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Collecting and dispensing apparatus for round parking tokens having an identification and/or communication element and intended for the fee-payment actuation of a parking barrier.

The invention relates to a collecting and dispensing apparatus for round parking tokens having an identification and/or communication element, in particular parking discs, which are intended for the fee-payment actuation of a parking barrier.

Parking tokens are issued to the particular user on passing entry-monitoring stations of a multi-storey car park or open-air car park. The data required for calculation of parking fees, such as, in particular the time of entry, date and number of the entry-monitoring station, can either, as is known from EP 0 176 465, be stored directly on the parking token, which bears an electronic component suitable for that purpose, or be transferred together with an individual identification of the parking token, to a central computer, as is known from DE 3307986. These parking tokens have the great advantage that they are re-useable, to be precise as an individual parking token for different users, as a debit parking token or as an access token for long-stay parkers.

The repeated collection and dispensing of the parking tokens requires entry-monitoring and exit-monitoring stations, which store the parking tokens that are to be dispensed and have been collected again, feed them to a read-write station and deliver them into dispensing apertures which are accessible to the car park user. For calculation of the parking time and parking

charges, the parking tokens therefore have to cover a number of transport paths, for which purpose conveyor belts or conveyor rollers are generally provided. This necessitates a structurally complex design of the collecting and dispensing apparatuses of the monitoring stations which is, moreover, susceptible to faults. A smooth dispensing operation and/or retrieval of the parking tokens is thus not ensured.

It is the aim of the invention therefore to provide a collecting and dispensing apparatus for round parking tokens bearing an identification and/or communication element for the fee-payment actuation of a parking barrier, which apparatus operates safely and reliably and is at the same time of simple construction.

That aim is achieved according to claim 1.

A collecting and dispensing apparatus is provided, which exploits the shape-related advantages of round, disc-shaped parking tokens, in particular their ability to roll, for the collecting and dispensing operation, operates largely without driven conveying systems and in so doing combines, and thereby also minimizes, the transport paths required for dispensing and retrieving the parking tokens.

Each parking token, individually separated from a stack of parking tokens, passes into a drop chute, where, by virtue of a preselected gradient, the parking tokens fall or roll downwards under the effect of their own weight. The drop chute comprises directing chutes having different gradients which guide the parking tokens to selectable locations. The action of the parking tokens passing through the drop chute is also used at the same time to read the particular

identification of the parking tokens and, if appropriate, for communication with a measuring point. If the response rate of the measuring point for the parking tokens which fall or roll past is too low, arresting means may be provided which slow down the falling or running rate of the parking tokens and/or allow the parking tokens to halt temporarily.

The at least one guide chute and the side chutes preferably have defining side walls which form the sliding or running surfaces for the downwardly moving parking tokens. The dimensions of the guide and side chutes are preferably matched to the thickness of the parking discs in order to avoid a tipping or toppling of the parking tokens out of the desired upright position. The cross-section of the chutes is consequently preferably rectangular and matched to the cross-section of the parking tokens.

In order to ensure a uniform downward movement of the parking tokens without rotation and turning of the parking tokens as they progress through the drop chute and guide and side chutes, the parking tokens fall through the guide chute in the upright position and the side chutes branch off from the guide chute in such a way that the parking tokens are able to enter into the side chutes from the at least one central guide chute by rolling around their circumference.

The side chutes can be formed by a dispensing chute and a collecting (retrieval) chute, the dispensing chute having a gradient leading away from the guide chute and the collecting chute having a gradient leading to the guide chute. The collecting chute is preferably guided above the dispensing chute so that operation can be carried out with a measuring point which is arranged in

the guide chute between the opening regions of the side chutes. In order, if desired, to be able to monitor and control also the removal of parking tokens from the dispensing chute by means of the measuring point in the guide chute, the measuring point can comprise several satellites suitable for receiving and, if desired, emitting electromagnetic signals.

