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(54) **PROCESS AND APPARATUS FOR THE IDENTIFICATION OF METAL DISC-SHAPED PIECES**

(57) Procedure and device for the identification of metallic discs, particularly applicable to coins consisting of a nucleus and a crown of different composition, which consists of obtaining and measuring a peak P_1 of the electrical signal produced as crown (8) passes the firs electromagnetic sensor (2); detection and measurement of one of the secondary peaks P_3 , P_4 shown by the electrical signal obtained as the crown (8) passes the first electromagnetic sensor (2); and measuring the value of peak P2 of the electrical signal produced as nucleus (9) passes a second electromagnetic sensor (3) at the same time as peak P1 is detected.

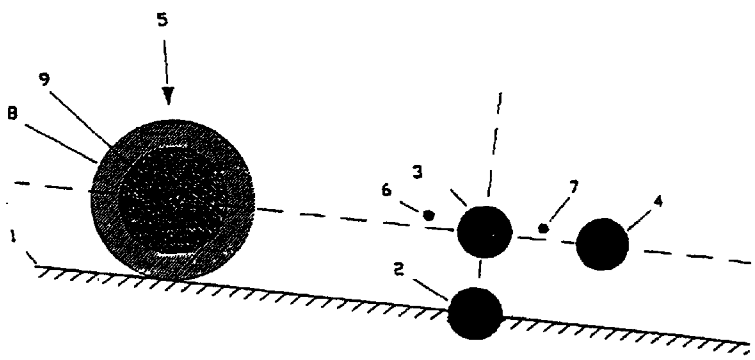

FIG.1

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Description

[0001] The present invention relates to a procedure and device for the identification of metallic discs, such as coins or tokens, and is particularly applicable to de identification of coins consisting of two or more parts of a different nature, for example coins with a crown and the nucleus made from metal or different alloys, or multilayer coins. The invention also includes the device which carries out the procedure.

[0002] More specifically the invention relates to a procedure and device providing precise information on the size of the coin and the nature of the different parts of which it consists, in order to correctly identify it, all of this by the use of optical and electromagnetic sensors. The invention is applicable for the differentiation of monometallic coins providing great certainty in rejection of frauds consisting of adding to a coin of lower value a ring of different material, such as plastic tape, aluminium, rings of different alloys, etc., in order to simulate a higher value coin.

[0003] Several devices are already known which discriminate or identify coins based on an individual or combined use of sensors of different types, basically electromagnetic sensors and to a lesser extent capacitance, optical, extensometric, piezoelectric and acoustic.

[0004] From within this background can be cited, for example, Spanish patent 555.181, by the same applicants, in which is described a coin discriminating device using a combination of two optical sensors, measuring coin sizes, and a electromagnetic sensor which provides information on the electrical probes of the alloy. This electromagnetic sensor consists of two coupled coils powered by a oscillator, through whose gap pass the coins.

[0005] In the same way we can cite U.S. patent 4705154, which describes a device which includes two electromagnetic sensors placed after each other in the chute or path of the coin, so that said coin is subjected to two consecutive measurements. Each of the sensors consists of two coupled coils. In one case, the coils are connected in phase and in the other they are connected in counterphase. Since the sensors are sufficiently separated both electromagnetic sensors are fed by the same oscillator.

[0006] A sensor of the same type is also described in U.S. patent 4754862, in which a coin discriminating device is proposed incorporating three electromagnetic sensors, each consisting of a single coil and arranged so that the coin interferes with them sequentially. The sensors share a single oscillator, but in this case a multiplexor is used to activate each sensor as the coin passes. The size of the sensors, two at least, is similar or greater than that of the coins to be analysed.

[0007] The techniques described in the analysed documents are not applicable to the discrimination of coins with parts of different natures, since the described electromagnetic sensors give an averaged information on the entire coin, without distinguishing the different parts which it is made of.

[0008] Also known are procedures for performing measurements at points of the coin and which are, therefore, adequate for analysis of coins having part of different nature.

[0009] In this sense document WO. 93/22747 can be cited which describes a coin validator using two small electromagnetic sensors (5mm compared with 14mm used normally), where the measurements relies on the different outputs given by each sensor when the coin is placed so that one of the parts, e.g. the outer one, intercepts one of the sensors while the other one, the internal, intercepts the other. In this way the different properties of the two materials are analysed. Patent PE.0076617A2 proposes a measurement procedure applicable to two-coloured coins based on using small Hall effect sensors. With these sensor the variations of the magnetic field caused by the coin under analysis can be measured with an acceptable spatial precision.

[0010] The use of small electromagnetic sensors has the disadvantages of giving low level electrical signals, being very sensitive to variations in the pass of the coin along the chute and also being of a delicate construction and handling. In addition Hall effect Sensors are very expensive.

[0011] The object of the present invention is to solve the aforementioned problems by a procedure and device which allow a precise measurement of the size of the coins and the properties of the alloys of their different parts, all of this without requiring expensive electronic components nor miniaturised electromagnetic sensors.

