G04C

ELECTROMECHANICAL CLOCKS OR WATCHES (mechanical parts of clocks or watches in general G04B; electronic time-pieces with no moving parts, electronic circuitry for producing timing pulses G04G)

Definition statement

This place covers:

- The "electromechanical timepieces" in a strict sense, namely timepieces in which the time reference (signal) is obtained by electromechanical means, that is by the cooperation of mechanically moving parts and electric/electronic/electromagnetic elements (e.g. a mechanical oscillator whose frequency is regulated by the use of coils), and
- electronic timepieces comprising mechanically moving parts (see G04G for the definition of electronic timepiece).

One has, in any case, to bear in mind that in the recent decades, a distinction between an electronic and an electromechanical timepiece has become more and more pointless, in some case even useless. For this reason, G04C is nowadays used to classify electromechanical aspects of clocks or watches in general, without putting an excessive stress on the nature of the timepiece as a whole (for more info, see "Overlapping with external fields" below).

Relationships with other classification places

Although an explicit link to G04B is present in the title of G04C, documents concerning mechanical parts of electromechanical timepieces could still be classified in G04C, especially if these mechanical parts cooperate to actuate or implement electronic and/or electromechanical functions.

A typical example of such a document involves a setting crown wherein a mechanical rotation (of the crown) is transformed into a sequence of electronic pulses.

The major overlaps of G04C are found with G04G. This depends on the fact that a clear distinction between the two has become less and less possible and also less and less important. To a certain extent, G04C and G04G should be regarded as two complementary classifications, or somehow like two sides of the same coin. For these reasons, some common aspects of these two subclasses shall be discussed here.

The following 1-to-1 correspondence between G04C and G04G subclasses is to be noted:

- G04C 9/00 is defined in parallel with G04G 5/00;- G04C 11/00 is defined in parallel with G04G 7/00;
- G04C 17/00 is defined in parallel with G04G 9/00;
- G04C 19/00 is defined in parallel with G04G 11/00;
- G04C 21/00 is defined in parallel with G04G 13/00;
- G04C 23/00 is defined in parallel with G04G 15/00.

In all of the above subclasses, documents can be found which could belong to their corresponding parallel subclass. For example, documents could be found in G04C 9/00 which could also be in G04G 5/00 and vice-versa.

When classifying, a lot is left to the common sense of the classifier. If a document describes relevant electromechanical aspects of a timepiece, this document will usually receive at least a classification symbol in G04C. The "real life" situation is such that most often documents receive a double classification (both in G04C and in G04G). Definitely, in cases of doubt, giving a classification symbol in both G04C and G04G is a preferred solution to choosing only one of them.

A typical example is given by the pair G04C 23/00- G04G 15/00. Here, timed switches, e.g., devices to execute a timed programme of switching on/off the heating system of a household are typically

classified. A document showing mechanical jumpers to set the time-on and time-off, together with details concerning the mechanical connections of the jumpers with other parts of the mechanism is usually classified in G04C 23/00. Similarly, a document showing a fully programmable CPU-based thermostat with wireless connection to the main heater is typically classified in G04G 15/00.

Special rules of classification

No document concerning radio-controlled timepieces should be classified in G04C, unless other technical aspects of the documents deserve a classification therein (for further details, see the corresponding paragraph in G04G).

G04C 1/00

Winding mechanical clocks electrically (winding mechanically G04B 3/00 {; electrical winding of spring driven arrangements for grammophones G11B 19/20})

Definition statement

This place covers:

Documents showing internal electric and/or electromechanical means to wind a mechanical energy source such as a mainspring or a (free-falling) weight. The typical device classified here is a wall clock, pendulum clock or the like. The field has not been particularly active in the last three decades.

