

Parking token for fee-payment actuation of a parking barrier.

The invention relates to a parking token for fee-payment actuation of a parking barrier, in the form of a flat piece of plastics material having an obverse and a reverse and having a machine-readable data carrier for storing data relating to multi-storey car parks and users thereof and, optionally, the entry and exit time.

Such parking tokens are issued to the user on passing entry-monitoring stations of a multi-storey car park or open-air car park, the data required for calculating the parking fee being stored on the parking token. The use of paying machines having a computer-controlled handling of the parking processes necessitates storage of the various parking information or codings in a machine-readable form. Use is therefore made firstly of so-called magnetic card tickets made of paper which have a magnetic strip for recording of the individual parking data and, secondly, of plastics material tickets having an individualising coding, for example a bar code, or a built-in programmable chip.

Whereas the magnetic card tickets of paper can be used only once, the parking tokens made of plastics material and having a programmable chip or a coding can be used for successive parking operations, to be precise as an individual parking token for different users or as a debit token for one user or as an access token for long-stay parkers. The repeated collecting and dispensing of the parking tokens of plastics material requires entry-monitoring and exit-monitoring stations which store the parking tokens to be issued, supply them to a read-write station and deliver them into dispensing openings which are accessible to the user of the multi-storey car park. For trouble-free progress

in the calculation of parking time and the fee due, the parking tokens must consequently be moved along several transport directions, for which purpose conveyor belts or transport rollers are generally provided. Because the parking tokens frequently tilt as they are being transported to the read-write station, susceptibility to faults is considerable, so that smooth operation of issuing and/or retrieving the parking tokens cannot be ensured. Susceptibility to faults is further intensified by the fact that the machine-readable data carriers can only be read from one direction.

It is therefore the aim of the invention to provide a parking token according to the preamble of claim 1, which is of simple construction and easy to handle, and allows installation of an inexpensive system for handling parking.

This aim is achieved according to the characterising clause of claim 1.

A parking token for a system for handling parking is provided which is capable of moving, without complicated transporting devices, by virtue of its ability to roll, and which, because it is readable from and if desired, also writable to, independently of its position, can be brought in varying positions to a read-write station or communications device. The combination according to the invention of parking token configuration and type of construction of the machine-readable data carrier largely exploit fully the handling advantages of a round form. Additionally, this parking token is re-usable, stable and inexpensive to manufacture. The contactlessly operating electronic component, which can at least have storage provision

but can also be programmable permits usage not impaired by wear through repeated scanning.

The parking token can thus be used for several successive parking operations, with the result that operating costs are kept low. Each parking token receives an individual coding or identification number so that by means of this parking token the parking fees can be calculated by an associated computer of a parking system, to be precise in dependence on the entry time and duration of parking.

A parking token with a programmable chip furthermore enables the parking data to be determined and stored by the token itself, so that the entry and exit stations can form isolated communication stations and the need for linking the entry and exit stations with the computer unit by cabling can be eliminated.

The thickness of the parking token is preferably between 2 and 4 mm. Such a thickness guarantees good stability which supports the ability of the parking token to roll. The diameter of the parking token can lie between 20 and 70 mm and is preferably 35 to 50 mm. These diameters make the parking token especially handy for use by the user of a multi-storey car park or open-air car park.

For a visible indication of the current parking time after entry into a multi-storey car park, the obverse of the parking token can have a digital time display which is provided with a clock that is set in operation when a parking token is issued. The current parking time is then permanently displayed to the user by means of the parking token he is carrying around with him.

To improve the sorting and/or stacking properties for storage in the collection and dispensing stations, the round parking tokens can have a central opening, in particular a central round hole.

The identification and/or communication component can operate passively and without a battery, or actively.

The passively operating identification and/or communication component can operate according to inductive energy and data transmission technology which is characterised by low energy consumption and a high data transmission rate. These components are additionally robust, not sensitive to dirt and because they have no energy source of their own can be used over a long period.

Actively operating identification and/or communication components simplify the construction of the communication stations, but because of the in-built batteries have only a restricted service life.

For optimum configuration of the position-independent data transmission, the data transmission devices produce and emit preferably omnidirectional waves.

Finally, by means of this parking token it is possible to construct a simple and inexpensive system for handling parking, which for ascertaining parking times and parking fees proceeds according to the method steps of claim 10.

Further constructions of the invention can be derived from the following description and the subsidiary claims.

The invention is explained in greater detail hereinafter with reference to the embodiments illustrated in the accompanying drawings.