[0012] The invention proposes a procedure for the identification of metallic discs, particularly coins consisting of a crown and a nucleus of different natures, consisting of the following stages: a) obtention and measurement of the peak of the signal produced when the crown of the coin passes a first electromagnetic sensor, which represents a first characteristic of said crown; b) measurements of the signal level produced as the nucleus of the coin passes a second electromagnetic sensor, at the same time as the peak of the aforementioned signal is detected, which represents a first characteristic of the nucleus of the coin; c) detection and measurement of one of the secondary peaks of the signal obtained as the crown of the coin passes the former sensor, which provides a second characteristic of the crown.

[0013] The procedure also includes a measurement of the signal level produced when the crown of the coin passes a third electromagnetic sensor at a time between the moment the crown begins to intercept this third electromagnetic sensor and the time it ceases to, which provides a third characteristic of the crown.

[0014] In addition the procedure includes a measurement of the peak of the signal produced as the nucleus of the coin passes the third electromagnetic sensor, which represents a second characteristic of said nucleus.

[0015] The procedure of the invention can be completed by obtaining the times in which the coin passes a first and second optical sensor, in order to calculate the size of the coin. In this case the time of the measurement of the signal level produced as the crown of the coin passes the third sensor can be defined by an amount of time after the coin has finished passing the firs optical sensor, which would be located before the third electromagnetic sensor.

[0016] With the proposed system in addition to the coin size, two or more representative characteristics are obtained for the ring and the nucleus which taken together ensures the exact identification of the coin being analysed.

[0017] In addition, the second and third electromagnetic sensors can be self-oscillating which allows measurement the frequencies to obtain an additional parameter related to each of the electrical amplitude measurements provided by these sensors.

[0018] The device for the execution of the described process includes a first and second electromagnetic sensors which are aligned perpendicularly to the path of the coins and the third electromagnetic sensor at a distance from the aforementioned second sensor along the coin path and placed at the same position as it along the path. Of the two aforementioned electromagnetic sensors, one is placed so that it intercepts only the coin crown, while the other is placed so that it sequentially intercepts both the nucleus and the crown. The third sensor will also intercept sequentially the nucleus and crown of the coins. The device also includes two optical sensors located at the same height along the coin path, separated from each other a certain distance along the coin path and preferably placed at either side of the second electromagnetic sensor mentioned above.

[0019] The sensors may be made from coupled pairs of inductors, placed on the opposite sides of the coin chute, each inductor pair forming an oscillator so that the different electromagnetic sensors are completely independent from each other, thus permitting measuring of different coin characteristics, particularly of the nucleus, which allows discriminating nuclei consisting of superimposed layers of different metals.

[0020] The optical sensors provide time signals of the coin passing for calculation of their size.

[0021] The first electromagnetic sensor is placed on the chute, so that the flux created by this sensor partially intercepts the coin, but fundamentally at its crown. This is important in order to avoid the contact resistance between the crown and the nucleus of the coin, which is uncontrollable, from affecting the quality of the measurement. This sensor can also be built from two coupled coils placed on either side of the coin chute, centred on the rolling channel, so that the coin intercepts approximately 50% of the senor's diameter. As will be later exposed, by adequately choosing the operation frequency and the mode of operation (emitter-receiver) an efficient discrimination of the coin crown can be achieved, regardless of the nucleus material. In certain cases it is convenient to use the self-oscillation configuration instead of the fixed frequency emitter-receiver one, particularly when discriminating coins with a magnetic crown, since in this case the frequency variation experienced by the sensor as the coin passes is a clear identification parameter of this property.

[0022] Obviously, the first electromagnetic sensor (2) instead of being located on the rolling track beneath the second sensor (3) could be mounted above said sensor (3) so that the coin partially intercepts the magnetic flux created between the two inductors of the sensor. This arrangement would naturally have the limitation that it would only be applicable for discrimating coins in a certain range of diameters and crown sizes.

[0023] The characteristics and advantages of the invention are described below in greater detail, with the aid of the enclosed drawings, in which an example is shown of a non-limiting embodiment.

[0024] In the drawings:

Figure 1 shows a longitudinal section of a segment of the rolling track with the device object of the invention and with a coin at the start of the segment.

Figure 2 is a view similar to figure 1, showing the moment when the coin simultaneously intercepts the first two electromagnetic sensors.

Figure 3 is a similar view to figures 1 and 2, showing the coin in an intermediate situation, at the time when it begins leave the first optical sensor and begins to intercept the third electromagnetic sensor.

Figure 4 shows a block diagram of the circuitry used in the device of the invention.

Figures 5 to 7 are diagrams showing the signals obtained when the coin passes the different sensors.

[0025] Figures 1 to 3 show a segment of the rolling track, labelled by number 1, along which are placed a first and second electromagnetic sensor, labelled 2 and 3, aligned with each other perpendicularly to rolling track (1), and a third electromagnetic sensor (4) separated from the second sensor (3) along the path of the coins and placed at the same height as it with respect to rolling track (1). Electromagnetic sensor (4), as seen in figures 1 to 3, is placed at the end of the area designed for coin measurement. This is a preferred embodiment, but depending on the physical space and the shape of the device casing, said electromagnetic sensor (4) could be placed at the start of the measurement area, for example, before electromagnetic sensors (2) and 3.

