

CPC COOPERATIVE PATENT CLASSIFICATION

G PHYSICS (NOTES omitted)

INSTRUMENTS

G05 **CONTROLLING; REGULATING** (specially adapted to a particular field of use, [see the relevant place for that field, e.g. A62C 37/00, B03B 13/00, B23Q](#))
(NOTES omitted)

G05D **SYSTEMS FOR CONTROLLING OR REGULATING NON-ELECTRIC VARIABLES**
(for continuous casting of metals [B22D 11/16](#) ; valves [per se F16K](#); sensing non-electric variables, [see the relevant subclasses of G01](#); for regulating electric or magnetic variables [G05F](#))

NOTES

1. This subclass does not cover features of general applicability to regulating systems, e.g. anti-hunting arrangements, which are covered by subclass [G05B](#).
2. In this subclass, the following term is used with the meaning indicated:
 - "systems" includes self-contained devices such as speed governors, pressure regulators.
3. Control systems specially adapted for particular apparatus, machines or processes are classified in the subclasses for the apparatus, machines or processes, provided that there is specific provision for control or regulation relevant to the special adaptation, either at a detailed level, (e.g. [A21B 1/40](#) : "for regulating temperature in bakers' ovens") or at a general level, (e.g. [B23K 9/095](#) : "for automatic control of welding parameters in arc welding"). Otherwise, classification is made in the most appropriate place in this subclass.

The following are lists of places where there is specific provision of the kind referred to above. Where such provision is at a detailed level, the places have been grouped according to the main groups of this subclass. Where the provision is at a general level (e.g. of a kind appropriate to more than one of the main groups specified in the lists, or to main groups [G05D 27/00](#) or [G05D 29/00](#)), the places are listed under the title "General References".

Places related to G05D 1/00

| | |
|---|--|
| A01B 69/00 | Agricultural machines or implements |
| A63H 17/36 | Toy vehicles |
| B60V 1/11 | Air-cushion vehicles |
| B62D 1/00 | Steering controls of motor vehicles or trailers, i.e. means for initiating a change of direction |
| B62D 6/00 | Arrangements for automatically controlling the steering depending on driving conditions |
| B62D 55/116 | Chassis of endless-tracked vehicles |
| B63H 25/00 | Marine steering; control of waterborne vessels |
| B64C 13/00 - B64C 15/00 | Controlling aircraft |
| B64D 25/10 | Controlling attitude or direction of aircraft ejector seats |
| B64G 1/24 | Cosmonautic vehicles |
| F41G 7/00 | Self-propelled missiles |
| F42B 15/01 | Guided missiles |
| F42B 19/01 | Marine torpedoes |

Places related to G05D 3/00

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|--|--|
| A43D 119/00 | Footwear manufacture |
| B21K 31/00 | Tool carriers in forging or pressing |
| B23B 39/26 | Pattern-controlled boring or drilling tools |
| B23D 1/30 , B23D 3/06 , B23D 5/04 | Planing or slotting machines controlled by copying device |
| B23H 7/18 | Electrode to workpiece spacing in electric discharge and electrochemical machining |
| B23K 26/02 | Workpiece in laser welding or cutting |
| B23K 37/04 | Workpiece in welding |
| B23K 37/06 | Molten metal in welding |
| B23Q 5/20 | Spindles in machine tools |
| B23Q 15/00 , B23Q 16/00 | Tool or work position in machine tools |
| B23Q 35/00 | Tools controlled by pattern or master model |
| B24B 17/00 | Grinding controlled by patterns, drawings, magnetic tape or the like |
| B24B 47/22 | Starting position in grinding |
| B30B 15/24 | Actuating members in presses |
| B62D 55/116 | Chassis of tracked vehicles |
| B65H 23/18 | Web-advancing mechanisms |
| E02F 3/43 | Dippers or buckets in dredgers |

G05D

G05D
(continued)

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| F15B 9/00 | Fluid-pressure servomotors with follow-up action |
| F24S 50/20 | Tracking of solar heat collectors |
| G03F 9/00 | Photomechanical production of patterned or textured surfaces |
| G11B 5/588 | Rotating heads in information storage systems |
| G21C 7/12 | Movement of control elements in nuclear reactors |
| Places related to G05D 5/00 | |
| A24B 7/14 | Tobacco cutting |
| B05C 11/02 | Thickness of coating of fluent material on surface |
| B21B 37/16 | Thickness, width, diameter or other transverse dimensions of the products of metal-rolling mills |
| C03B 18/04 | Dimension of glass ribbon |
| D21F 7/06 | Thickness of layer in paper making |
| Places related to G05D 7/00 | |
| A45D 20/26 | Air in hair drying helmets |
| A61M 5/168 | Flow of media to the human body |
| B03C 3/36 | Gases or vapour in electrostatic separators |
| B05C 11/10 | Fluent material in coating devices |
| B67D 1/12 | Dispensing beverages on draught |
| B67D 7/28 | Transferring liquids |
| C10K 1/28 | Gas purifiers |
| E21B 21/08 | Flushing boreholes |
| E21B 43/12 | Obtaining liquids from wells |
| F01D 17/00 | Flow in non-positive-displacement machines or systems |
| F01M 1/16 | Lubrication arrangements |
| F01P 7/00 | Coolant flow in cooling devices |
| F02C 9/16, F02C 9/50 | Gas-turbine working fluid |
| F16L 55/027 | Throttle passages in pipes |
| F24F 11/00 | Air-flow or supply of heating or cooling fluids in air treatment arrangements |
| F26B 21/12 | Air or gas flow in dryers |
| G01G 11/08 | Continuous flow weighing apparatus |
| G21D 3/14 | Coolant in nuclear power plant |
| Places related to G05D 9/00 | |
| B01D 21/34 | Liquid level in sedimentation arrangements |
| B41L 27/04 | Ink level in printing, manifolding or duplicating arrangements |
| F22D 5/00 | Feed water for boilers |
| H01J 1/10, H01J 13/14 | Liquid pool electrodes in electric discharge tubes or lamps |
| Places related to G05D 11/00 | |
| B01D 21/32 | Density in sedimentation arrangements |
| B01F 15/04 | Mixers |
| B24C 7/00 | Abrasive blasts |
| B28C 7/00 | Mixtures of clays or cements |
| B65G 53/66 | Bulk material conveyors |
| F02K 3/075 | Flow ratio in jet-propulsion plants |
| Places related to G05D 13/00 | |
| B21C 1/12 | Drum speed in metal drawing |
| B23Q 15/00 | Cutting velocity of tool or work |
| B30B 15/20 | Ram speed in presses |
| B60K 31/00 | Setting or limiting speed of vehicles |
| B60L 15/00 | Electrically-propelled vehicles |
| B64D 31/08 | Cruising speed of aircraft |
| D01D 1/09 | Feed rate in manufacture of artificial filaments, threads, fibres, bristles or ribbons |
| D01G 15/36 | Carding machines |
| D02H 13/14 | Warping, beaming or leasing machines |
| D03D 51/16 | Cyclically varying speed of looms |
| G01N 30/32 | Speed of fluid carrier in chemical analysis |
| G11B 15/46 | Filamentary or web record carriers or heads for such carriers in information storage systems |
| G11B 19/28 | Non-filamentary, non-web record carriers, or heads for such carriers in information storage systems |
| Places related to G05D 15/00 | |
| B25D 9/26 | Portable percussive tools |
| B30B 15/22 | Ram pressure in presses |
| B65H 59/00 | Tension in filamentary material |
| {B65H 23/00, B65H 59/00} | Tension in webs, tapes, filamentary material |
| B66D 1/50 | Rope, cable or chain tension |
| D03D 49/04 | Tension in looms |