The dispensing chute can, furthermore, be constructed with a pivotable rolling and sliding surface, as a result of which its inclination, and thus the fall in the dispensing channel, is variable. In the dispensing chute, in addition to the gradient directed downwards and leading away from the guide chute, a gradient which is likewise directed downwards but leads towards the guide chute can then be set. Parking tokens which have rolled into a removal position can be moved back into the guide chute by pivoting the rolling and sliding surface. At the same time, the extent of the rolling and sliding surface into a passage through the guide chute can be selected to be such that the passage is blocked or freed in selectable pivoted positions.

The separating device can be formed in a simple manner by a narrowed part in the form of a chute at the base of the supply container, in which narrowed part the parking tokens can be stacked one above the other. For ejection of the lowest parking token each time there may be provided an ejection means, which transfers preferably only one parking token at a time into the drop chute. The ejection means can discharge the parking tokens in succession to an inlet region which aligns the parking tokens for entry into the drop chute.

Other separating devices, for example, using separators at the bases of the supply container, may likewise be used.

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

The invention is explained in more detail hereinafter with reference to the embodiments illustrated in the accompanying drawings, in which

- Fig. 1 shows diagrammatically a longitudinal section of a first embodiment of a collecting and dispensing apparatus for an entry-monitoring and/or exit-monitoring station of a parking system for fee-payment operation of a parking barrier,
- Fig. 2 shows diagrammatically a longitudinal section of a second embodiment of a collecting and dispensing apparatus for an entry-monitoring and/or exit-monitoring station of a parking system for fee-payment operation of a parking barrier,
- Fig. 3 shows diagrammatically a longitudinal section of a part of a third embodiment of a collecting and dispensing apparatus.

The first embodiment, illustrated in Figure 1, of a collecting and dispensing apparatus for an entry-monitoring and/or exit-monitoring station of a parking system for fee-payment operation of a parking barrier 39, comprises a supply container 1 for round parking tokens 2 bearing an identification and/or communication element. The parking tokens 2 are massed together in the supply container 1 and held in readiness for issue to users of a multi-storey car park or open-air car park.

At its base the supply container 1 has a separating device 3 with which individual parking tokens 2 can be separated in succession from the supply of parking tokens in the supply container 1 in order thereafter to pass individually into an adjoining chute 4.

The separating device 3 here comprises a narrowed part 5 in the form of a chute which terminates above a guide path 6 along which an ejection means 7 operates. The narrowed part 5 in the form of a chute is dimensioned such that at least one stack of parking tokens 2 lying flat one on top of another is formed therein; if desired, several stacks of parking tokens 2 arranged side by side can be formed in the narrowed part 5, for which purpose suitable sliding surfaces can be provided in the narrowed part 5. For an automatic charging of the narrowed part 5 with parking tokens 2, the narrowed part 5 consists of a preferably vertically upright chute having inwardly inclined inlet faces 8 which are formed preferably in the base portion of the supply container 1. By virtue of their own weight, the parking tokens 2 are then able to stack themselves lying one above the other in the narrowed part 5. The narrowed part 5 can adjoin the base of the supply container 1 directly as an extension, or be combined with an attachment 9.

The lowermost parking token 2 each time of a stack of parking tokens in the narrowed part 5 passes into engagement with the guide path 6, without being bounded laterally by the narrowed part 5, so that the lowermost parking token 2 is exposed for a lateral engagement by the ejection means 7. For that purpose, the ejection means 7 is displaced by means of a slide member 10 in a forward movement against the circumferential surface of the lowermost parking token 2 and moves it into the

drop chute 4. The slide member 10 then moves back again into its starting position, so that the parking token previously lying above the lowermost parking token 2 is able to fall into the lowermost position. The directions of movement of the slider member 10 are indicated by the arrow A. The slider member 10 is here in the form of a separator which in a plate-like portion has a recess for receiving the lowermost parking token 2 each time.