[0026] Electromagnetic sensor (2) consists of two coupled inductors placed next to the rolling track (1) of the coins. The configuration of this sensor will be preferably of the emitter-receiver type and they will be mounted near the rolling track of the coins, so that the electromagnetic field received by the sensor is affected mainly by the coin crown. This can be achieved using for example a 9mm diameter sensor, placed on the rolling track and displaced outwards so that the coins interfere it in approximately 50% of its size. Since this sensor is along the perpendicular line from the centre of sensor (3) to rolling track (1), when the coin is centred on sensor (3) it will also be centred on sensor (2), figure 2.

[0027] Electromagnetic sensor (3) will also consist of two coupled inductors placed on opposite sides of the coin pass chute 5. At either side of this electromagnetic sensor there will be two optical sensors 6 and 7 in charge of measuring the coin size (chord).

[0028] In the example shown in the drawings, coin (5) has a crown 8 and a nucleus 9. Sensor (3) will be of as size smaller than that of the smallest nucleus of the two-coloured coin which may be analysed and will be placed so that when the coin is centred, the interaction with the electromagnetic field created by sensor (3) will mainly be due to the coin nucleus.

[0029] With the described conditions, when a coin (5) passes the described system it will first intercept optical sensor (6), which together with optical sensor (7) will measure the size of the coin. It will later intercept nucleus sensor (3). Further on the coin will intercept crown sensor (2), causing a sharp signal with a well—|| defined peak P_1 , due to the configuration (emitter-receiver) used and to the positioning of the first electromagnetic sensor (2), figures 5 and 6, which coincides when the coin is centred on sensor (2) and therefore with sensor (3), as shown in figure 2. When this situation is detected, values P_1 corresponding to the signal peak mentioned above and P_2 which corresponds to the nucleus sensor are taken, all of these signals being characteristic of the ring and the nucleus of the coin respectively.

[0030] In addition, as seen in figures 5 and 6, which show signals recorded by sensors 3 and (2) for two different two-coloured coins, as well a being different in peaks P_1 and P_2 for one coin, sensor two shows two secondary peaks P_3 and P_4, which do not appear for the other coin. This is due to the different conductivity of the metal used for ring (8) or external part of the coin; thus in figure 5 the ring is a good conductor while in figure 6 it is a poor one. As is natural, in intermediate situations peaks P_3 and P_4 are between the two extreme situations described. This property of sensor (2) appears only for certain sensor configurations, in this case emitter-receiver, and for certain operation frequency band, for which reason it is important to design the sensor properly to use this effect. Therefore, by measuring peak P_1 as well as P_3 or P_4, (P_3 and P_4 are equivalent as they are symmetrical), an additional parameter of the coin ring is obtained exclusive of this ring, since it is created when the coin begins to interfere with sensor (2).

[0031] Up to now two relevant measurements have been obtained of ring (8) of the coin and one of nucleus 9. To improve the security of the system it is convenient to include a third electromagnetic sensor (4) sensitive to another property of the alloy. For example, if sensor (3) is built with the coils connected in phase, sensor (4) would be opposite, or perhaps using a different operation frequency or any other variation which would allow obtaining a second characteristic independent of the one sensor (3). For example, figure 7 shows a signal of sensor (4) working with the two inductors connected in counterphase, as a two-coloured coin rolls along the measurement area. The measurement to consider would be the maximum variation of the signal P_5 of figure 7, which for this particular sensor appears in its mid area and corresponds to the coin centred with sensor (4). The peak value is easily measurable by any of the presently known procedures.

[0032] In addition, electromagnetic sensor (4) will allow to obtain a third property of the crown by measuring the signal level produced as crown 8 passes sensor (4) in a certain moment, which will lie in the time taken for the coin to begin and end intercepting said electromagnetic sensor (4).

[0033] With the above embodiment sensor (4) can be used in combination with one of the optical sensors to obtain the third characteristic mentioned above of the coin crown, reading the amplitude of the sensor (4) signal at a time T_1 taken from the time the coin is in the position shown in figure 3. The electrical signal produced by the sensor can be seen in figure 7, where the central part of the signal represents a second characteristic of the coin nucleus, while the value of signal V_5, corresponding to its value at a time T_1 after the end of the rise of optical sensor (6), would be a third characteristic of the coin crown. The value chosen for T_1 would depend on the size of the coins to be discriminated and the existing separation between electromagnetic sensor (4) and optical sensor (6). If the separation of the optical sensors is less than the chord of the examined coin, time T_1 can be calculated for each of the coins entered in the device, as it varies inversely to the speed with which they pass the sensors. In this way measurement by sensor (4) of the ring will be carrried out at fixed positions for each of the coin values (coin diameters). The average speed of the coin can be easily found by measuring the time of the entry and of the coin between the two optical sensors.

