SECTION G — PHYSICS

G05 CONTROLLING; REGULATING

G05F SYSTEMS FOR REGULATING ELECTRIC OR MAGNETIC VARIABLES (regulating the timing or recurrence frequency of pulses in radar or radio navigation systems G01S; regulation of current or voltage, specially adapted for use in electronic time-pieces G04G 19/02; closed-loop systems for regulating non-electric variables by electric means G05D; regulating power supply of digital computers G06F 1/26; for obtaining desired operating characteristics of electromagnets with armatures H01F 7/18; regulating electric power distribution networks H02J; regulating the charging of batteries H02J 7/00; regulating of the output of static converters, e.g. switching regulators, H02M; regulation of the output of electric generators H02N, H02P 9/00; controlling transformers, reactors or choke coils H02P 13/00; regulating frequency response, gain, maximum output, amplitude or bandwidth of amplifiers H03G; regulating tuning of resonant circuits H03J; controlling generators of electronic oscillations or pulses H03L; regulating characteristics of transmission lines H04B; controlling electric light sources H05B 37/02, H05B 39/04, H05B 41/36; electric control of X-ray apparatus H05G 1/30) **[4, 5]**

Note(s) [4]

1. This subclass covers:
   - systems only;
   - use of hydraulic, pneumatic, mechanical, and electrical motors for varying electric characteristics of devices which restore the quantity regulated;
   - the combination of static converters and current or voltage regulators, if the essential characteristic resides in the combination.
2. This subclass does not cover elements per se, which are covered by the relevant subclasses.

1/00 Automatic systems in which deviations of an electric quantity from one or more predetermined values are detected at the output of the system and fed back to a device within the system to restore the detected quantity to its predetermined value or values, i.e. retroactive systems [1, 2006.01]

1/02 • Regulating electric characteristics of arcs (arrangements for feeding or moving of electrodes for spot or seam welding or cutting B23K 9/12; arrangements for feeding electrodes for electric heating or electric lighting H05B 7/109, H05B 31/18; automatic control of power for heating by discharge H05B 7/148) **[1, 2, 2006.01]**

1/04 • • by means of saturable magnetic devices **[1, 2006.01]**

1/06 • • by means of discharge tubes **[1, 2006.01]**

1/08 • • by means of semiconductor devices **[1, 2006.01]**

1/10 • Regulating voltage or current (G05F 1/02 takes precedence; for electric railways B60M 3/02) **[1, 2006.01]**

1/12 • • wherein the variable is actually regulated by the final control device is ac (G05F 1/625 takes precedence) **[1, 4, 2006.01]**

1/13 • • • using ferroresonant transformers as final control devices **[4, 2006.01]**

1/14 • • • using tap transformers or tap changing inductors as final control devices **[1, 4, 2006.01]**

1/147 • • • • with motor driven tap switch **[4, 2006.01]**

1/153 • • • • • controlled by discharge tubes or semiconductor devices **[4, 2006.01]**

1/16 • • • • combined with discharge tubes or semiconductor devices **[1, 2006.01]**

1/20 • • • • • semiconductor devices only **[1, 2006.01]**

1/22 • • • • combined with separate magnetic control devices having a controllable degree of saturation **[1, 2006.01]**

1/24 • • • using bucking or boosting transformers as final control devices **[1, 2006.01]**

1/247 • • • • with motor in control circuit **[4, 2006.01]**

1/253 • • • • the transformers including plural windings in series between source and load (G05F 1/247 takes precedence) **[4, 2006.01]**

1/26 • • • • combined with discharge tubes or semiconductor devices **[1, 2006.01]**

1/30 • • • • • semiconductor devices only **[1, 2006.01]**

1/32 • • • using magnetic devices having a controllable degree of saturation as final control devices **[1, 2006.01]**

1/325 • • • • with specific core structure, e.g. gap, aperture, slot, permanent magnet **[4, 2006.01]**

1/33 • • • • with plural windings through which current to be controlled is conducted **[4, 2006.01]**

1/335 • • • • • on different cores **[4, 2006.01]**

1/34 • • • • combined with discharge tubes or semiconductor devices **[1, 2006.01]**

1/38 • • • • • semiconductor devices only **[1, 2006.01]**

1/40 • • • using discharge tubes or semiconductor devices as final control devices **[1, 2006.01]**

1/42 • • • • discharge tubes only **[1, 2006.01]**

1/44 • • • • semiconductor devices only **[1, 2006.01]**

1/445 • • • • • being transistors in series with the load **[3, 2006.01]**

1/45 • • • • • being controlled rectifiers in series with the load **[3, 2006.01]**

1/455 • • • • • • with phase control **[3, 2006.01]**

1/46 • • wherein the variable actually regulated by the final control device is dc (G05F 1/625 takes precedence) **[1, 4, 2006.01]**

1/52 • • • using discharge tubes in series with the load as final control devices **[1, 2006.01]**