The drop chute 4 comprises a central guide chute 11 and a first side chute 12 branching off therefrom for dispensing the parking tokens 2 separated from the stack, and a second side chute 13 branching off from the guide chute 11 for retrieving parking tokens 2 which have been dispensed. As will be explained in further detail below, the operation of the parking barrier, not illustrated, is linked to the dispensing and collecting of the parking tokens 2 through these side chutes 12, 13. The guide chute 11 is constructed so that it provides a passage in the form of a distributor for the parking tokens, adjacent to which passage the side chutes 12, 13 branch off.

The central guide chute 11 is set up with a fall in order that the parking tokens 2 are able to move downwards under their own weight. The central guide chute 11 is preferably oriented substantially vertically and has a chute width between side faces 14, 15 that is preferably only slightly larger than the diameter of the parking tokens 2. This results in the parking tokens 2, guided by the side faces 14, 15, falling vertically downwards, whilst standing up, that is, in an upright position. So that the parking tokens 2 do not tip over from this upright position into the position in which they lie flat, the transverse width

26 (compare Fig. 2) of the central guide chute 11 is matched to the thickness of the parking tokens 2. The central guide chute 11 is consequently preferably of rectangular cross-section. In order to be able to bring the parking tokens 2 into the drop chute 11 in the upright position, in which they are therefore capable of rolling, the drop chute 4 has, preferably at its inlet side, an inlet portion 16 which connects the separating device 3 with the drop chute 4. For that purpose, this inlet portion 16 can have suitable sliding and guiding surfaces 17.

The side chute 12 provided for dispensing parking tokens 2 is inclined downwardly with respect to the horizontal direction and branches off from the central guide chute 11 at some distance from the inlet portion 16. The width of the side chute 12 between two side faces 18, 19 is preferably only slightly larger than the diameter of the parking tokens 2, which can then enter the side chute 12, rolling around their circumferential face, from the guide chute 11 and can run downwards in the side chute 12 without risk of jumping. The transverse width 27 (compare Fig. 2), provided for that purpose, of the side chute 12 is in particular preferably chosen so that the parking tokens 2 are held in the upright position, in which they are capable of rolling, and do not fall over into the flat position. The end of the side chute 12 lying opposite the guide chute 11 can be constructed at an outer side of the collecting and/or dispensing apparatus as a removal opening for the parking tokens 2 to be issued.

Entry into the side chute 12 is controlled by way of a routing mechanism 20, which selectively blocks either the passage through the central guide chute 11 or the passage through the side chute 12.

The length of the central guide chute 11 is preferably selected such that the guide chute extends beyond the point at which the side chute 12 branches off and terminates open, or suitable for opening, over a collecting container 21 for used parking tokens 2.

Seen in three dimensions, the side chute 13 for the insertion of used parking tokens 2 branches off from the central guide chute 11 above the side chute 12. The side chute 13 is inclined upwards with respect to the horizontal direction so that the parking tokens 2 introduced into the side chute 13 roll back into the guide chute 11 under the effect of gravity. For that purpose, the width of the side chute 13 between the side faces 22, 23 is preferably only slightly larger than the diameter of the parking tokens 2 and, in particular, the associated transverse width 28 (compare Fig. 2) is preferably matched to the thickness of the parking tokens 2 so that the latter do not topple over out of the position in which they are capable of rolling. The transverse widths 27, 28 of the side chutes 12, 13 are preferably the same.

The side chute 13 for feeding in parking tokens 2 that are to be returned is preferably arranged above the dispensing side chute 12 in order to be able to re-issue through the one dispensing side chute 12 parking tokens 2 on which charges have not been correctly settled.

In the central guide chute 11, between the branch-off points of the side chutes 12, 13 a measuring point 24 is arranged for reading and/or recording an identification and/or communication element of the parking tokens 2 and/or communicating with that element. Depending on the response rate of the

measuring point 24, means can also be provided which temporarily hold the parking tokens 2, which are in the process of sliding past, in the region of the measuring point 24. In the embodiment illustrated, these means are formed by a slide member 25 which blocks off the passage through the guide chute 11 as required. The direction of movement of the slide member 25 is indicated by an arrow B.