G05D

G05D
(continued)

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| D05B 47/04 | Tension in sewing machines |
| D21F 3/06 | Pressure in paper-making machines |
| F26B 13/12 | Drying fabrics |
| F26B 21/10 | Pressure in dryers |
| G11B 15/43 | Record carrier tension in information storage arrangements |
| Places related to G05D 16/00 | |
| B60C 23/00 | Tyre pressure |
| B63C 11/08 | Air within diving suit |
| B64D 13/00 | Aircraft air-pressure |
| B65G 53/66 | Bulk material conveyors |
| D01D 1/09 | Manufacture of artificial filaments, threads, fibres, bristles or ribbons |
| E21B 21/08 | Flushing boreholes |
| F01M 1/16 | Lubrication arrangements |
| G01N 30/32 | Pressure of fluid carrier in chemical analysis |
| H01J 7/14 | Pressure in electric discharge tubes or lamps |
| H01K 1/52 | Pressure in electric incandescent lamps |
| Places related to G05D 19/00 | |
| B25D 9/26 | Portable percussion tools |
| B65G 27/32 | Jigging conveyors |
| Places related to G05D 21/00 | |
| B01D 21/32 | Density in sedimentation arrangements |
| B01D 53/30 | Treating gases or vapours |
| G01N 30/34 | Composition of fluid carrier in chemical analysis |
| Places related to G05D 22/00 | |
| A01G 25/16 | Watering gardens, fields, sports grounds or the like |
| A01K 41/04 | Poultry incubators |
| A24B 9/00 | Tobacco products |
| F24F 11/00 | Air conditioning |
| F26B 21/08 | Dryers |
| Places related to G05D 23/00 | |
| A21B 1/40 | Bakers' ovens |
| A45D 6/20 | Hair curlers |
| B21C 31/00 | Metal extruding |
| B60C 23/00 | Tyre temperature |
| B64G 1/50 | Cosmonautic vehicles |
| C03B 18/18 , C03B 18/22 | Float baths in glass making |
| D01D 1/09 | Manufacture of artificial filaments, threads, fibres, bristles or ribbons |
| D04B 35/30 | Knitting machines |
| D06F 75/26 | Hand irons |
| D21F 5/06 | Paper-making machines |
| F01M 5/00 | Lubricant in lubrication arrangements |
| F16N 7/08 | Arrangements for supplying oil or unspecified lubricant from a reservoir |
| F22G 5/00 | Steam superheat |
| F26B 21/10 | Dryers |
| G01N 30/30 | Temperature of fluid carrier in chemical analysis |
| H01M 10/60 | Electric storage cells |
| H05B 6/06 , H05B 6/50 , | Dielectric, induction or microwave heating |
| H05B 6/68 | |
| H05G 1/36 | Anode of X-ray tube |
| Places related to G05D 25/00 | |
| B41B 21/08 | Photographic composing machines |
| H01S 3/10 , H05B 33/08 , | Lasers and other light sources |
| H05B 35/00 to H05B 43/00 | |
| General references | |
| A01J 5/007 | Milking machines |
| B23K 9/095 | Welding parameters |
| B23Q 35/00 | Copying |
| B24B 17/00 , B24B 49/00 | Grinding or polishing |
| B24C 7/00 | Abrasive blasts |
| B67D 1/12 | Dispensing beverages on draught |
| G03G 21/20 | Electrographic, electrophotographic or magnetographic processes |
| H02P 5/00 - H02P 9/00 | Dynamo-electric motors or generators |