References

Limiting references

This place does not cover:

The watch winders for manually wound watches	G04B 3/006
Devices for electrically and/or electromechanically winding the mainspring (or the like) of mechanical timepieces	G04D 7/009, G04B 3/006
Winders for automatic watches	G04D 7/009

Special rules of classification

In particular, although the heading of G04D 7/009 is not appropriate, the winders for automatic watches are classified in that group and not the G04B 5/00.

G04C 3/00

Electromechanical clocks or watches independent of other time-pieces and in which the movement is maintained by electric means {(synchronisation G04C 11/00)}

Definition statement

This place covers:

- Position sensitive switches integrated in timepieces (G04C 3/001 and subgroups);
- electrically driven timepieces comprising electromechanical regulators (up to G04C 3/08 and subgroups);
- three sub-groups (**/14**, **/16** and **/18**) dealing with different technical possibilities to drive the display.

Relationships with other classification places

There could be overlap between G04C 3/001 and subgroups and G04C 9/00. Hence consider this when searching G04C 3/001 and subgroups. For more details concerning this overlap, see the section concerning G04C 9/00.

Special rules of classification

When searching in G04C 3/06 and subgroups or G04C 3/08 and subgroups consider whether it is the case to extend the search in G04C 5/00 (electromagnetic escapements).

For practical reasons, G04C 3/14 and subgroups comprises also documents concerning step-motors per se, if these motors are used nowhere else than in timepieces. Therefore, a natural overlap with H02K 37/00 (general group for step motors) does exist. When searching in G04C 3/14 and subgroups, this overlap has to be considered, on a case-by-case level.

The same applies to G04C 3/12 and subgroups, the general group for piezoelectric actuators being H10N 30/00 and piezoelectric actuators being also found in H02K 33/16.

G04C 3/14

incorporating a stepping motor (G04C 3/02 - G04C 3/12 take precedence {; generating commutating pulses in primary clocks G04C 13/0463})

References

Limiting references

This place does not cover:

Electromechanical clocks or watches wherein movement is regulated by a pendulum	G04C 3/02
Electromechanical clocks or watches wherein movement is regulated by a balance	G04C 3/04
Electromechanical clocks or watches wherein movement is regulated by a mechanical oscillator other than a pendulum or balance, e.g. by a tuning fork	G04C 3/08
Generating commutating pulses in primary clocks	G04C 13/0463

Informative references

Attention is drawn to the following places, which may be of interest for search:

Circuit arrangements; Electric clock installations	G04C 13/02
Secondary clocks actuated intermittently by electromechanical step advancing mechanisms	G04C 13/10
Apparatus for producing preselected time intervals for use as timing standards	G04F 5/00
Producing timing pulses	G04G 3/00
Setting, i.e. correcting or changing, the time-indication	G04G 5/00
Synchronisation	G04G 7/00
Control circuits for stepping motors in general	H02P 8/00

G04C 9/00

Electrically-actuated devices for setting the time-indicating means (of secondary clocks G04C 13/03; radio-controlled time-pieces G04R)

Definition statement

This place covers:

Documents dealing with setting the time (or the date) in an electromechanical timepiece or, by electromechanical means, in an electronic timepiece. With the exception of G04C 9/02, the key element of G04C 9/00 is a setting crown.

References

Limiting references

This place does not cover:

Pulse transmission systems with additional means for setting the time indication of secondary clocks	G04C 13/03
Radio-controlled timepieces	G04R

Special rules of classification

G04C 9/02 contains many radio-controlled timepieces (which are nevertheless all double classified and shall be soon removed from here) and, in addition, it contains documents showing systems allowing to test or correct the running precision of a timepiece by establishing a wireless communication between the timepiece and an external control device. Typically, these control devices are available on timepiece manufacturing sites or in retailer shops, to perform calibration or re-calibration of some (otherwise inaccessible) of the timepiece elements.

Documents classified in the rest of G04C 9/00 should, as a general rule, contain details concerning the operations that a user needs to perform in order to set the time. On the contrary, if a document merely contains hardware details concerning the electromechanical setting element (the crown, most typically), then classification in G04C 3/001 should be considered. In the past, this has not always been a strict policy, therefore an overlap still exists and should always be considered.

