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Device for reading and collecting media which can be read without contact

The invention relates to a device for reading and
5 collecting media which can be read without contact.
Typically this medium is a token which can be read and
written to without contact via a radio link, but the
invention is applicable to all media which can be read
without contact, in particular a microcircuit card
10 ("smart card").

A contact-free token or card is able to communicate at
a short distance (around ten centimeters) with a
coupler provided with an antenna, for all functions
15 such as writing, reading, authentication, etc. Usually,
this medium also receives the power needed for its
operation via this antenna. This type of remote
communication is in the process of standardization
according to the ISO 14443 standard. A smart card which
20 can be read and written to via a radio link may further
have means capable of being read by a contact method,
namely magnetic reading, optical reading or electrical
reading, so that it can also be read and written to by
contact readers, that is to say requiring insertion
25 into a machine.

The device according to the invention is more
particularly intended to be used in the field of
ticketing for transport. It will be described for this
30 field, but other fields can be envisioned, in
particular automatic dispensing. Ticketing systems for
public transport have evolved over several years from
conventional ticketing to the use of contact-free
tokens or smart cards. However, the cost of these
35 contact-free tokens or cards (several hundred times the
price of a paper ticket with a magnetic strip) leads to
these media being recovered and reused. When the user
enters the transport network using a ticket valid for a
single journey, the medium for this ticket is read



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without insertion into a machine, by virtue of the contact-free reading. When the user leaves the transport network, he has to insert the medium into a terminal for a gate to open. The inserted medium is
5 read by a reader in order to check its validity, and it is collected by this terminal if it is a valid ticket; otherwise, it is rejected and returned to the user. If it is a ticket that is valid for several journeys, it is only collected when its value becomes zero. It is
10 then revalidated by a new writing operation, then resold. Thus it can be reused several hundred times.

The device for collecting media must only collect valid media since only these can be recycled. The invalid
15 media must be returned to the users who have inserted them into the reading and collecting device. Devices for reading and collecting media which can be read without contact are known which operate in a similar manner to an automatic vending machine using coins,
20 with regard to the treatment of invalid media. The user is invited to insert the medium into an inlet orifice. The medium drops into a reader which determines whether or not it is valid, and which controls an electromechanical router. Depending on the case, the
25 medium then drops into a basket for collecting valid media, or into a chute which takes it to an outlet orifice where the user can pick it up.

The dual circuit downstream of the router occupies a
30 not insignificant volume. Furthermore, the orifice for returning the invalid media is necessarily lower than the reader since gravity is used to bring the medium toward the outlet orifice. However, this orifice should not be very low, so that the user does not have to bend
35 down. The design of a pay terminal having such a reading and collecting device is therefore tricky.

The aim of the invention is to provide a reading and collecting device which is simpler to produce than the

known devices.

The subject of the invention is a device for reading and collecting media which can be read without contact, comprising:

- an entrance allowing a medium to be inserted into the reading and collecting device;

- reading means comprising a radio transmitting-receiving circuit for reading a medium;

10 - means for collecting the media which are recognized as valid by the reading means;

characterized in that the radio transmitting-receiving circuit is placed so that it can read a medium in an area upstream of the entrance of the device, such that
15 a medium can be read before it is inserted into the entrance;

and in that the collection means comprise means for preventing a medium being inserted into the entrance of the reading and collecting device when this medium is
20 not recognized as valid by the reading means.

The device thus characterized is simple to produce since it does not have means for returning the invalid media, by virtue of the fact that the invalid tokens
25 can never be inserted into the device. Since the radio transmitting-receiving means are placed so as to radiate in the area which is upstream of the entrance, they can read a token even before it is inserted into the entrance. The means for preventing the insertion
30 block the entrance in the absence of a medium recognized as valid.

The invention will be better understood and other characteristics will become apparent by means of the description below and the accompanying figures:

35 - figure 1 shows schematically a front view of an exemplary embodiment of the device according to the invention.

- figure 2 shows schematically a side view of this exemplary embodiment.

This exemplary embodiment comprises:

- 5 - a wall 4 made of a transparent plastic for the radiowaves used for the contact-free reading;
- an entrance 3 fitted with a chute, so that a token 1 with contact-free reading can easily be inserted, by hand, into this entrance 3;
- 10 - a control unit 6, mainly consisting of a microcontroller;
- a radio transmitting-receiving circuit 5, connected to the control unit 6;
- a flap 11c supported by a lever 11a, 11b pivoting
15 about an axis 9, this lever having a first arm 11a which can be pulled over by a solenoid 10, and a second arm 11b which is pulled over by a spring 8 in order to return the flap 11c to the rest position, that is to say blocking the entrance 3;
- 20 - three optical position sensors C1, C2, C3 which detect the presence of the token respectively in three positions:
 - in front of the entrance 3;
 - in a position referred to as the
25 reinitialization position, where writing is carried out in order to reinitialize the value allocated to this medium in order to constitute a new ticket;
 - in a position referred to as the effective
30 collection position, where the token passes when it drops after having been reinitialized;
- a light and sound indicator 12 actuated by the control unit 6 when the token 1 presented in front of the entrance 3 is not recognized as valid.