- 1/00 Control of position, course or altitude of land, water, air, or space vehicles, e.g. automatic pilot** (steering applicable only to other than landborne vehicles, e.g. three-dimensional steering applicable to both aircraft and submarines [B60K](#) ; construction or disposition of steering means on land vehicles [B62](#), on waterborne vessels [B63](#) ; manual or automatic control of aircraft, e.g. using automatic pilot or radiated signal [B64C](#) ; radio navigation systems or analogous systems using other waves [G01S](#))
- 1/0005 . {with arrangements to save energy}
- 1/0011 . {associated with a remote control arrangement}
- 1/0016 . . {characterised by the operator's input device (input arrangements for computing systems in general [G06F 3/00](#))}
- 1/0022 . . {characterised by the communication link (data switching networks in general [H04L 12/00](#))}
- 1/0027 . . {involving a plurality of vehicles, e.g. fleet or convoy travelling (traffic control systems for road vehicles [G08G 1/00](#) ; for marine craft [G08G 3/00](#) ; for aircraft [G08G 5/00](#) ; fleet control of land vehicles from a control room [G05D 1/0297](#))}
- 1/0033 . . {by having the operator tracking the vehicle either by direct line of sight or via one or more cameras located remotely from the vehicle}
- 1/0038 . . {by providing the operator with simple or augmented images from one or more cameras located onboard the vehicle, e.g. tele-operation (images analyzed by a computer and used for automatic navigation [G05D 1/0246](#))}
- 1/0044 . . {by providing the operator with a computer generated representation of the environment of the vehicle, e.g. virtual reality, maps (maps used for automatic navigation [G05D 1/0274](#) ; flight directors [G01C 23/005](#))}
- 1/005 . . {by providing the operator with signals other than visual, e.g. acoustic, haptic}
- 1/0055 . {with safety arrangements}
- 1/0061 . . {for transition from automatic pilot to manual pilot and *vice versa*}
- 1/0066 . . {for limitation of acceleration or stress}
- 1/0072 . . {to counteract a motor failure}
- 1/0077 . . {using redundant signals or controls}
- 1/0083 . {to help an aircraft pilot in the rolling phase}
- 1/0088 . {characterized by the autonomous decision making process, e.g. artificial intelligence, predefined behaviours (using knowledge based models [G06N 5/00](#))}
- 1/0094 . {involving pointing a payload, e.g. camera, weapon, sensor, towards a fixed or moving target}
- 1/02 Control of position or course in two dimensions
- 1/0202 . . {specially adapted to aircraft}
- 1/0204 . . . {to counteract a sudden perturbation, e.g. cross-wind, gust}
- 1/0206 . . {specially adapted to water vehicles}
- 1/0208 . . . {dynamic anchoring}
- 1/021 . . {specially adapted to land vehicles}

NOTES

1. This group covers control of position or course in two dimensions specially adapted for land vehicles, i.e. control systems to define a trajectory for a land vehicle, and to take suitable actions to make the vehicle follow said trajectory.

2. Relationships with other classification places.
- Subclass [G01C](#) covers navigation in general, i.e. determining the position and course of land vehicles, ships, aircraft, and space vehicles.
- Subclass [G01S](#) covers radio, sonar or lidar navigation systems, i.e. navigation by use of radio, acoustic or optical waves, or analogue arrangements using other electromagnetic waves.
- Subclass [G08G](#) covers navigation systems for traffic control purposes, i.e. systems in which the navigation is not performed autonomously by or in the vehicle, but where the vehicles are guided by instructions transmitted to them.
- Aspects of navigation systems that are important per se should also be classified in the relevant groups of [G01C](#) (see for example list under "Informative References" below).
- Aspects of radio, sonar or lidar navigation systems that are important per se should also be classified in the relevant groups of [G01S](#) (see for example list under "Informative References" below).
- Aspects of navigation systems for traffic purposes that are important per se should also be classified in the relevant groups of [G08G](#) (see for example list under "Informative References" below).
3. Informative References.
- Attention is drawn to the following places, which could be of interest for search:
- navigation, i.e. determining the position and course of land vehicles, ships, aircraft, and space vehicles [G01C 21/00](#)
 - measuring distance traversed on the ground by vehicles, e.g. using odometers [G01C 22/00](#)
 - position-fixing by co-ordinating a plurality of determinations of direction or position lines [G01S 5/00](#)
 - determining distance or velocity using waves and not using reflection or reradiation of waves [G01S 11/00](#)
 - radar systems specially designed for traffic control [G01S 13/91](#)
 - radar systems specially designed for anti-collision purposes [G01S 13/93](#)
 - sonar systems specially designed for anti-collision purposes [G01S 15/93](#)
 - lidar systems specially designed for anti-collision purposes [G01S 17/93](#)
 - traffic control systems for road vehicles [G08G 1/00](#)
 - monitoring the location of fleet of vehicles in traffic control systems [G08G 1/127](#)
 - anti-collision traffic control systems [G08G 1/16](#)
- 1/0212 . . . {with means for defining a desired trajectory (involving a plurality of land vehicles [G05D 1/0287](#))}