By means of a control means (not shown), to which the functional elements are connected, in particular the ejection means 7, slide member 25, measuring point 24 and routing mechanism 20 of the described collecting and dispensing apparatus, as well as the parking barrier 39 and its control device 38, the operation thereof can take place as described hereinafter.

At the beginning of a parking operation, a parking token 2, triggered by a signal from the car park user, is separated from the stack of parking tokens by means of the ejection means 7 and falls or rolls through the chutes 11, 12 into a dispensing opening accessible to the car park user. The routing mechanism 20 is located in the position in which it is blocking the guide chute 11 (solid line), so that the separated parking token 2 falls through the guide chute 11, to be precise until it reaches the routing mechanism 20, from where the parking token 2 is able to roll through the side chute 12. Before issue, in the measuring point 24, which the parking token 2 is to pass and which is located in the chute 11, the particular identification code is read and fed to a computer which adds and stores entry time, date and the station number. Alternatively, this data can be recorded on the parking token 2. By removing the parking token from the dispensing opening, which can be recognised by means of a light barrier or by

means of electromagnetic signals, an entrance parking barrier, not illustrated, is opened.

At the end of parking, the user feeds the parking token 2 into a slot of a paying machine, not illustrated. There, the identification or the other parking data is read and the entry time is compared with the actual time by computer and the parking charge is established therefrom and displayed. After payment of the parking fee due, the parking token 2 is released from the paying machine. The computer adopts the new time and adds a waiting time within which the car park user must have driven out of the car park. Alternatively, the waiting time can be written into the parking token.

Still with the same parking token 2, the user drives to the exit and feeds the token into the side chute 13 of the collecting and dispensing apparatus, from where it passes into the central guide chute 11 and to the measuring point 24. At the measuring point 24 the identification is compared with the computer data or the waiting time. If it is valid, an exit barrier opens and the parking token 2 falls through the guide chute 11 into the collecting container 21. The routing mechanism 20 is here located in the position shown by the broken line. If the parking token is not valid, the routing mechanism 20 blocks the guide chute 11 so that the parking token 2 is diverted into the dispensing side chute 12 and is given back again.

The parking system can likewise be used for long-term parkers or season-ticket holders.

Fig. 2 shows a second embodiment of a collecting and dispensing apparatus for an entry-monitoring and/or exit-monitoring station of a parking system for fee-

payment operation of a parking barrier, in which adjoining a supply container 1 for parking tokens 2 there is, after an interposed separating device 3, a drop chute 4.

The separating device 3 is here formed by an outlet opening provided in the base portion of the supply container 1 for one parking token 2 each time; suitable feed devices and/or separators, arranged in or on the container, for separating the parking tokens 2 can be associated with the outlet opening.

The drop chute 4 accepts in an inlet portion 16 the parking tokens 2, discharged in succession from a supply, preferably in the upright position in which they are thus capable of rolling. In the inlet portion 16, which is provided with a downwardly inclined fall and the lateral dimensions of which match those of the parking tokens 2, the parking tokens 2 run individually one after the other into the guide chute 11. According to one embodiment, not illustrated, the inlet portion 16 can also be omitted.

The drop chute 4 in this case moreover differs from the first embodiment essentially in that the side wall 14 of the guide chute 11 running past the side chutes 12, 13 is constructed only in sections, and the base side face 19 of the side chute 12 is formed on a rocker 29.

A substantially open configuration of the guide chute 11 with respect to the side chutes 12, 13 is possible, since, owing to the preferred arrangement of the input chute 13 above the dispensing chute 12, the parking tokens 2 in the upper portion of the guide chute 11 are automatically returned to the guide chute 11 should they be thrown to one side. Passing of the measuring

point 24 is ensured by a side wall member 30 which positively guides the parking tokens 2 in the region of the measuring point 24. At the level of the branching-off point of the dispensing side chute 12, the rocker 29 ensures a positive guidance of the falling parking tokens 2.

