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.

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.

1/00 Control of position, course or altitude of land, water, air, or space vehicles, e.g. automatic pilot (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

G05D 1/021 (continued)

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 for anti-collision purposes G01S 13/93
- sonar systems specially designed for for anti-collision purposes G01S 15/93
- lidar systems specially designed for 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 singals (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 intertial 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 exernally 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 inclusing 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 synchromachines (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; 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

NOTE

{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.}

G05D 16/00 (continued)

WARNING

Group G05D 16/00 is impacted by reclassification into groups G05D 16/024 and G05D 16/028.

Groups G05D 16/00, G05D 16/024, and G05D 16/028 should be considered in order to perform a complete search.

16/02 . Modifications to reduce the effects of instability, e.g. due to vibrations, friction, abnormal temperature, overloading, unbalance (vibration-dampers F16F 7/00)

16/024 . {Controlling the inlet pressure, e.g. back-pressure regulator}

WARNING

Group G05D 16/024 is incomplete pending reclassification of documents from group G05D 16/00.

Groups G05D 16/00 and G05D 16/024 should be considered in order to perform a complete search.

16/028 . {Controlling a pressure difference (control of flow G05D 7/00)}

WARNING

Group G05D 16/028 is incomplete pending reclassification of documents from group G05D 16/00.

Groups G05D 16/00 and G05D 16/028 should be considered in order to perform a complete search.

16/04 . without auxiliary power

WARNING

Group G05D 16/04 is impacted by reclassification into groups G05D 16/0402 and G05D 16/0404.

Groups G05D 16/04, G05D 16/0402, and G05D 16/0404 should be considered in order to perform a complete search.

16/0402 . . {with two or more controllers mounted in series}

WARNING

Group G05D 16/0402 is incomplete pending reclassification of documents from groups G05D 16/04 and G05D 16/10.

Groups G05D 16/04, G05D 16/10, and G05D 16/0402 should be considered in order to perform a complete search.

16/0404 . . {with two or more controllers mounted in parallel}

WARNING

Group G05D 16/0404 is incomplete pending reclassification of documents from groups G05D 16/04 and G05D 16/10.

Groups G05D 16/04, G05D 16/10 and G05D 16/0404 should be considered in order to perform a complete search.

16/06 . . the sensing element being a flexible membrane, yielding to pressure, e.g. diaphragm, bellows, capsule

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

WARNING

Group G05D 16/10 is impacted by reclassification into groups G05D 16/101, G05D 16/107, G05D 16/109, G05D 16/0402, and G05D 16/0404.

All groups listed in this Warning should be considered in order to perform a complete search.

16/101 . . . {the controller being arranged as a multiple-way valve}

WARNING

Group G05D 16/101 is incomplete pending reclassification of documents from groups G05D 16/10 and G05D 16/103.

Groups G05D 16/10, G05D 16/103 and G05D 16/101 should be considered in order to perform a complete search.

16/103 . . . {the sensing element placed between the inlet and outlet (multiple-way valve G05D 16/101)}

WARNING

Group G05D 16/103 is impacted by reclassification into group G05D 16/101.

Groups G05D 16/103 and G05D 16/101 should be considered in order to perform a complete search.

16/106 . . . . {Sleeve-like sensing elements; Sensing elements surrounded by the flow path}

16/107 . . . {with a spring-loaded piston in combination with a spring-loaded slideable obturator that move together over range of motion during normal operation}

WARNING

Group G05D 16/107 is incomplete pending reclassification of documents from group G05D 16/10.

Groups G05D 16/10 and G05D 16/107 should be considered in order to perform a complete search.

16/109 . . . {with two or more pistons acting as a single pressure controller that move together over range of motion during normal operations (controllers mounted in series G05D 16/0402, controller mounted in parallel G05D 16/0404)}

WARNING

Group G05D 16/109 is incomplete pending reclassification of documents from group G05D 16/10.

Groups G05D 16/10 and G05D 16/109 should be considered in order to perform a complete search.

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 membranes within the main valve}

16/166 . . . {using pistons within the main valve}

16/18 . . derived from an external source

WARNING

Group G05D 16/18 is impacted by reclassification into group G05D 16/187.

Groups G05D 16/18 and G05D 16/187 should be considered in order to perform a complete search.

16/185 . . . {using membranes within the main valve}

16/187 . . . {using pistons within the main valve}

WARNING

Group G05D 16/187 is incomplete pending reclassification of documents from group G05D 16/18.

Groups G05D 16/18 and G05D 16/187 should be considered in order to perform a complete search.

16/20 . characterised by the use of electric means

16/2006 . . {with direct action of electric energy on controlling means (combination of electric and non-electric auxiliary G05D 16/2093)}

16/2013 . . . {using throttling means as controlling means}

WARNING

Group G05D 16/2013 is impacted by reclassification into groups G05D 16/2022 and G05D 16/2024.

Groups G05D 16/2013, G05D 16/2022, and G05D 16/2024 should be considered in order to perform a complete search.

16/202 . . . . {actuated by an electric motor}

16/2022 . . . . {actuated by a proportional solenoid (throttling means G05D 16/2024)}

WARNING

Group G05D 16/2022 is incomplete pending reclassification of documents from group G05D 16/2013.

Groups G05D 16/2013 and G05D 16/2022 should be considered in order to perform a complete search.

16/2024 . . . . {the throttling means being a multiple-way valve}

WARNING

Group G05D 16/2024 is incomplete pending reclassification of documents from group G05D 16/2013.

Groups G05D 16/2013 and G05D 16/2024 should be considered in order to perform a complete search.

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 controlling 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 (combination of electric and non-electric auxiliary G05D 16/2093)}

16/2093 . . {with combination of electric and non-electric auxiliary power}

WARNING

Group G05D 16/2093 is impacted by reclassification into groups G05D 16/2095 and G05D 16/2097.

Groups G05D 16/2093, G05D 16/2095, and G05D 16/2097 should be considered in order to perform a complete search.

16/2095 . . . {using membranes within the main valve}

WARNING

Group G05D 16/2095 is incomplete pending reclassification of documents from group G05D 16/2093.

Groups G05D 16/2093 and G05D 16/2095 should be considered in order to perform a complete search.

16/2097 . . . {using pistons within the main valve}

WARNING

Group G05D 16/2097 is incomplete pending reclassification of documents from group G05D 16/2093.

Groups G05D 16/2093 and G05D 16/2097 should be considered in order to perform a complete search.

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)

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 temperaure 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