- 1/0214 {in accordance with safety or protection criteria, e.g. avoiding hazardous areas (monitoring the location of vehicles within a certain area, e.g. forbidden or allowed areas, in traffic control systems for road vehicles [G08G 1/13](#))}
- 1/0217 {in accordance with energy consumption, time reduction or distance reduction criteria}
- 1/0219 {ensuring the processing of the whole working surface}
- 1/0221 {involving a learning process}
- 1/0223 {involving speed control of the vehicle (vehicle fittings for automatically controlling, i.e. preventing speed from exceeding an arbitrarily established velocity or maintaining speed at a particular velocity, as selected by the vehicle operator [B60K 31/00](#))}
- 1/0225 {involving docking at a fixed facility, e.g. base station or loading bay (parking aids [B62D 15/027](#))}
- 1/0227 . . . {using mechanical sensing means, e.g. for sensing treated area}
- 1/0229 {in combination with fixed guiding means}
- 1/0231 . . . {using optical position detecting means (position-fixing by using electromagnetic waves other than radio waves, e.g. optical position detecting means [G01S 5/16](#))}
- 1/0234 {using optical markers or beacons (optical beacons per se [G01S 1/70](#))}
- 1/0236 {in combination with a laser (lasers per se [H01S](#))}
- 1/0238 {using obstacle or wall sensors ([G05D 1/0246](#) and [G05D 1/0289](#) take precedence; lidar systems designed for anti-collision purposes [G01S 17/93](#))}
- 1/024 {in combination with a laser (lasers per se [H01S](#))}
- 1/0242 {using non-visible light signals, e.g. IR or UV signals}
- 1/0244 {using reflecting strips}
- 1/0246 {using a video camera in combination with image processing means (image data processing in general [G06T](#) ; video signal coding and transmission [H04N](#))}
- 1/0248 {in combination with a laser (lasers per se [H01S](#))}
- 1/0251 {extracting 3D information from a plurality of images taken from different locations, e.g. stereo vision (stereoscopic image analysis [H04N 13/00](#); depth recovery from images [G06T 7/593](#))}
- 1/0253 {extracting relative motion information from a plurality of images taken successively, e.g. visual odometry, optical flow (determining position or orientation from images [G06T 7/70](#))}
- 1/0255 . . . {using acoustic signals, e.g. ultra-sonic signals (sonar systems designed for anti-collision purposes [G01S 15/93](#))}
- 1/0257 . . . {using a radar (radar systems designed for anti-collision purposes between land vehicles or between land vehicle and fixed obstacles [G01S 13/931](#))}
- 1/0259 . . . {using magnetic or electromagnetic means}
- 1/0261 {using magnetic plots}
- 1/0263 {using magnetic strips}
- 1/0265 {using buried wires}
- 1/0268 . . . {using internal positioning means}
- 1/027 {comprising inertial navigation means, e.g. azimuth detector (inertial navigation [G01C 21/16](#) ; inertial navigation combined with non-inertial navigation instruments [G01C 21/165](#))}
- 1/0272 {comprising means for registering the travel distance, e.g. revolutions of wheels (measuring distance traversed on the ground by vehicles, e.g. using odometers [G01C 22/00](#))}
- 1/0274 {using mapping information stored in a memory device (navigation using map-matching [G01C 21/30](#))}
- 1/0276 . . . {using signals provided by a source external to the vehicle (involving a plurality of vehicles [G05D 1/0287](#) ; automatically controlling vehicle speed responsive to externally generated signals [B60K 31/0058](#))}
- 1/0278 {using satellite positioning signals, e.g. GPS}
- 1/028 {using a RF signal}
- 1/0282 {generated in a local control room}
- 1/0285 {using signals transmitted via a public communication network, e.g. GSM network}
- 1/0287 . . . {involving a plurality of land vehicles, e.g. fleet or convoy travelling (traffic control systems for road vehicles [G08G 1/00](#), particularly anticollision systems [G08G 1/16](#))}
- NOTE**
- In this group, the following terms or expressions are used with the meaning indicated:
- fleet means a plurality of vehicles controlled in a coordinated manner or under unified control;
 - convoy (or platooning) means a plurality of vehicles following an identical trajectory, said vehicles being separated by a predetermined distance maintained by a control system
- 1/0289 {with means for avoiding collisions between vehicles (vehicle fittings for automatically controlling speed including means for detecting potential obstacles [B60K 31/0008](#) ; avoiding obstacles by action on the steering system [B62D](#) ; radar, sonar, lidar systems designed for anti-collision purposes [G01S 13/93](#), [G01S 15/93](#), [G01S 17/93](#))}
- 1/0291 {Fleet control (monitoring fleets in traffic control systems for road vehicles [G08G 1/127](#), [G08G 1/127](#))}
- 1/0293 {Convoy travelling}
- 1/0295 {by at least one leading vehicle of the fleet}
- 1/0297 {by controlling means in a control room}
- 1/03 . . . using near-field transmission systems, e.g. inductive-loop type {([G05D 1/021](#) and subgroups take precedence)}
- 1/04 . . . Control of altitude or depth