G04C 10/00

Arrangements of electric power supplies in time pieces {(circuits G04G 19/00; mounting, assembling of components of electromechanical watches G04C 3/008, of electronic watches G04G 17/00)}

Definition statement

This place covers:

Documents showing details of the power supply of timepieces. These details generally concern:

- The mechanical positioning of the power supply with respect to the remaining elements of the timepiece;
- mechanical modifications which other parts of the timepiece have to undergo in order to fit/cope with the power supply (e.g. special dials to cooperate with solar cells mounted there under);
- power supply details of "automatic electromechanical" (also known as Kinetic) watches.

Special rules of classification

Due to the non-existence of a corresponding group in G04G, many documents concerning details of power supplies of purely electronic timepieces can still be found in G04C 10/00 and/or in G04G 17/04. This should be borne in mind when searching these groups.

Similarly, if a document contains details of power supply circuits, it may be classified only in G04G 19/00, even if it concerns an electromechanical timepiece or an electronic timepiece with mechanically moving parts.

G04C 13/00

Driving mechanisms for clocks by primary clocks

Definition statement

This place covers:

Primary-secondary clock systems wherein, as a general rule, the secondary clocks are not autonomous clocks and they constantly need driving signals issued by the primary clock in order to deliver time information.

G04C 13/04

Primary clocks

Definition statement

This place covers:

Details of the primary clock part.

G04C 13/08

Secondary clocks actuated intermittently

Definition statement

This place covers:

Details concerning secondary clocks.

G04C 17/00

Indicating the time optically by electric means (G04C 19/00 takes precedence; by mechanical means G04B 19/00, G04B 19/20)

Definition statement

This place covers:

Documents showing electromechanical time displays. The groups/subgroups are defined in terms of the technical features used to display time (bands, flaps, drums, etc).

Special rules of classification

When searching in G04C 17/0091, extension of the search to G04G 9/0082 is necessary.

G04C 17/00 is the subclass of G04C having the highest overlap with G04B. Therefore, extension of the search in corresponding parts of G04B should always be considered, especially if the search concerns the manufacturing methods of the mechanically moving parts.

G04C 19/00

Producing optical time signals at prefixed times by electric means

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

This means that countdown timers which would count-down a predetermined time interval independently on the time of the day	G04F 1/00, G04F 3/00.

Special rules of classification

The title of this subclass contains the expression "at predetermined times".

This is an important aspect because this subclass contains documents describing timepieces producing a visual action at a predetermined time of the day.

This means that countdown timers which would count-down a predetermined time interval independently on the time of the day are not part of G04C 19/00, but rather G04F 1/00, G04F 3/00.

See G04C 23/00

G04C 21/00

Producing acoustic time signals by electrical means {(for mechanical clocks or watches **G04B 21/08**, **G04B 25/00**)}

Special rules of classification

Likewise G04C 19/00, only with acoustic output instead of visual.

This subclass also contains the group G04C 21/04 which features the electromechanical version of the so called "minute repeater" complication.

See G04C 23/00.

G04C 23/00

Clocks with attached or built-in means operating any device at preselected times or after preselected time-intervals (if restricted to producing acoustic time signals by electrical means **G04C 21/00**; mechanical alarm clocks **G04B 23/02**; apparatus which can be set and started to measure-off predetermined intervals **G04F 3/06**; time or time-programme switches which automatically terminate their operation after the programme is completed **H01H 43/00**)

Definition statement

This place covers:

Documents related to timepieces providing an electromechanical action (non visual, nor acoustic) at predetermined times (of the day). It also extends to the possibility to act after the elapse of a predetermined time interval which is nevertheless counted starting from a predetermined time of the day.

Special rules of classification

This subclass completes a triplet with G04C 19/00 and G04C 21/00.