[0034] If the self-oscillation configuration is used for sensors 3 and 4, that is, their oscillation frequency depends on the inductors used as sensors, this frequency can be measured and be an additional parameter related to the readings of electrical amplitude provided by the described sensors. Frequency measurement for each of sensors 3 and 4 described above can be carried out by any known procedure; in our case an impulse count is used for a known time (fixed or variable) with which the frequency of the oscillator will be the quotient of the number resulting from the count and the time of the count. These operations can be performed by block 25 of figure 4, which is a microprocessor.

[0035] The block diagram appearing in figure 4 shows a sketch of the elements making up the preferred embodiment of the invention proposed. The sensors have been represented in the order in which they are intercepted by coin (5). In the order followed by the coin as it rolls on inclined ramp (1), it first intercepts optical sensor (6), connected to microprocessor (25) in charge among other things of measuring the passing times of the coins by optical sensors to measure their diameter.

[0036] After this the coin intercepts electromagnetic sensor (3), which as mentioned above measures properties of the nucleus of the coin. Sensor (3) consists of two small inductors preferably of the pot-core type of 9 mm diameter, placed on either side of the coin path, connected in phase, that is the electromagnetic fields are added (mutual induction coefficient M>0), and being part of an oscillator 10, followed by a rectifier 11 and an amplifier and signal conditioner 12, the output of which is connected to multiplexor 23, in charge of commuting the different inputs to an analog-digital converter 24 which provides microprocessor (25) with the digital values equivalent to the analog values of the signals from electromagnetic sensors 3,4 and (2). In addition a direct connection is made from oscillator 10 to microprocessor (25) to analyse the frequency of oscillation, which also provides information on the characteristics of the coin.

[0037] In its path along ramp (1) the coin intercepts sensor (2) of ring (8) or outer part of the coin, consisting of two inductors mounted on either side of the coin passage and placed in the rolling track of the coin, so that the electromagnetic flux created between the inductors is intercepted as the coin passes mainly by its outer part (ring). As with sensor (3), the inductors must be small, 9mm diameter pot-core type inductors being advisable. In this case the sensor configuration should preferably be emitter-receiver. The emitter is fed by a square-signal generator 13 with a resistance 14 in series of a value substantially higher than that of the sensor (2) itself, the set behaving as a current generator modulated by a square signal. To avoid parasitic oscillations it is advisable to introduce a R-C filter 15 in parallel with sensor (2). The signal delivered by the receiver of sensor (2) is entered into a current-voltage converter, at whose output is obtained a square signal of an amplitude proportional to the electromagnetic field transmitted between the emitting coil and the receiving one of sensor (2). To avoid unwanted peturbations, the signal is made to pass a band-pass filter 15. The filtered signal is suitably amplified in amplifier 18 and then rectified in stage 19. The output is sent to multiplexor 23 to be analysed by microprocessor (25) and electromagnetic sensor (3).

[0038] Depending on the diameter of the coin, in its path along ramp (1) it may intercept second optical sensor (7) simultaneously with other sensors as seen in figures 2 an 3. This is not inconvenient, since direct inputs have been made to microprocessors (25) to analyse all signal even if they are simultaneous. Thanks to this property, when the coin enters the area of influence of the third electromagnetic sensor (4) and lies in the position shown in figure 3, measurements can be taken related to coin diameter (sensor no. 7) and the ring of the coin, measuring, at the time when sensor (6) is open, the amplitude of electromagnetic sensor (4). This measurement, as explained before, is characteristic of another property of the coin ring.

[0039] Electromagnetic sensor (4) is built similarly to sensor (3) described above, with the difference that the coils are preferably connected in opposing phase (mutual induction coefficient M<0), to thus obtain a new distinguishing characteristic of the coin. This sensor can also be built with pot-core type inductors of 9 mm diameter, mounted at a height above the rolling track identical to that of sensor (3), so that the nucleus of the coin under study is analysed. Sensor (4) is part of an oscillating circuit 20 which oscillates freely. This oscillation is affected by the presence of the coin both in its frequency of oscillation and in the amplitude of these oscillations. The oscillation signal is rectified in block 21 and is amplified and filtered suitably in block 22 before applying it to multiplexor 23 for analysis jointly with other signals by microprocessor (25). In addition a direct connection has been made from oscillator 20 to microprocessor (25) to analyse the oscillation frequency, which also gives information on the characteristics of the coin.

[0040] Microprocessor (25) analyses the signals it receives from the electromagnetic and optical sensors and processes them according to a function program which may reside indifferently in an internal memory of the microprocessor or in an external one 26, which also stores the parameters representative of admissible coins. Once the coin is measured and the representative parameters have been calculated for each of the sensors, microprocessor (25) compares these parameters with those characteristic of admissible coins, stored in memory 26. If the coin is accepted it is allowed in through a acceptance trapdoor, not shown, through outlet block 28, controlling by other sensors not shown and by input block 27 that it is correctly admitted, avoiding possible fraud. When the coin is admitted, a code is sent from output block 28 identifying the type of coin. Admission may be restricted by external conditions (inhibitors, commands from the vending machine, etc.) these signals being received in block 27.