- 1/042 . . {specially adapted for aircraft}
 - 1/044 . . . {during banks}
 - 1/046 . . . {to counteract a perturbation, e.g. gust of wind}
 - 1/048 . . {specially adapted for water vehicles}
 - 1/06 . . Rate of change of altitude or depth
 - 1/0607 . . . {specially adapted for aircraft}
 - 1/0615 {to counteract a perturbation, e.g. gust of wind}
 - 1/0623 {by acting on the pitch}
 - 1/063 {by acting on the motors}
 - 1/0638 {by combined action on the pitch and on the motors}
 - 1/0646 {to follow the profile of undulating ground}
 - 1/0653 {during a phase of take-off or landing}
 - 1/0661 {specially adapted for take-off}
 - 1/0669 {specially adapted for vertical take-off}
 - 1/0676 {specially adapted for landing}
 - 1/0684 {on a moving platform, e.g. aircraft carrier}
 - 1/0692 . . . {specially adapted for under-water vehicles}
 - 1/08 . . Control of attitude, i.e. control of roll, pitch, or yaw
 - 1/0808 . . {specially adapted for aircraft}
 - 1/0816 . . . {to ensure stability}
 - 1/0825 {using mathematical models}
 - 1/0833 {using limited authority control}
 - 1/0841 {to prevent a coupling between different modes}
 - 1/085 {to ensure coordination between different movements}
 - 1/0858 . . . {specially adapted for vertical take-off of aircraft}
 - 1/0866 . . . {specially adapted to captive aircraft}
 - 1/0875 . . {specially adapted to water vehicles}
 - 1/0883 . . {specially adapted for space vehicles}
 - 1/0891 . . {specially adapted for land vehicles}
 - 1/10 . . Simultaneous control of position or course in three dimensions ([G05D 1/12](#) takes precedence)
 - 1/101 . . {specially adapted for aircraft}
 - 1/102 . . . {specially adapted for vertical take-off of aircraft}
 - 1/104 . . . {involving a plurality of aircrafts, e.g. formation flying ([traffic control systems for aircraft G08G 5/00](#))}
 - 1/105 . . . {specially adapted for unpowered flight, e.g. glider, parachuting, forced landing ([parachutes per se B64D 17/00](#))}
 - 1/107 . . {specially adapted for missiles}
 - 1/108 . . . {animated with a rolling movement}
 - 1/12 . . Target-seeking control
- NOTE**
- Within groups [G05D 3/00](#) - [G05D 3/20](#), in the absence of an indication of the contrary, an invention is classified in the last appropriate place
- 3/00 Control of position or direction ([G05D 1/00](#) takes precedence)**
- 3/10 . . without using feedback
 - 3/105 . . {Solar tracker}
 - 3/12 . . using feedback
 - 3/121 . . {using synchroscopes (selsyns)}
 - 3/122 . . . {without modulation}
- 3/124 . . . {with modulation}
 - 3/125 . . {using discrete position sensor}
 - 3/127 . . . {with electrical contact}
 - 3/128 . . {using clutch or brake}
 - 3/14 . . using an analogue comparing device
 - 3/1409 . . . {with dc amplifier chain}
 - 3/1418 . . . {with ac amplifier chain}
 - 3/1427 . . . {with non-linear amplifier chain}
 - 3/1436 . . . {with fine or coarse devices}
 - 3/1445 . . . {with a plurality of loops}
 - 3/1454 {using models or predicting devices}
 - 3/1463 {using PID devices}
 - 3/1472 . . . {with potentiometer}
 - 3/1481 . . . {with discrete position sensor}
 - 3/149 . . . {with clutch or brake}
 - 3/16 . . . whose output amplitude can only take a number of discrete values ([G05D 3/18](#) takes precedence)
 - 3/165 {using clutch or brake}
 - 3/18 . . . delivering a series of pulses
 - 3/183 {using stepping motor}
 - 3/186 {using clutch or brake}
 - 3/20 . . using a digital comparing device
 - 3/203 . . . {using fine or coarse devices}
 - 3/206 . . . {using clutch or brakes}
- 5/00 Control of dimensions of material**
- 5/02 . . of thickness, e.g. of rolled material ([of specific materials B21B, B29C, B32B, C03B, D21F](#))
 - 5/03 . . characterised by the use of electric means
 - 5/04 . . of the size of items, e.g. of particles
 - 5/06 . . characterised by the use of electric means
- 7/00 Control of flow ([level control G05D 9/00](#) ; [ratio control G05D 11/00](#) ; of media to the human body [A61M 5/168](#) ; [weighing apparatus G01G](#))**
- 7/005 . . {characterised by the use of auxiliary non-electric power combined with the use of electric means}
 - 7/01 . . without auxiliary power
 - 7/0106 . . {the sensing element being a flexible member, e.g. bellows, diaphragm, capsule}
 - 7/0113 . . . {the sensing element acting as a valve}
 - 7/012 . . . {the sensing element being deformable and acting as a valve}
 - 7/0126 . . {the sensing element being a piston or plunger associated with one or more springs}
 - 7/0133 . . . {within the flow-path}
 - 7/014 {using sliding elements}
 - 7/0146 . . {the in-line sensing element being a piston or float without flexible member or spring}
 - 7/0153 . . . {using slidable elements}
 - 7/016 . . . {the sensing element being a ball}
 - 7/0166 . . {the sensing element being a float or a ball placed outside the flow path to be controlled}
 - 7/0173 . . {using pivoting sensing element acting as a valve mounted within the flow-path}
 - 7/018 . . {using rotary sensing element}
 - 7/0186 . . {without moving parts}
 - 7/0193 . . {using hydraulic or pneumatic amplifiers, relays or transmitters}
 - 7/03 . . with auxiliary non-electric power ([G05D 7/005](#) takes precedence)

- 7/06 . . characterised by the use of electric means
{(G05D 7/005 takes precedence)}
- 7/0605 . . {specially adapted for solid materials}
- 7/0611 . . . {characterised by the set value given to the control element}
- 7/0617 . . {specially adapted for fluid materials}
- 7/0623 . . . {characterised by the set value given to the control element}
- 7/0629 . . . {characterised by the type of regulator means}
- 7/0635 {by action on throttling means
(G05D 7/0688, G05D 7/0694 take precedence)}
- 7/0641 {using a plurality of throttling means
(G05D 7/067 takes precedence)}
- 7/0647 {the plurality of throttling means being arranged in series}
- 7/0652 {the plurality of throttling means being arranged in parallel}
- 7/0658 {the plurality of throttling means being arranged for the control of a single flow from a plurality of converging flows
(G05D 7/0652 takes precedence; ratio control G05D 11/13)}
- 7/0664 {the plurality of throttling means being arranged for the control of a plurality of diverging flows from a single flow
(G05D 7/0652 takes precedence; ratio control G05D 11/13)}
- 7/067 {characterised by free surface flow
(open channel water distribution systems E02B 13/00)}
- 7/0676 {by action on flow sources (G05D 7/0688, G05D 7/0694 take precedence)}
- 7/0682 {using a plurality of flow sources}
- 7/0688 {by combined action on throttling means and flow sources (G05D 7/0694 takes precedence)}
- 7/0694 {by action on throttling means or flow sources of very small size, e.g. microfluidics (microvalves F16K 99/0001; microstructural devices per se B81B)}
- 9/00** **Level control, e.g. controlling quantity of material stored in vessel (controlling level of liquid-pool electrode in electric discharge tubes and lamps H01J 1/10, H01J 13/14)**
- 9/02 . . without auxiliary power
- 9/04 . . with auxiliary non-electric power
- 9/12 . . characterised by the use of electric means
- 11/00** **Ratio control (control of chemical or physico-chemical variables, e.g. pH-value G05D 21/00 ; humidity control G05D 22/00 ; control of viscosity G05D 24/00 ; proportioning the ingredients for mixing clay or cement with other substances B28C 7/00)**
- 11/001 . . {with discontinuous action}
- 11/003 . . {using interconnected flow control elements}
- 11/005 . . {using synchronised pumps}
- 11/006 . . {involving a first fluid acting on the feeding of a second fluid}
- 11/008 . . {involving a fluid operating a pump motor}
- 11/02 . . Controlling ratio of two or more flows of fluid or fluent material
- 11/03 . . without auxiliary power
- 11/035 . . with auxiliary non-electric power
- 11/04 . . . by sensing weight of individual components, e.g. gravimetric procedure
- 11/06 . . . by sensing density of mixture, e.g. using aerometer
- 11/08 . . . by sensing concentration of mixture, e.g. measuring pH value
- 11/10 by sensing moisture of non-aqueous liquids
- 11/12 . . . by sensing viscosity of mixture
- 11/13 . . characterised by the use of electric means
- 11/131 . . . {by measuring the values related to the quantity of the individual components (G05D 11/139 takes precedence)}
- 11/132 {by controlling the flow of the individual components (G05D 11/133 takes precedence)}
- 11/133 {with discontinuous action}
- 11/134 {by sensing the weight of the individual components}
- 11/135 . . . {by sensing at least one property of the mixture (G05D 11/139 takes precedence)}
- 11/136 {by sensing the viscosity}
- 11/137 {by sensing the density of the mixture}
- 11/138 {by sensing the concentration of the mixture, e.g. measuring pH value}
- 11/139 . . . {by measuring a value related to the quantity of the individual components and sensing at least one property of the mixture}
- 11/16 . . Controlling mixing ratio of fluids having different temperatures, e.g. by sensing the temperature of a mixture of fluids having different viscosities
- 13/00** **Control of linear speed; Control of angular speed; Control of acceleration or deceleration, e.g. of a prime mover (synchronising telegraph receiver and transmitter H04L 7/00)**
- 13/02 . . Details
- 13/04 . . providing for emergency tripping of an engine in case of exceeding maximum speed
- 13/06 . . providing for damping of erratic vibrations in governors
- 13/08 . . without auxiliary power
- 13/10 . . Centrifugal governors with fly-weights
- 13/12 . . . Details
- 13/14 Fly weights; Mountings thereof; Adjusting equipment for limits, e.g. temporarily
- 13/16 Risers; Transmission gear therefor; Restoring mechanisms therefor
- 13/18 . . . counterbalanced by spider springs acting immediately upon the fly-weights
- 13/20 . . . counterbalanced by spider springs acting upon the articulated riser
- 13/22 . . . counterbalanced by fluid pressure acting upon the articulated riser
- 13/24 . . . counterbalanced by two or more different appliances acting simultaneously upon the riser, e.g. with both spring force and fluid pressure, with both spring force and electromagnetic force
- 13/26 . . . with provision for modulating the degree of non-uniformity of speed
- 13/28 . . . with provision for performing braking effects in case of increased speed

