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(54) **Device and procedure for verification of coins**

(57) Device for obtaining physicomachanical characteristics of a coin (5) for its verification, particularly intended to be mounted in a selector, the selector comprising a casing which defines a rolling track (4) for the coin to be verified, in which track is located an impact element (6) which has a initial idle position in which said impact element is at least partially introduced in said track, so the coin strikes said impact element in its journey along the rolling track. The device comprises at least a first sensor (10) of an acoustic wave produced by the coin striking the impact element, which comprises means of conversion of the acoustic wave into an electric signal. The impact element is mounted on the casing of the selector with freedom of movement according to at least a first direction and said impact element is configured in such a way that, after the strike, it returns to its initial idle position.

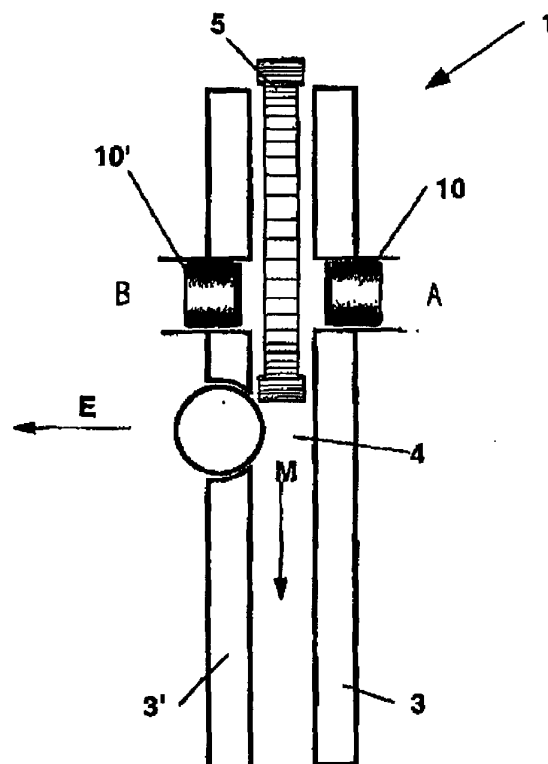


FIGURE 1

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Description

FIELD OF THE INVENTION

[0001] The present invention is included within the devices which check the validity of coins or of metallic tokens, or of disc-shaped elements in general. To distinguish coins of legal tender or valid tokens, from each other or from pertinent counterfeits, these devices determine different properties thereof, such as: their dimensions, electrical and electromagnetic properties, presence of minting impressions, weight, hardness, etc.

BACKGROUND OF THE INVENTION

[0002] At the moment, to determine the different properties of coins or metal tokens, use is made of all types of sensor (optical, electromagnetic, piezoresistive, etc.); the signals obtained from these sensors are processed by subsequent electronic procedures.

[0003] Of all these procedures, the most used are those that measure the dimensions of the coins by optical devices, and those that determine properties of the alloy related with the electrical conductivity and the magnetic permeability using one or several electromagnetic sensors.

[0004] A smaller number of inventions are known and described related with the measurement of mechanical properties of the coins such as their elasticity, hardness, weight or density which result of interest to detect counterfeits made from softer and less elastic materials like lead and tin, of which some counterfeits are made of. Also, it is of interest to detect the presence of blanks, that is, coins without minting and whose difference with the corresponding coin of legal tender is usually, besides the missing relief, a minimal difference in dimensions. Logically, the discrimination of these blanks based on the aforementioned properties of elasticity, hardness, density, and certainly of properties of an electromagnetic type proves practically impossible.

[0005] A quality of coins which results from the combination of their elasticity, dimensions and density (always assumed disc-shaped) is their sound on striking a certain medium, since the fundamental frequencies of the former depend in a known manner on the properties mentioned. The measurement of the sound would therefore make possible the discernment of coins, counterfeits and tokens which would be distinguished from each other by their elasticity, density, dimensions, or combinations of these three parameters.

[0006] Some patents are known and described in the state of the art which use the measurement of the sound as a variable for the discrimination of coins.