Claims

1. Procedure for identification of metal discs, particularly applicable to identification of coins consisting

of a nucleus and a crown of different compositions, by obtaining properties relating to the identification of the nature of the coin crown and nucleus, as the coin passes a track along which electromagnetic sensors are placed, characterised in that it includes a combination of obtaining and measuring peak P_1 of the electric- signal produced as crown (8) of coin (5) passes a first electromagnetic sensor (2) of the emitter-receiver type sensitive to the coin crown, representing a first characteristic of said ring (8); detection and measurement of the value P_2 of the electrical signal produced as the coin nucleus (9) passes a second electromagnetic sensor (3) of the self-oscillating type, consisting of two coupled inductors arranged on either side of the coin passage track and in a perpendicular line from the centre of the first sensor (2) to the rolling ramp (1), at the same time as peak P_1 of the aforementioned signal is detected, representing a first characteristic of the nucleus (9) of the coin.

2. Procedure as claimed in claim 1, characterised in that it also consists of the measurement of the value of peak P5 of the electrical signal produced when coin nucleus (9) passes a third electromagnetic sensor (4) of the self-oscillating type, independent from the other electromagnetic sensors (2 and 3) mentioned above, which is provided with two coupled inductors placed at either side of the passing track of the coins, representative of a second characteristic of said nucleus.

3. Procedure as claimed in claim 2, characterised in that it also includes measurement of value (V5) of the electrical signal produced as coin crown (8) passes the third electromagnetic sensor (4) at a given time.

4. Procedure as claimed in claim 1, characterised in that a measurement is made of the oscillation frequencies of the electromagnetic sensors (3 and 4), having independent oscillators, as the coin passes, to obtain a additional parameter related to each of the measurements of electrical signal amplitude provided by said sensors.

5. Device for the identification of metallic discs, particularly for the identification of coins consisting of a nucleus and a crown of different composition, by electromagnetic sensors placed in a section of the coin path characterised in that it comprises a combination of a first and second electromagnetic sensors (2 and 3) aligned perpendicularly to the rolling track (1) of coins (5) and placed so that one intercepts only the crown (8) of the coin s and the other intercepts the nucleus (9) and the crown (8); each sensor consisting of two coupled inductors placed on either side of the passing track of the coins, the first having an emitter-receiver configuration and the second sensor self-oscillating.

6. Device as claimed in claim 5, characterised in that the first electromagnetic sensor (2) consists of two pot-core type inductors one being the emitter and the other the receiver, the operation frequency chosen so that the pass of the coins causes an increase in the signal when the coin begins to interfere with the field created between the emitter and the receiver, this increase being a function of the conductivity of the outermost part of the coin.

7. Device as claimed in claim 6, characterised in that the first electromagnetic sensor (2) consists f two pot-core type inductors connected to an oscillator and operating in the self-oscillation configuration.

8. Device as claimed in claim 5, characterised in that the first electromagnetic sensor (2) is placed under the second electromagnetic sensor (3) preferably partially intercepting the rolling ramp, so that it is especially sensitive to the crown or outer part of the coins.

9. Device as claimed in claim 5, characterised in that the first electromagnetic sensor (2) is placed above the second electromagnetic sensor (3) so that it is especially sensitive to the crown or outer part of the coins within a certain range of diameters and crowns.

10. Device as in claim 5, characterised in that it also includes a third electromagnetic sensor (4) separated from the second electromagnetic sensor (3) mentioned above along the coin path and at the same height as it from the rolling track.

11. Device as claimed in claim 5 characterised in that it also comprises two optical sensors (6 and 7) placed at the same height from the rolling track and arranged preferably at either side of the second electromagnetic sensor (3).

12. Device as claimed in claim 6, characterised in that the emitter of the first electromagnetic sensor (2) is fed by a current generator modulated by a fixed frequency square signal and the receiver of this same sensor is connected to a current-voltage converter, whose output is connected to stages consisting of a band-pass filter, amplifier and rectifier.

13. Device as claimed in claim 10, characterised in that the second electromagnetic sensor (3) and the third electromagnetic sensor (4) are placed on the walls of the coin measuring channel so that they are well centred with the coin nucleus, providing two independent characteristics of the nucleus or inner of

the coins.

14. Device as claimed in claim 10, characterised in that both the second electromagnetic sensor (3) and the third electromagnetic sensor (4) are preferably built with pot-core inductors of a size smaller than that of the smallest nucleus of the coins to be discriminated, connecting the inductors of each sensor to independent oscillators, so that two independent measurements are made of the coin nucleus.

15. Device as claimed in claim 14, characterised in that in one sensor (3) the inductors are connected in phase, while in the other sensor (4) they are preferably connected in opposite phase.