- 13/30 . . Governors characterised by fluid features in which the speed of a shaft is converted into fluid pressure ([transducers converting variations of physical quantities into fluid pressure variations F15B 5/00](#))
- 13/32 . . . using a pump
- 13/34 . with auxiliary non-electric power ([fluid-pressure converters F15B 3/00](#))
- 13/36 . . using regulating devices with proportional band, i.e. P regulating devices
- 13/38 . . . involving centrifugal governors of fly-weight type
- 13/40 . . . involving fluid governors of pump type
- 13/42 . . . involving fluid governors of flow-controller type, i.e. the width of liquid flow being controlled by fly-weights
- 13/44 . . . involving fluid governors of jet type
- 13/46 . . using regulating devices with proportional band and integral action, i.e. PI regulating devices
- 13/48 . . . involving resilient restoring mechanisms
- 13/50 . . . involving connecting means or superimposing a proportional regulating device and an integral regulating device
- 13/52 . . using regulating devices with proportional band and derivative action, i.e. PD regulating devices
- 13/54 . . . involving centrifugal governors of fly-weight type exerting an acceleratory effect
- 13/56 . . . involving restoring mechanisms exerting a delay effect
- 13/58 . . . involving means for connecting a speed regulating device and an acceleration regulating device
- 13/60 . . using regulating devices with proportional band, derivative and integral action, i.e. PID regulating devices
- 13/62 . characterised by the use of electric means, e.g. use of a tachometric dynamo, use of a transducer converting an electric value into a displacement ([electric motor control H02P](#))
- 13/64 . Compensating the speed difference between engines meshing by a differential gearing or the speed difference between a controlling shaft and a controlled shaft ([G05D 13/62 takes precedence](#))
- 13/66 . Governor units providing for co-operation with control dependent upon a variable other than speed
- 15/00 Control of mechanical force or stress; Control of mechanical pressure**
- 15/01 . characterised by the use of electric means
- 16/00 Control of fluid pressure** ([control of pressure in electric discharge tubes or lamps H01J](#), e.g. [H01J 7/14](#); [control of pressure in electric incandescent lamps H01K 1/52](#))
- 16/02 . Modifications to reduce the effects of instability, e.g. due to vibrations, friction, abnormal temperature, overloading, unbalance ([vibration dampers F16F 7/00](#))
- 16/04 . without auxiliary power
- 16/06 . . the sensing element being a flexible membrane, yielding to pressure, e.g. diaphragm, bellows, capsule
- 16/0602 . . . {two controllers being mounted in series}
- 16/0605 . . . {two controllers being mounted in parallel}
- 16/0608 . . . {the controller being mounted within the flow path and having slidable elements}
- 16/0611 . . . {the sensing element being deformable, e.g. Bourdon tube}
- 16/0613 {the deformable sensing element acting as a throttling member}
- 16/0616 {the sensing element being a bellow}
- 16/0619 {acting directly on the obturator}
- 16/0622 {characterised by the form of the obturator}
- 16/0625 {acting indirectly on the obturator, e.g. by a lever}
- 16/0627 {characterised by the form of the obturator}
- 16/063 {the sensing element being a membrane}
- 16/0633 {characterised by the properties of the membrane}
- 16/0636 {characterised by the loading device of the membrane, e.g. spring}
- 16/0638 {characterised by the form of the obturator}
- 16/0641 {the obturator is a membrane}
- 16/0644 {the membrane acting directly on the obturator}
- 16/0647 {using one membrane without spring}
- 16/065 {characterised by the form of the obturator}
- 16/0652 {using several membranes without spring}
- 16/0655 {using one spring-loaded membrane}
- 16/0658 {characterised by the form of the obturator}
- 16/0661 {characterised by the loading mechanisms of the membrane}
- 16/0663 {using a spring-loaded membrane with a spring-loaded slideable obturator}
- 16/0666 {characterised by the form of the obturator}
- 16/0669 {characterised by the loading mechanisms of the membrane}
- 16/0672 {using several spring-loaded membranes}
- 16/0675 {the membrane acting on the obturator through a lever}
- 16/0677 {using one membrane without spring}
- 16/068 {characterised by the form of the obturator}
- 16/0683 {using a spring-loaded membrane}
- 16/0686 {characterised by the form of the lever}
- 16/0688 {characterised by the form of the obturator}
- 16/0691 {characterised by the loading mechanisms of the membrane}
- 16/0694 {using a spring-loaded membrane with a spring-loaded slideable obturator}
- 16/0697 {using several membranes}
- 16/08 . . . Control of liquid pressure
- 16/10 . . the sensing element being a piston or plunger
- 16/103 . . . {with sensing element placed within the flow-path}
- 16/106 {using sliding elements}
- 16/12 . . the sensing element being a float
- 16/14 . with auxiliary non-electric power
- 16/16 . . derived from the controlled fluid
- 16/163 . . . {using one or several membranes}
- 16/166 . . . {using one or several pistons}