- Fig. 1 shows diagrammatically a plan view of a first embodiment of the parking token,
- Fig. 2 shows diagrammatically a side view of the parking token shown in Fig. 1,
- Fig. 3 shows diagrammatically a plan view of a second embodiment of the parking token,
- Fig. 4 shows diagrammatically a side view of the parking token shown in Fig. 3,
- Fig. 5 shows diagrammatically a plan view of a third embodiment of the parking token.

Fig. 1 and Fig. 2 show a first embodiment of a parking token, for the fee-payment actuation of a parking barrier, in the form of a flat piece of plastics material 1 having an obverse 2 and a reverse 3 which are arranged spaced from and parallel with one another. The obverse 2 and the reverse 3 define a rounded piece of plastics material 1. The parking token thus has the shape of a round coin, which is able to roll by means of an edge 4 forming the circumferential face. The space between the obverse 2 and the reverse 3 is completely filled with plastics material, so that the plastics material piece 1 is of solid construction. The space between the obverse 2 and reverse 3 may alternatively, however, be only partially filled, so that the plastics material piece has an inner hollow structure in order, if need be, to be able to adjust the rolling behaviour in dependence on the weight of the parking token.

In the obverse 2 there is furthermore inserted a machine-readable data carrier, which is an electronic

identification and/or communication component 5 responding and operating contactlessly and independently of position and which is constructed to store and/or read parking data. The reader is referred to the following description for details. This data carrier component 5 can terminate flush with the obverse 2 or lie in a recess in the plastics material piece 1 beneath or behind the obverse 2 so that the data carrier component 5 is surrounded by the plastics material piece 1. The arrangement of the data carrier component 5 on or in the parking token can be effected centrally or to one side or eccentrically.

As illustrated in Figs 3 and 4, as well as being of one-piece construction, the round coin can also be of multi-part construction. The round coin here consists of two discs 8, 9 that can be fixedly joined to one another, can be arranged flush one against the other and can receive the data carrier component 5 in the inner space enclosed by them. Such a construction simplifies mounting of the data carrier component 5 in the plastics material piece 1 if, in particular, it is not desirable for the incorporation of the data carrier component 5 to be visible from the outside. In addition, the plastics material piece 1 has an opening 10, which is here in the form of centrally located round hole. This opening 10 can, of course, also be provided in the round parking token shown in Figs 1 and 2.

The thickness of the plastics material piece 1 shown in Figs 1 to 4 is 3 mm, but can vary between 0.5 and 6 mm and is preferably between 2 and 4 mm. The diameter of the plastics material piece 1 is 40 mm, but may vary between 20 and 70 mm and is preferably between 35 and 50 mm.

Fig. 5 shows a third embodiment of the parking token, which, as regards the configuration of the plastics material piece 1 and the identification and/or communication component 5 is constructed like the second embodiment according to Fig. 3, but to supplement it additionally has a display panel for the visible indication of the address of the multi-storey car park and the parking token number in plain writing and/or the current parking time. In the case of a visible indication of the current parking time, the obverse 2 can have a digital time display which is provided with a clock means that is set in operation when the parking token is issued.

The identification and/or communication component 5 operating contactlessly and independently of position comprises a chip and a data transmission device emitting electromagnetic waves. This component 5 stores at least one once-only and therefore unique code number which can be read out contactlessly and independently of position. The component 5 can be constructed to be capable of processing as well as storing data, and for that purpose is loaded with separate menus to serve as stand-alone data carrier which can not only be read out but also have parking data written into it. The chip can consequently be re-programmed for each parking operation, in order to allow an additional processing of the parking data. The parking data are then carried by the round parking token and entered anew for each parking operation, the preceding parking data being deleted or overwritten. Repeated issue of the parking token with a fixed-code or reprogrammable component 5 for short-term parkers is consequently possible. The same applies to the use of the parking token as a debit token or long-term parker token.

The identification and/or communication component 5 preferably operates passively and without batteries, to be precise with an inductive transmission of energy and data. The component 5 then comprises a chip and an aerial in the form of a coil which serves for transmission of energy and data. On the chip there is a memory region, in which the code or an identification number is unchangeably stored, and an electronic circuit. Chip and coil form a resonant circuit, the coil being the receiver coil for the inductive energy transmission and the sender coil for the data transmission by means of natural resonance of the resonant circuit in communication with a read-write station. The frequencies of the stimulated oscillations can lie in the range between 100 and 300 kHz.

