

## SECTION F — MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING

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

**F01N GAS-FLOW SILENCERS OR EXHAUST APPARATUS FOR MACHINES OR ENGINES IN GENERAL; GAS-FLOW SILENCERS OR EXHAUST APPARATUS FOR INTERNAL-COMBUSTION ENGINES** (arrangements in connection with gas exhaust of propulsion units in vehicles B60K 13/00; combustion-air intake silencers specially adapted for, or arranged on, internal-combustion engines F02M 35/00; protecting against, or damping, noise in general G10K 11/16)

#### Note(s)

Attention is drawn to the Notes preceding class F01, especially as regards Note (3).

- |             |  |       |         |   |
|-------------|--|-------|---------|---|
| <b>1/00</b> | <b>Silencing apparatus characterised by method of silencing [1, 2006.01]</b>   | 3/029 | • • • • | by adding non-fuel substances to exhaust [7, 2006.01]   |
| 1/02        | • by using resonance [1, 2006.01]  | 3/031 | • • •   | having means for by-passing filters, e.g. when clogged or during cold engine start [7, 2006.01]   |
| 1/04        | • • having sound-absorbing materials in resonance chambers [1, 2006.01]  | 3/032 | • • • • | during filter regeneration only [7, 2006.01]  |
| 1/06        | • by using interference effect [1, 2006.01]  | 3/033 | • • •   | in combination with other devices [7, 2006.01]  |
| 1/08        | • by reducing exhaust energy by throttling or whirling [1, 2006.01]  | 3/035 | • • • • | with catalytic reactors [7, 2006.01]  |
| 1/10        | • • in combination with sound-absorbing materials [1, 2006.01]   | 3/037 | • •     | by means of inertial or centrifugal separators, e.g. associated with agglomerators [7, 2006.01]   |
| 1/12        | • • using spirally- or helically-shaped channels (F01N 1/10 takes precedence; cyclones B04C) [1, 2006.01]  | 3/038 | • •     | by means of perforated plates defining expansion chambers associated with condensation and collection chambers [7, 2006.01]   |
| 1/14        | • by adding air to exhaust gases [1, 2006.01]  | 3/04  | • •     | by means of liquids [1, 2006.01]  |
| 1/16        | • by using movable parts [1, 2006.01]  | 3/05  | • •     | by means of air, e.g. by mixing exhaust with air (silencers working by addition of air to exhaust F01N 1/14; arrangements for the supply of additional air for the thermal or catalytic conversion of noxious components of exhaust F01N 3/30) [7, 2006.01] |
| 1/18        | • • having rotary movement [1, 2006.01]  | 3/06  | •       | for extinguishing sparks [1, 2006.01]   |
| 1/20        | • • having oscillating or vibrating movement (the parts being resilient walls F01N 1/22) [1, 2006.01]  | 3/08  | •       | for rendering innocuous (using electric or electrostatic separators F01N 3/01; chemical aspects B01D 53/92) [1, 7, 2006.01]   |
| 1/22        | • • the parts being resilient walls [1, 2006.01]   | 3/10  | • •     | by thermal or catalytic conversion of noxious components of exhaust [1, 3, 2006.01]   |
| 1/24        | • by using sound-absorbing materials (F01N 1/04, F01N 1/06, F01N 1/10, F01N 1/14, F01N 1/16 take precedence) [1, 2006.01]  | 3/18  | • • •   | characterised by methods of operation; Control [3, 2006.01]   |
| <b>3/00</b> | <b>Exhaust or silencing apparatus having means for purifying, rendering innocuous, or otherwise treating exhaust</b> (electric control F01N 9/00; monitoring or diagnostic devices for exhaust-gas treatment apparatus F01N 11/00) [1, 4, 2006.01] | 3/20  | • • • • | specially adapted for catalytic conversion (F01N 3/22 takes precedence) [3, 2006.01]  |
| 3/01        | • by means of electric or electrostatic separators [7, 2006.01]  | 3/22  | • • • • | Control of additional air supply only, e.g. using by-passes or variable air pump drives [3, 2006.01]  |
| 3/02        | • for cooling, or for removing solid constituents of, exhaust (by means of electric or electrostatic separators F01N 3/01) [1, 7, 2006.01]   | 3/24  | • • •   | characterised by constructional aspects of converting apparatus (filtering in combination with catalytic reactors F01N 3/035) [3, 7, 2006.01]   |
| 3/021       | • • by means of filters [7, 2006.01]   | 3/26  | • • • • | Construction of thermal reactors [3, 2006.01]   |
| 3/022       | • • • characterised by specially adapted filtering structure, e.g. honeycomb, mesh or fibrous [7, 2006.01]   | 3/28  | • • • • | Construction of catalytic reactors [3, 2006.01]   |
| 3/023       | • • • using means for regenerating the filters, e.g. by burning trapped particles [7, 2006.01]   | 3/30  | • • • • | Arrangements for supply of additional air (control, e.g. using by-passes or variable air pump drives, F01N 3/22) [3, 2006.01]   |
| 3/025       | • • • • using fuel burner or by adding fuel to exhaust [7, 2006.01]  |       |         |   |
| 3/027       | • • • • using electric or magnetic heating [7, 2006.01]  |       |         |   |
| 3/028       | • • • • • using microwaves [7, 2006.01]  |       |         |   |

## F01N

- 3/32 • • • • • using air pumps (using jet air pumps F01N 3/34; pumps in general F04) [3, 2006.01]
- 3/34 • • • • • using air conduits or jet air pumps, e.g. near the engine exhaust port [3, 2006.01]
- 3/36 • • • • • Arrangements for supply of additional fuel [3, 2006.01]
- 3/38 • • • • • Arrangements for igniting [3, 2006.01]
- 5/00 Exhaust or silencing apparatus combined or associated with devices profiting by exhaust energy** (using kinetic or wave energy of exhaust gases in exhaust systems for charging F02B; predominant aspects of such devices, see the relevant classes for the devices) [1, 2006.01]
  - 5/02 • the devices using heat [1, 2006.01]
  - 5/04 • the devices using kinetic energy [1, 2006.01]
- 9/00 Electrical control of exhaust gas treating apparatus** (monitoring or diagnostic devices for exhaust-gas treatment apparatus F01N 11/00; conjoint electrical control of two or more combustion engine functions F02D 43/00) [4, 2006.01]

- 11/00 Monitoring or diagnostic devices for exhaust-gas treatment apparatus** [7, 2006.01]
- 13/00 Exhaust or silencing apparatus characterised by constructional features** [2010.01]
  - 13/02 • having two or more separate silencers in series [2010.01]
  - 13/04 • having two or more silencers in parallel, e.g. having interconnections for multi-cylinder engines [2010.01]
  - 13/06 • specially adapted for star-arrangement of cylinders, e.g. exhaust manifolds [2010.01]
  - 13/08 • Other arrangements or adaptations of exhaust conduits [2010.01]
  - 13/10 • • of exhaust manifolds [2010.01]
  - 13/12 • specially adapted for submerged exhausting [2010.01]
  - 13/14 • having thermal insulation [2010.01]
  - 13/16 • Selection of particular materials [2010.01]
  - 13/18 • Construction facilitating manufacture, assembly or disassembly [2010.01]
  - 13/20 • having flared outlets, e.g. of fish-tail shape [2010.01]
- 99/00 Subject matter not provided for in other groups of this subclass** [2010.01]