- 16/18 . . derived from an external source
- 16/185 . . . {using one or several membranes}
- 16/20 . characterised by the use of electric means
- 16/2006 . . {with direct action of electric energy on controlling means ([G05D 16/2093](#) takes precedence)}
- 16/2013 . . . {using throttling means}
- 16/202 {actuated by an electric motor}
- 16/2026 {with a plurality of throttling means}
- 16/2033 {the plurality of throttling means being arranged in series}
- 16/204 {the plurality of throttling means being arranged in parallel}
- 16/2046 {the plurality of throttling means being arranged for the control of a single pressure from a plurality of converging pressures ([G05D 16/204](#) takes precedence)}
- 16/2053 {the plurality of throttling means comprising only a first throttling means acting on a higher pressure and a second throttling means acting on a lower pressure, e.g. the atmosphere}
- 16/206 {the plurality of throttling means being arranged for the control of a plurality of diverging pressures from a single pressure ([G05D 16/204](#) takes precedence)}
- 16/2066 . . . {using control means acting on the pressure source}
- 16/2073 {with a plurality of pressure sources}
- 16/208 . . . {using a combination of controlling means as defined in [G05D 16/2013](#) and [G05D 16/2066](#)([G05D 16/2073](#) takes precedence)}
- 16/2086 . . {without direct action of electric energy on the controlling means ([G05D 16/2093](#) takes precedence)}
- 16/2093 . . {with combination of electric and non-electric auxiliary power}
- 17/00 Control of torque; Control of mechanical power**
- 17/02 . characterised by the use of electric means
- 19/00 Control of mechanical oscillations, e.g. of amplitude, of frequency, of phase (generating or transmitting mechanical vibrations [B06B](#) ; control of electric motors [H02P](#))**
- 19/02 . characterised by the use of electric means
- 21/00 Control of chemical or physico-chemical variables, e.g. pH value**
- 21/02 . characterised by the use of electric means
- 22/00 Control of humidity (of tobacco products [A24B 9/00](#) ; air conditioning [F24F](#))**
- 22/02 . characterised by the use of electric means
- 23/00 Control of temperature (automatic switching arrangements for electric heating apparatus [H05B 1/02](#) ; controlling induction heating [H05B 6/06](#) ; regulating temperature of anode of X-ray tube [H05G 1/36](#))**
- NOTE**
- Within groups [G05D 23/01](#) - [G05D 23/32](#), an invention is classified in the last appropriate place in the absence of an indication of the contrary
- 23/01 . without auxiliary power
- 23/015 . . {with mechanical sensing element not covered by groups [G05D 23/02](#) and [G05D 23/12](#)}
- 23/02 . . with sensing element expanding and contracting in response to changes of temperature ([G05D 23/13](#) takes precedence)
- 23/021 . . . {the sensing element being a non-metallic solid, e.g. elastomer, paste}
- 23/022 {the sensing element being placed within a regulating fluid flow}
- 23/023 {the sensing element being placed outside a regulating fluid flow}
- 23/024 . . . {the sensing element being of the rod type, tube type, or of a similar type}
- 23/025 {the sensing element being placed within a regulating fluid flow}
- 23/026 {the sensing element being placed outside a regulating fluid flow}
- 23/027 {for combustible fluid}
- 23/028 . . . {with fusing sensing element}
- 23/08 . . . with bimetallic element (valve arrangements adapted for mixing [F16K 11/00](#))
- 23/10 with snap-action elements (for valves [F16K 31/56](#))
- 23/12 . . with sensing element responsive to pressure or volume changes in a confined fluid
- 23/121 . . . {characterised by the sensing element}
- 23/122 {using a plurality of sensing elements}
- 23/123 . . . {the sensing element being placed within a regulating fluid flow}
- 23/125 . . . {the sensing element being placed outside a regulating fluid flow}
- 23/126 {using a capillary tube}
- 23/127 {to control a gaseous fluid circulation}
- 23/128 {the fluid being combustible}
- 23/13 . . by varying the mixing ratio of two fluids having different temperatures
- 23/1306 . . . {for liquids ([G05D 23/1393](#) takes precedence)}
- 23/1313 {without temperature sensing element}
- 23/132 {with temperature sensing element}
- 23/1326 {details of the sensor}
- 23/1333 {measuring the temperature of incoming fluid}
- 23/134 {measuring the temperature of mixed fluid}
- 23/1346 {with manual temperature setting means}
- 23/1353 {combined with flow controlling means}
- 23/136 {with pressure equalizing means}
- 23/1366 {using a plurality of sensing elements}
- 23/1373 {measuring the temperature of mixed fluid}

