by	F41B 5/143
2. 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.

F41C SMALLARMS, e.g. PISTOLS, RIFLES (functional features or details common to both smallarms and ordnance, mountings therefor [F41A](#); projecting missiles without use of explosive or combustible propellant charge [F41B](#)); ACCESSORIES THEREFOR

NOTE

Attention is drawn to the definitions in Note (2) following the title of class [F41](#).

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.

F41F APPARATUS FOR LAUNCHING PROJECTILES OR MISSILES FROM BARRELS, e.g. CANNONS (smallarms [F41C](#)); LAUNCHERS FOR ROCKETS OR TORPEDOES; HARPOON GUNS (functional features or details common to both smallarms and ordnance, mountings therefor [F41A](#); projecting missiles without use of explosive or combustible propellant charge [F41B](#))

NOTE

This subclass does not cover the arrangement of armaments, adaptation of mountings therefor, or arrangements of ammunition handlers on ships or aircraft, if they present a shipbuilding or aircraft-building aspect, which are covered by subclass [B63G](#) or [B64D](#).

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.

F41G WEAPON SIGHTS; AIMING (optical aspects thereof [G02B](#))

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.

F41H ARMOUR; ARMoured TURRETS; ARMoured OR ARMED VEHICLES; MEANS OF ATTACK OR DEFENCE, e.g. CAMOUFLAGE, IN GENERAL

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.

F41J TARGETS; TARGET RANGES; BULLET CATCHERS {(targets for shooting or hurling games [A63F 9/0204](#))}

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.

F42 AMMUNITION; BLASTING

NOTES

1. This class covers also means for practice or training which may have aspects of simulation, although simulators are generally covered by class [G09](#).
2. In this class, the following terms or expressions are used with the meanings indicated:
 - "primer" effects the first explosive step in the sequence of explosion;
 - "percussion cap" means a primer which is struck to explode;
 - "igniter" effects the first spark-producing or heat-producing step but may not be explosive;
 - "firing-means" or "initiator" (used respectively in the arts of weaponry and blasting) means a device acting directly on the primer, which device may or may not form part of the fuze;
 - "detonator" or "detonator charge" means a charge used to amplify the explosion of the primer;
 - "fuze" means an assembly or mechanism which incorporates safety and arming means in order that the explosion can only take place under certain conditions; this assembly or mechanism determines also the moment (instantaneous or delayed) or the manner, e.g. impact, proximity, hydrostatic pressure, of the firing;
 - "ammunition" covers propulsive charge and projectile whether or not forming a single body, unless otherwise made clear;
 - "projectile", "missile" or "projectile or missile" means any body which is projected or propelled;
 - "guided missile" means projectile or missile which is guided during at least part of its trajectory;
 - "rocket" means projectile or missile which is self-propelled, during at least part of its trajectory, by a rocket engine, i.e. by a jet-propulsion engine carrying both fuel and oxidant therefor;
 - "fuse" or "fuse cord" means a continuous train of explosive enclosed in a usually flexible cord or cable for setting-off an explosive charge in the art of blasting.

F42B **EXPLOSIVE CHARGES, e.g. FOR BLASTING, FIREWORKS, AMMUNITION**
(explosive compositions [C06B](#); fuzes [F42C](#); blasting [F42D](#))**WARNINGS**

1. The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:
[F42B 5/14](#) covered by [F42B 12/40](#), [A01K 11/00](#)
2. 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.

F42C **AMMUNITION FUZES** (blasting cartridge initiators [F42B 3/10](#); chemical aspects [C06C](#)); **ARMING OR SAFETY MEANS THEREFOR** (filling fuzes [F42B 33/02](#); fitting or extracting primers in or from fuzes [F42B 33/04](#); containers for fuzes [F42B 39/30](#))**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.

F42D **BLASTING** (fuses, e.g. fuse cords, [C06C 5/00](#); {for obtaining fluid from wells [E21B 43/00](#); for mining or quarrying [E21C 37/00](#); for making tunnels or galleries [E21D 9/006](#)}; cartridges [F42B 3/00](#))**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.

F99 **SUBJECT MATTER NOT OTHERWISE PROVIDED FOR IN THIS SECTION****F99Z** **SUBJECT MATTER NOT OTHERWISE PROVIDED FOR IN THIS SECTION****NOTE**

This subclass covers subject matter that:

- a. Is not provided for, but is most closely related to, the subject matter covered by the subclasses of this section, and
- b. Is not explicitly covered by any subclass of another section.