A parking token entering the range of a read-write station of entry/exit stations or paying stations consequently receives pulses by way of its aerial, with the result that the chip obtains a tripping signal and thereupon transmits its identification number to the read-write station by way of the coil. This data transmission is not directed and is generally effected by way of omni-directional waves and therefore contactlessly and independently of position. If the memory region on a processable chip is formed, for example, by an EEPROM (electrically erasable and programmable read-only memory), then the component is also programmable contactlessly and independently of position.

The identification and/or communication component 5 can also operate actively and then has, in addition to a chip which has memory capability and is optionally programmable, a transmitter which is activated and

transmits its identification number whenever it enters the signal field of a read-write station. The energy supply is effected by way of a battery built into the component 5. For the rest, the remarks made above apply.

The use of the above-described parking token in a system for handling parking to ascertain parking times and/or parking fees can be exploited as follows.

The parking tokens in the form of round parking coins are dispensed at the entrance to a multi-storey car park or open-air car park by way of a dispenser from a supply container having a drop chute. Prior to issue, in a read-write station, which the parking token has to pass, the particular identification code is read and supplied, contactlessly and independently of position, to a computer which adds entry time, date and the station number, and stores this collected data. If the parking token is in the form of a stand-alone parking token, the entry time can be stored directly in the parking token so that the external data transmission to the computer is not necessary. With removal of the parking token from an ejection slot 12, an entry barrier is opened.

At the end of the parking period, the user feeds the parking token into a paying station. The parking token enters the signal field of a read-write station and the identification is read out again contactlessly and independently of position, and by means of a computer the entry time is compared with the actual time and the parking fee is determined therefrom and displayed. After the parking fee due has been paid, the parking token is released. The computer adopts the new (pay) time and adds a waiting time within which the car park

token is released. The computer adopts the new (pay) time and adds a waiting time within which the car park user must have driven out of the car park. Alternatively, the new (pay) time can be entered contactlessly and independently of position into the parking token.

Still with the same parking token, the user drives to the exit and feeds the token into an appropriate input slot 13, where it is read again. If it is valid, the exit barrier opens and the parking token falls into a collecting container for re-use. In the case of the programmable parking token, the read-in parking data are additionally deleted down to the fixed-code.

The parking system can be applied not only to short-term parkers but also to long-term parkers.



Patent Claims

1. A parking token for fee-payment actuation of a parking barrier, in the form of a flat plastics material piece having an obverse and a reverse and having a machine-readable data carrier for storing data relating to multi-storey car parks and users thereof and, optionally, the entry and exit time, characterised in that the plastics material piece (1) is in the shape of a round coin, on or in which an identification and/or communication component (5) operating contactlessly is mounted, which component comprises a chip and a data transmission device emitting electromagnetic waves.
2. A parking token according to claim 1, characterised in that the chip (5) is programmable to store and process entry and exit times next to an individual identification number, and for that purpose is both readable from and writable to.
3. A parking token according to claim 1 or 2, characterised in that the round coin consists of two discs (8, 9) that are fixedly joinable to one another and enclose the identification and/or communication component, the total thickness of which discs is 2 to 4 mm.
4. A parking token according to one of claims 1 to 3, characterised in that the coin has a diameter of 20 to 70 mm, preferably 35 to 50 mm.
5. A parking token according to one of claims 1 to 4, characterised in that for the current parking time the



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obverse (2) has a digital time display (7) with clock means and power source.

6. A parking token according to one of claims 1 to 5, characterised in that the round coin has a central opening (10), in particular a central round hole, for sorting and stacking purposes.

7. A parking token according to one of claims 1 to 6, characterised in that the identification and/or communication component (5) operates passively and comprises an inductively operable data transmission device with receiving and transmitting properties.

8. A parking token according to one of claims 1 to 6, characterised in that the identification and/or communication component (5) operates actively and is constructed with a transmitter as data transmission device.

9. A parking token according to one of claims 1 to 8, characterised in that the data transmission device produces and emits omnidirectional waves.

10. A method for ascertaining parking times and/or parking fees using parking tokens according to claim 1 to 9, characterised by the issue of a parking token read contactlessly and having an individual identification number for the car park user on entry into a multi-storey car park or open-air car park, the transfer of the entry time under the read identification number to a computer and/or storage of the entry time in the chip of the parking token, feeding of the parking token into a paying station, transport of the parking token using its rolling properties to a read-write station, reading of the



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identification number, optionally reading of the entry time and entering of an exit time in the chip of the parking token after payment of the parking fees due, insertion of the parking token into an exit station and transport of the parking token using its rolling properties to a read-write station for reading the identification number to the computer for the release check or, if desired, additional reading of the exit time on the parking token and erasure of the parking data after opening of a parking barrier.