- 23/138 . . . {for gases ([G05D 23/1393](#) takes precedence)}
- 23/1386 . . . {for steam and liquid ([G05D 23/1393](#) takes precedence)}
- 23/1393 . . . {characterised by the use of electric means}
- 23/185 . . . with auxiliary non-electric power
- 23/1852 . . . {with sensing element expanding and contracting in response to change of temperature}
- 23/1854 . . . {with bimetallic element}
- 23/1856 . . . {with sensing element responsive to pressure or volume change in a confined fluid}
- 23/1858 . . . {by varying the mixing ratio of fluids having different temperatures}
- 23/19 . . . characterised by the use of electric means ([G05D 23/1393](#) takes precedence)
- NOTE**
- In this group, multi-aspect classification is applied, so that subject matter characterised by aspects covered by more than one of its subgroups, which is considered to represent information of interest for search, should be classified in each of those subgroups. Temperature control arrangements are classified in subgroups [G05D 23/20](#) - [G05D 23/275](#) on the base of the type of temperature sensor and in the subgroups directly under [G05D 23/19](#) for each aspect related to temperature control in general.
- 23/1902 . . . {characterised by the use of a variable reference value}
- 23/1904 . . . {variable in time}
- 23/1905 . . . {associated with tele control}
- 23/1906 . . . {using an analogue comparing device}
- 23/1909 . . . {whose output amplitude can only take two discrete values}
- 23/1912 . . . {whose output amplitude can take more than two discrete values}
- 23/1913 . . . {delivering a series of pulses}
- 23/1917 . . . {using digital means}
- 23/1919 . . . {characterised by the type of controller}
- 23/192 . . . {using a modification of the thermal impedance between a source and the load}
- 23/1921 . . . {using a thermal motor}
- 23/1923 . . . {using thermal energy, the cost of which varies in function of time}
- 23/1924 . . . {using thermal energy, the availability of which is aleatory}
- 23/1925 . . . {using a combination of auxiliary electric and non-electric power}
- 23/1927 . . . {using a plurality of sensors ([G05D 23/1902](#), [G05D 23/1917](#), and [G05D 23/1919](#) take precedence)}
- 23/1928 . . . {sensing the temperature of one space}
- 23/193 . . . {sensing the temperature in different places in thermal relationship with one or more spaces}
- 23/1931 {to control the temperature of one space}
- 23/1932 {to control the temperature of a plurality of spaces}
- 23/1934 {each space being provided with one sensor acting on one or more control means}
- 23/1935 {using sequential control}
- 23/1951 . . . {with control of the working time of a temperature controlling device}
- 23/20 . . . with sensing elements having variation of electric or magnetic properties with change of temperature ([G05D 23/13](#) takes precedence)
- 23/2033 {details of the sensing element}
- 23/2034 {the sensing element being a semiconductor}
- 23/2035 {the sensing element being a ionized gas}
- 23/2036 {the sensing element being a dielectric of a capacitor}
- 23/2037 {details of the regulator}
- 23/2039 {using mechanical means}
- 23/22 . . . the sensing element being a thermocouple
- 23/2236 {details of the regulator}
- 23/2237 {using discharge tubes}
- 23/2239 {using photoelectric elements}
- 23/224 {using selfs or transformers}
- 23/24 . . . the sensing element having a resistance varying with temperature, e.g. a thermistor
- 23/2401 {using a heating element as a sensing element}
- 23/2451 {Details of the regulator}
- 23/2453 {using discharge tubes}
- 23/2454 {using photoelectric elements}
- 23/2456 {using selfs or transformers}
- 23/26 . . . the sensing element having a permeability varying with temperature
- 23/27 . . . with sensing element responsive to radiation
- 23/275 . . . with sensing element expanding, contracting, or fusing in response to changes of temperature
- 23/27535 {Details of the sensing element}
- 23/27536 {using fusible material}
- 23/27537 {using expansible fluid}
- 23/27539 {using conductible expansible fluid}
- 23/2754 {using bimetallic element}
- 23/27541 {using expansible solid}
- 23/27543 {using the controlled element as sensing element}
- 23/30 . . . Automatic controllers with an auxiliary heating device affecting the sensing element, e.g. for anticipating change of temperature ([automatic controllers in general and not restricted to control of temperature G05B](#))
- 23/303 {using a sensing element having a resistance varying with temperature, e.g. thermistor}
- 23/306 {using semiconductor devices}
- 23/32 . . . with provision for adjustment of the effect of the auxiliary heating device, e.g. a function of time
- 24/00 Control of viscosity**
- 24/02 . . . characterised by the use of electric means

25/00 **Control of light, e.g. intensity, colour, phase**
 (mechanically operable parts of lighting devices for the control of light [F21V](#) ; optical devices or arrangements using movable or deformable elements for controlling light independent of the light source [G02B 26/00](#) ; devices or arrangements, the optical operation of which is modified by changing the optical properties of the medium of the devices or arrangements for the control of light, circuit arrangements specially adapted therefor, control of light by electro-magnetic waves, electrons or other elementary particles [G02F 1/00](#) ; circuit arrangements for controlling light sources [H01S 3/10](#), [H05B 33/08](#), [H05B 35/00](#) - [H05B 43/00](#))

25/02 . characterised by the use of electric means

27/00 **Simultaneous control of variables covered by two or more of the preceding main groups**

27/02 . characterised by the use of electric means

29/00 **Simultaneous control of electric and non-electric variables**

99/00 **Subject matter not provided for in other groups of this subclass**

2201/00 **Application**

- 2201/02 . Control of position of land vehicles
- 2201/0201 . . Agriculture or harvesting machine
- 2201/0202 . . Building or civil engineering machine
- 2201/0203 . . Cleaning or polishing vehicle
- 2201/0204 . . Golf cart
- 2201/0205 . . Harbour vehicle, e.g. crane
- 2201/0206 . . Vehicle in a health care environment, e.g. for distribution of food or medicins in a hospital or for helping handicapped persons
- 2201/0207 . . Unmanned vehicle for inspecting or visiting an area
- 2201/0208 . . Lawn mower
- 2201/0209 . . Combat or reconnaissance vehicle for military, police or security applications
- 2201/021 . . Mining vehicle
- 2201/0211 . . Vehicle in an office environment, e.g. for delivering mail or for videoconferencing
- 2201/0212 . . Driverless passenger transport vehicle
- 2201/0213 . . Road vehicle, e.g. car or truck
- 2201/0214 . . Position controlled toy
- 2201/0215 . . Vacuum cleaner
- 2201/0216 . . Vehicle for transporting goods in a warehouse, factory or similar
- 2201/0217 . . Anthropomorphic or bipedal robot
- 2201/0218 . . Planetary exploration vehicle