16. Device as claimed in claim 14, characterised in that the self-oscillation configuration is used for both sensors, the oscillation frequency depending on the characteristics of the inductors and the properties of the coin.

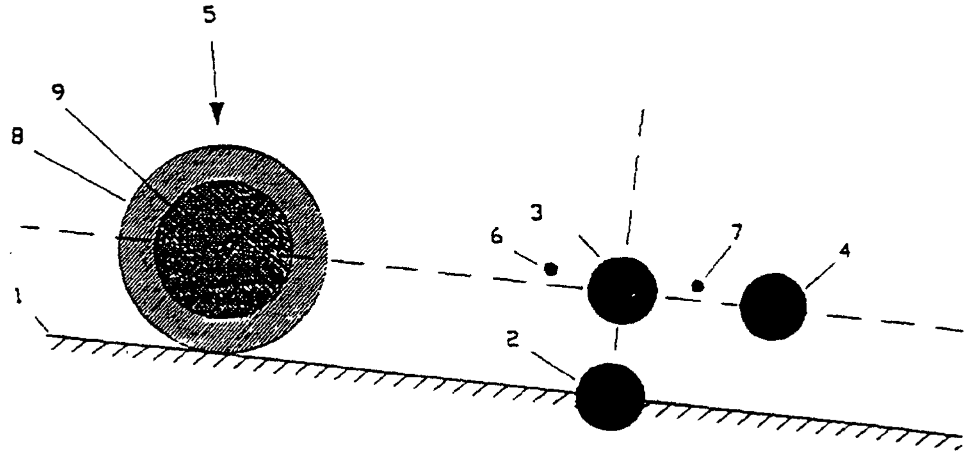


FIG.1

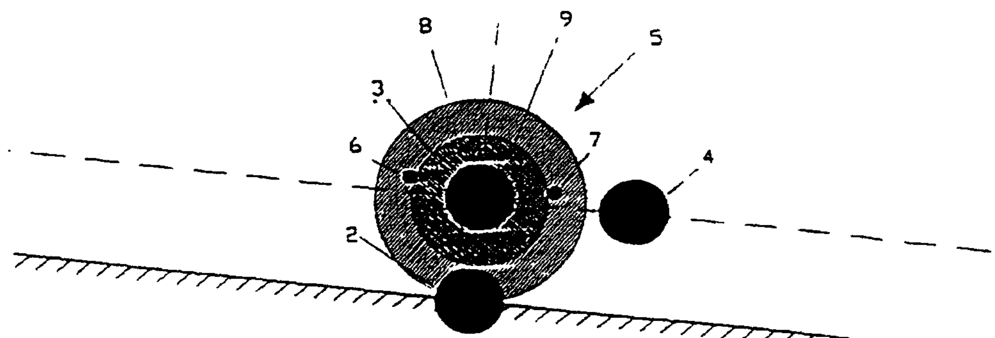


FIG.2

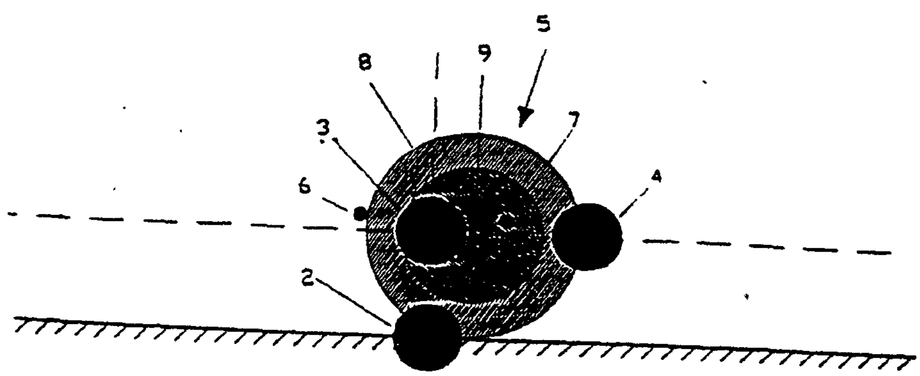


FIG.3

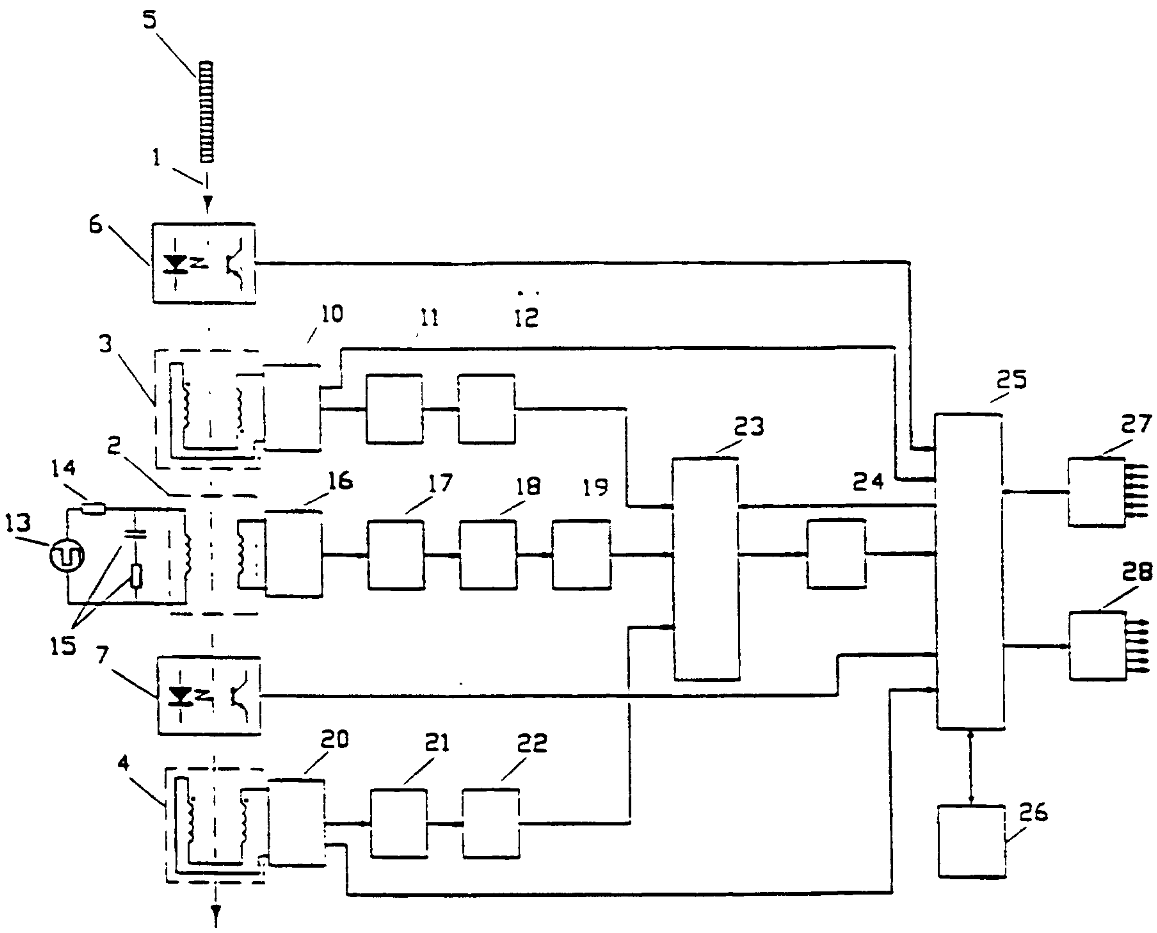
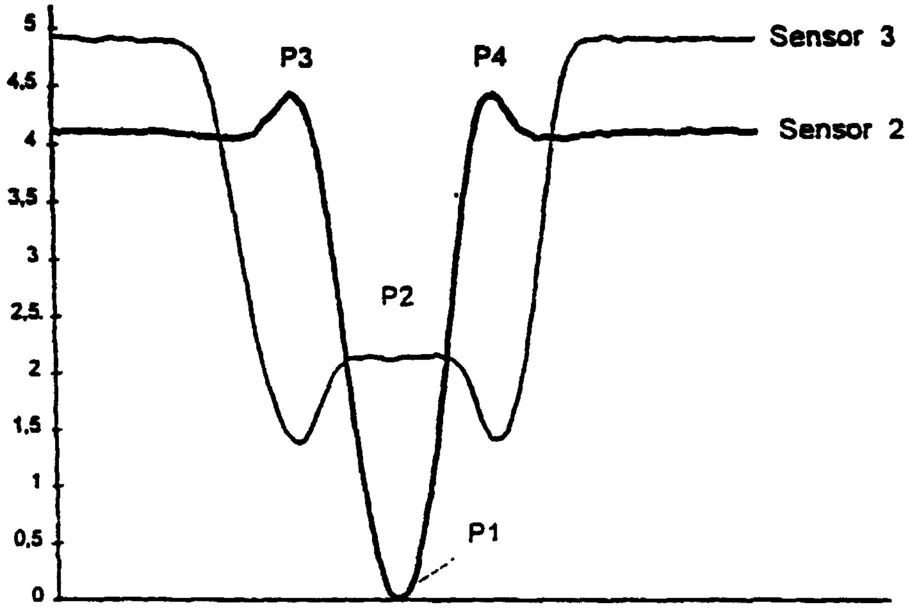