As already explained, the parking tokens 2 are moved downwards in the drop chute 4 under the influence of gravity. The essential functional elements for determining the directions of movement are, within the side chutes 12, 13, the respective side faces 19, 22 which bound these chutes 12, 13 at the bottom and therefore serve as rolling and sliding surfaces. Consequently, in the side chute 12, the direction of movement of the parking token 2 in this side chute 12 is determined by the inclination of the side face 19 serving as running surface. In order to be able to vary this inclination, and thus the fall, in the dispensing side chute 12, the side face 19 is formed on the rocker 29, which for that purpose is preferably pivotable about an axis at right angles to the longitudinal plane of the drop chute 4. The pivoting direction is indicated by the arrow C.

The rocker 29 can be displaced into a pivoted position in which the side chute 12 has a downwardly directed gradient directed away from the guide chute 11. In this pivoted position the rocker 29 blocks, with its end 31 facing towards the guide chute 11, the passage through the guide chute 11, and thus takes over the task of the routing mechanism 20 according to the first embodiment. A parking token 2 entering the side chute 12 then rolls as far as a removal opening 32. The particular parking token 2 is able to be held in the

removal opening by means of an upwardly angled arm 33 on the rocker 29. The arm 33 thus prevents the parking tokens 2 from falling out of the collecting and dispensing apparatus, this being unacceptable. The parking tokens arranged in the removal opening 32 in this manner can either be removed by hand or be ejected by means of a pronounced pivoted position of greater inclination of the rocker 29.

A light barrier can be provided in the region of the removal opening 32 for monitoring the removal of the respective parking tokens from the removal opening 32. If each parking token 2 has an electromagnetic signal source, by means of an associated receiving device in the drop chute 4 the interruption of the signal reception can be used to recognise removal. The receiving device can be linked to the measuring point 24. These examples for monitoring removal also apply to the first embodiment.

Time and again during parking operations, parking tokens 2 that have been requested, that is, those that have been moved into the removal opening 32, are not then removed. Such parking tokens 2 then have to be reclaimed, to be precise preferably within a selectable time period, for example, 30 seconds. The rocker 29 enables such a retrieval by pivoting into a position in which the running surface 19 has an inclination direction downwards towards the guide chute 11. Furthermore, it is ensured that the end 31 facing towards the guide chute 11 frees the passage through the guide chute 11 so that the parking token 2 that has not been removed is able to fall into the receiving container 21. This pivoted position of the rocker 29

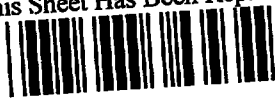
also enables the parking tokens 2 returned through the side chute 13 for collection to fall into the receiving container 21.

The different directions of movement in which the parking tokens 2 are able to move in the drop chute 4 are marked by arrows. The way in which the parking process proceeds is comparable with that described for the first embodiment.

Fig. 3 shows diagrammatically a fragment of a third embodiment of a collecting and dispensing apparatus which is substantially the same as the second embodiment. One difference lies in the arrangement of the pivot point 34 of the rocker 29 in relation to the front edge of the collecting and dispensing apparatus, and thus also the arrangement of the angled arm 33. Compared with Fig. 2, the pivot point 34 and the orientation of the angled arm 33 is selected so that the respective parking tokens 2 project in the removal position illustrated in Fig. 3 beyond the front edge of the collecting and dispensing apparatus, and can therefore be easily removed by a car park user.

Furthermore, the parking tokens 2 are provided with an electromagnetic signal source 35. Instead of one measuring point, a multi-part measuring point can be provided in the guide chute 11, and may have in particular separate satellite-type receiving devices 36, 37 in order to have a receiving device 37 for monitoring the removal of a parking token that is separate from the receiving device or devices 36 for reading or communicating with the parking tokens 2 in order to establish and/or process the parking data.