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The radio transmitting-receiving circuit 5 is placed so as to radiate in the area 2 which is upstream of the entrance 3, in order to be able to read a token even before it is inserted into the entrance 3; and so as to

radiate also downstream of the entrance 3 so that it can reinitialize this token after it has been inserted into the entrance 3.

5 When the solenoid 10 is not powered, the first arm 11a of the flap 11c is in the rest position and the entrance 3 is closed. When the solenoid 10 is powered, it pulls the first arm 11a over to the working position and the entrance 3 is open; on the other hand, the
10 second arm 11b recloses the passage between this second arm and a wall 13 which guides the token. The token 1' is then immobilized, until the solenoid 10 is no longer powered.

15 When a user presents a token 1 in front of the entrance 3, the sensor C1 detects its presence. The control unit 6 reads the token 1 by means of the circuit 5, due to the fact that it can radiate in the area 2, upstream of the inlet of the entrance 3.

20 If the token 1 is not recognized as valid by the control unit 6, the latter actuates the indicator 12 to inform the user that he cannot insert it into the entrance 3, and that he must therefore keep it.

25 If the token 1 is recognized as valid by the control unit 6, the latter powers the solenoid 10 in order to open the flap 11. The user inserts his token 1 into the entrance 3.

30 When the sensor C2 detects that a token 1' has arrived in the reinitialization position, the control unit 6 writes to the token 1' by means of the circuit 5, due to the fact that it can also radiate in the area
35 downstream of the inlet of the entrance 3. When the reinitialization is completed, the control unit 6 stops powering the solenoid 10. The flap 11c again closes the entrance and its second arm 11b releases the token 1'. The latter then drops into a collection container 7.

The sensor C3 detects the passage of the token 1' toward the container 7, and informs the control unit 6 thereof. It can then process a new token presented at the inlet of the entrance.

CLAIMS

1. A device for reading and collecting media (1) which can be read without contact, comprising:
- 5 - an entrance (3) allowing a medium (1) to be inserted into the reading and collecting device;
- reading means (5, 6) comprising a radio transmitting-receiving circuit (5) for reading a medium (1);
- 10 - means (6 to 11) for collecting the media which are recognized as valid by the reading means (5, 6);
- characterized** in that the radio transmitting-receiving circuit (5, 6) is placed so that it can read a medium (1) in an area (2) upstream of the entrance (3) of the
- 15 device, such that a medium (1) can be read before it is inserted into the entrance (3);
- and in that the collection means (6 to 11) comprise means (11c) for preventing a medium being inserted into the entrance (3) of the reading and collecting device
- 20 when this medium is not recognized as valid by the reading means (5, 6).
2. The device as claimed in claim 1, characterized in that the means for preventing the insertion of a medium
- 25 comprise:
- a flap (11c) blocking the inlet of the entrance (3);
- and an actuator (10) controlled by the reading means, in order to open the flap only if a medium is
- 30 recognized as valid.
3. The device as claimed in claim 2, characterized in that it further comprises means (11b) for immobilizing a medium (1') in the device, in a position where it can
- 35 be written to; and in that these means (11b) for immobilizing a medium are coupled to the means (11c) for preventing the insertion of a medium, such that the same operation again closes the entrance (3) of the device and releases a medium (1') which was immobilized

in the position where it can be written to.

4. The device as claimed in claim 1, characterized in
that it further comprises means (6, 12) for indicating
5 to the user that the medium that he is preparing to
insert is not valid, when this medium is not recognized
as valid by the reading means (5, 6).

5. The device as claimed in claim 1, characterized in
10 that it further comprises means (C1, 6) for detecting
the presence of a medium (1) in front of the entrance
(3), and then for triggering an operation of reading
the medium for the purpose of determining whether it is
valid.

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6. The device as claimed in claim 1, characterized in
that it further comprises means (C2, 6) for detecting
the presence of a medium (1') downstream of the
entrance, and then for triggering an operation of
20 writing to the medium.

7. The device as claimed in claim 1, characterized in
that it further comprises means (C3, 6) for detecting
the effective collection of a medium.