FIG.4


5
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4
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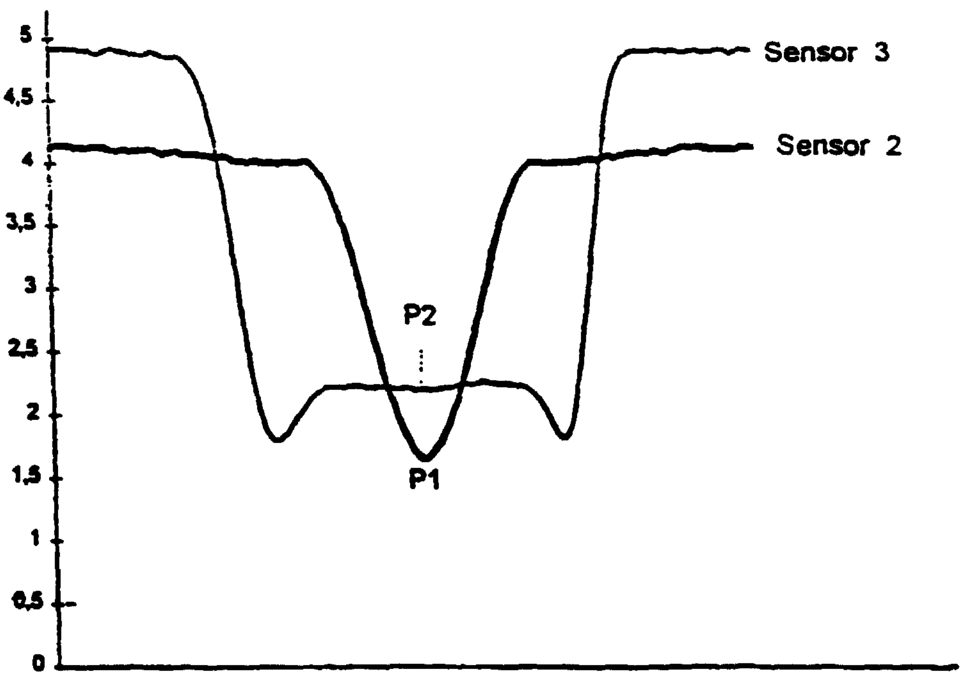
0
P3
P4
P2
P1
Sensor 3
Sensor 2

FIG. 5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Sensor 3
Sensor 2

FIG. 6

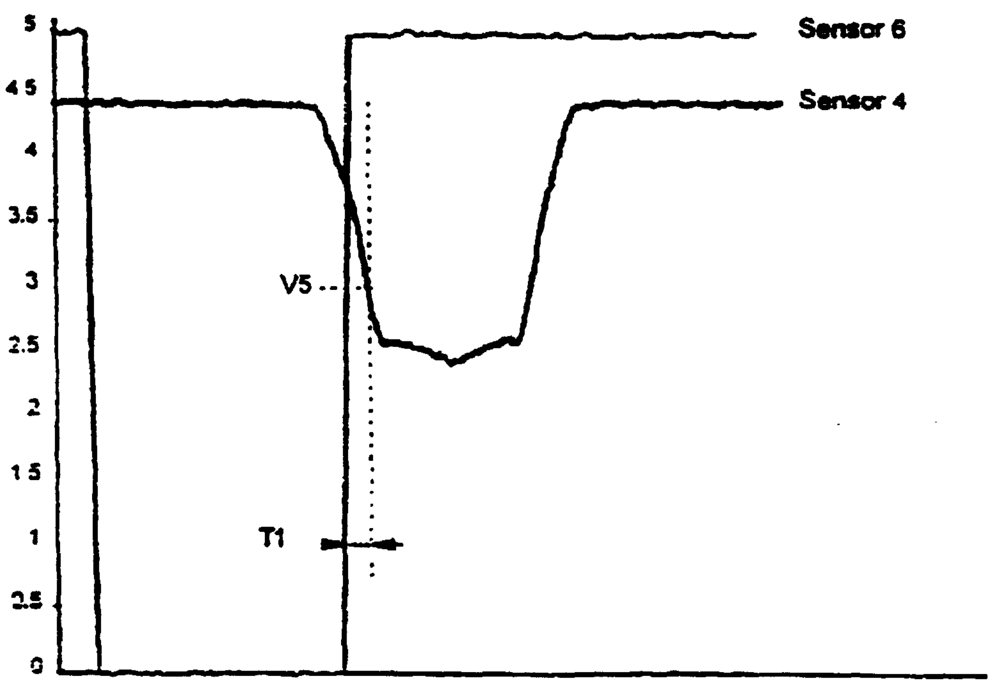

FIG. 7

INTERNATIONAL SEARCH REPORT

International Application No
PCT/ES 98/00236

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 G07F3/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 G07F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category°	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 91 15003 A (DUNCAN IND PARKING CONTROL SYS) 3 October 1991 see page 15, line 12 - line 27 see page 28, line 4 - page 29, line 11 see page 35, line 21 - page 36, line 28 see page 42 see page 48, line 15 - page 49, line 23 see figures 11,14,18,24 ---	1,8,9,11
A	EP 0 710 933 A (COIN ACCEPTORS INC) 8 May 1996 see column 3, line 4 - column 4, line 6 see abstract see column 5, line 20 - line 42 see figures 2,3 --- -/--	1,3,6,7, 11,13,14

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
13 November 1998	09.12.98

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European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Bocage, S

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INTERNATIONAL SEARCH REPORT

International Application No
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