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Patent Claims

1. A collecting and dispensing apparatus for round parking tokens (2) having an identification and/or communication element which are intended for the fee-payment actuation of a parking barrier (39), having a supply container (1), which has at its base a separating device (3) for the parking tokens (2), an adjoining chute (4) with at least one central guide chute (11) and branching off therefrom side chutes (12, 13) having a respective inclination for dispensing and collecting parking tokens (2) rolling under gravity, and having a measuring point (24) in the central guide chute (11) for reading the parking tokens (2) which are to be issued and/or which have been returned, which measuring point is connected to a control means for actuating the parking barrier (39).

2. A collecting and dispensing apparatus for disc-shaped parking tokens according to claim 1, characterised in that the at least one guide chute (11), if desired adjoining an inlet region (16), and the side chutes (12, 13) have dimensions which prevent the parking tokens (2) toppling over out of an upright position, in which they are capable of rolling, during their movement through the drop chute (4).

3. A collecting and dispensing apparatus according to claim 1 or 2, characterised in that the side chutes (12, 13) are arranged with respect to the at least one guide chute (11) such that the parking tokens (2) run in by way of their circumferential faces.

4. A collecting and dispensing apparatus according to one of claims 1 to 3, characterised in that the guide





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chute (11) leads into a collecting container (21) for parking tokens (2) that have been used and are to be re-introduced into the supply container (1) again.

5. A collecting and dispensing apparatus according to one of claims 1 to 4, characterised in that an input chute (13) branches off from the guide chute (11) above a dispensing chute (12), and the measuring point (24) is arranged in the guide chute (11) between the opening regions of the chutes (12, 13).

6. A collecting and dispensing apparatus according to one of claims 1 to 5, characterised in that at the entrance to a dispensing chute (12) there is provided a routing mechanism (20) selectively blocking off the guide chute (11).

7. A collecting and dispensing apparatus according to one of claims 1 to 5, characterised in that the bottom running surface (19) of the dispensing chute (12) is in the form of a rocker (29) which varies the inclination of the dispensing chute (12) and is suitable for blocking off the guide chute (11).

8. A collecting and dispensing apparatus according to claim 7, characterised in that the rocker comprises two running surfaces (19, 33) angled with respect to one another, the running surface (33) on the dispensing side being in the form of a stop face for a removal position of a respective parking token (2) to be dispensed.

9. A collecting and dispensing apparatus according to one of claims 1 to 8, characterised in that the drop chute (4) has an arresting device (25) blocking off the





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passage for temporarily holding the parking tokens in the region of the measuring point (24).

10. A collecting and dispensing apparatus according to one of claims 1 to 9, characterised in that the measuring point (24) has associated with it several signal-receiving devices (36, 37) distributed in the drop chute (4) for interaction with signal sources installed on or in the parking tokens.

11. A collecting and dispensing apparatus according to one of claims 1 to 10, characterised in that the at least one central guide chute (11) is a substantially vertically oriented drop chute.

12. A collecting and dispensing apparatus according to one of claims 1 to 10, characterised in that the separating device (3) comprises a narrowed part (5) in the form of a chute at the base of the supply container (1) for stacking parking tokens (2), which part has a width only slightly exceeding the diameter of the parking tokens (2) and is arranged above a separation channel (6) which is connected to the guide chute (11) and intended for an ejection means (7) to act on the parking tokens (2) laterally.

13. A collecting and dispensing apparatus according to claim 11, characterised in that the ejection means (7) comprises a slider member (10) which is arranged to be displaced beneath the narrowed part (5) and has a recess for receiving one parking token (2) each time.





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chute (4) has an arresting device (25) blocking off the passage for temporarily holding the parking tokens in the region of the measuring point (24).

10. A collecting and dispensing apparatus according to one of claims 1 to 9, characterised in that the measuring point (24) has associated with it several signal-receiving devices (36, 37) distributed in the drop chute (4) for interaction with signal sources installed on or in the parking tokens.

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13. A collecting and dispensing apparatus according to claim 11, characterised in that the ejection means (7) comprises a slider member (10) which is arranged to be displaced beneath the narrowed part (5) and has a recess for receiving one parking token (2) each time.