1/54 • • • • additionally controlled by the unregulated supply **[1, 2006.01]**

1/56 • • • using semiconductor devices in series with the load as final control devices **[1, 2006.01]**

1/563 • • • • including two stages of regulation, at least one of which is output level responsive, e.g. coarse and fine regulation **[4, 2006.01]**

1/565 • • • • sensing a condition of the system or its load in addition to means responsive to deviations in the output of the system, e.g. current, voltage, power factor (G05F 1/563 takes precedence) **[4, 2006.01]**

1/567 • • • • • for temperature compensation **[4, 2006.01]**

1/569 • • • • • for protection **[4, 2006.01]**

1/571 • • • • • • with overvoltage detector **[4, 2006.01]**

1/573 • • • • • • with overcurrent detector **[4, 2006.01]**

1/575 • • • • characterised by the feedback circuit **[4, 2006.01]**

1/577 • • • • for plural loads **[4, 2006.01]**

1/585 • • • • • providing voltages of opposite polarities **[4, 2006.01]**

1/59 • • • • including plural semiconductor devices as final control devices for a single load **[4, 2006.01]**

1/595 • • • • • semiconductor devices connected in series **[4, 2006.01]**

1/607 • • • using discharge tubes in parallel with the load as final control devices **[3, 2006.01]**

1/61 • • • • including two stages of regulation, at least one of which is output level responsive **[4, 2006.01]**

1/613 • • • using semiconductor devices in parallel with the load as final control devices **[3, 2006.01]**

1/614 • • • • including two stages of regulation, at least one of which is output level responsive **[4, 2006.01]**

1/618 • • • using semiconductor devices in series and in parallel with the load as final control devices **[4, 2006.01]**

1/62 • • • using bucking or boosting dc sources **[1, 2006.01]**

1/625 • • wherein it is irrelevant whether the variable actually regulated is ac or dc **[4, 2006.01]**

1/63 • • • using variable impedances in series with the load as final control devices **[4, 2006.01]**

1/635 • • • • being Hall effect devices, magnetoresistors or thermistors **[4, 2006.01]**

1/644 • • • • being pressure-sensitive resistors **[4, 2006.01]**

1/648 • • • • being plural resistors among which a selection is made **[4, 2006.01]**

1/652 • • • using variable impedances in parallel with the load as final control devices **[4, 2006.01]**

1/656 • • • using variable impedances in series and in parallel with the load as final control devices **[4, 2006.01]**

1/66 • Regulating electric power **[1, 2006.01]**

1/67 • • to the maximum power available from a generator, e.g. from solar cell **[4, 2006.01]**

1/70 • Regulating power factor; Regulating reactive current or power **[3, 2006.01]**

3/00 Non-retroactive systems for regulating electric variables by using an uncontrolled element, or an uncontrolled combination of elements, such element or such combination having self-regulating properties [1, 2006.01]

3/02 • Regulating voltage or current **[1, 2006.01]**

3/04 • • wherein the variable is ac **[1, 2006.01]**

3/06 • • • using combinations of saturated and unsaturated inductive devices, e g. combined with resonant circuit **[1, 2006.01]**

3/08 • • wherein the variable is dc **[1, 2006.01]**

3/10 • • • using uncontrolled devices with non-linear characteristics **[1, 4, 2006.01]**

3/12 • • • • being glow discharge tubes **[1, 2006.01]**

3/16 • • • • being semiconductor devices **[3, 2006.01]**

3/18 • • • • • using Zener diodes **[3, 2006.01]**

3/20 • • • • • using diode-transistor combinations (G05F 3/18 takes precedence) **[3, 2006.01]**

3/22 • • • • • • wherein the transistors are of the bipolar type only (G05F 3/26, G05F 3/30 take precedence) **[4, 2006.01]**

3/24 • • • • • • wherein the transistors are of the field-effect type only (G05F 3/26, G05F 3/30 take precedence) **[4, 2006.01]**

3/26 • • • • • • Current mirrors **[4, 2006.01]**

3/28 • • • • • • • combined with a non-linear current amplifier **[4, 2006.01]**

3/30 • • • • • • Regulators using the difference between the base-emitter voltages of two bipolar transistors operating at different current densities (G05F 3/26 takes precedence) **[4, 2006.01]**

5/00 Systems for regulating electric variables by detecting deviations in the electric input to the system and thereby controlling a device within the system to obtain a regulated output [1, 2006.01]

5/02 • Phase controlled switching using electronic tubes or three or more terminal semiconductive devices **[4, 2006.01]**

5/04 • using a transformer or inductor as the final control device **[4, 2006.01]**

5/06 • • saturable **[4, 2006.01]**

5/08 • using a linearly acting final control device **[4, 2006.01]**

7/00 Regulating magnetic variables (details of apparatus for measuring magnetic variables involving magnetic resonance G01R 33/28) **[1, 5, 2006.01]**