[0007] Thus, for example, in EP-0318229-A2 a procedure is described for the discrimination of coins based on the analysis of the sound emitted by the coins after impact on a hard surface or plate, using as sensor a microphone located in the proximity of the impact surface.

[0008] Also, in GB 2 200 778 A (EP 0 356 582 A1) the measurement is proposed of the characteristic resonant frequencies of coins, or other metallic pieces, when striking on an element of great volume and weight, and against which it is required that the coins collide always at the same point.

[0009] In EP O 360 506 a similar device is proposed in which the coin falls on a resistant element of great elasticity which leads to the coin vibrating and emitting sound. The information on the sound is combined with the information on the weight and dimensions obtained by other sensors to determine the validity thereof.

[0010] The patent EP 0766207 B1 concerns a procedure for identification of coins which uses the acoustic signal produced by the coin after colliding with a hard surface. The signal received by a microphone is applied to a bank of filters and is subsequently integrated by means of independent integrators for each one of the filters. The parameters which are obtained are related with the relative values between one and another band of said integration and their evolution over the time that the acoustic signal lasts.

[0011] However, the greatest limitation which all these procedures suffer is that, due to the mechanical position and disposition both of the impact element and, in some cases, of the microphones, the quality of the sound produced is not sufficient to extract the valuable information which the sound in question contains on the aforementioned properties of the coin. On occasions, it is even difficult to discern which is the sound produced by the coin itself on impact with the desired element from others produced by whatever of the elements with which the coin comes into contact, both inside and outside the discriminator, in all its rolling channel. Also, and since the impact element, typically the striking plate, is usually joined to the rest of the casing, the vibration induced by the impact on the striking plate is spread throughout said casing producing a sound which also can mask that of the coin itself.

[0012] Another problem common to most discrimination procedures which make use of sound, is that the measurement thereof is carried out under conditions in which the coin is not sufficiently stabilized, so that for example in EP O 360 506 it is required that the coin always strikes on the same point starting from the same initial conditions. Although each coin, or in general disc-shaped metallic piece, possesses some characteristic frequencies of vibration and therefore an emitted sound of perfectly defined characteristics, the intensity in the excitation and evolution in time in these modes of vibration depends on the form and intensity of the impact. This is why to achieve the least possible spread in the measurement of the sound, it is necessary that the impact of the coin take place under conditions in which the coins are as stabilized as possible.

[0013] Lastly, an aspect which has not been taken into account in any of the previous embodiments is the disposition of the microphone, and even the possibility of

using more than one of these elements. Given the dimensions of a coin selector, and more particularly of the channel down which the coins roll, the propagation and distortion aspects of the sound wave are important, whereby differences in the placement of the microphone of the order of 1 cm provide in short times appreciably different signals.

DESCRIPTION OF THE INVENTION

[0014] The invention relates to a device in accordance with claims 1 and 3 and to a selector in accordance with claim 10. Preferred embodiments of the device are defined in the dependent claims.

[0015] The fundamental limitations which the procedures described above suffer, are that the characteristics of the sound emitted by the coin depend, as well as on the mechanical and dimensional properties thereof, on the mechanical configuration of the selector, on the form and conditions in which the impact thereof takes place on the element mounted for the purpose of producing the sound and on the position of the microphone. Thus, the sound signal produced by the coin does not have sufficient regularity in the course of different insertions, and is also masked by sounds coming from the actual casing, striking plate, etc. As well as this, situations usually arise in which the sound analysed does not correspond to that of the desired impact between the coin and the element mounted for it, but instead has its origin in multiple other impacts produced over the course of the rolling channel of the coin.

[0016] For the purpose of resolving the aforementioned limitations, the present invention relates to a device for obtaining the physico-mechanical characteristics of a coin for its verification thereof, which is particularly intended to be mounted in a selector. This selector comprises a casing which defines a rolling track for the coin (or the coins) to be verified, in which track is located an impact element, which has an initial idle position in which said impact element is at least partially inserted in said track, so the coin strikes against said impact element in its journey along the rolling channel.

[0017] The device of the invention comprises at least a first sensor of an acoustic wave produced by the striking of the coin on the impact element, which comprises means of conversion of the acoustic wave into an electric signal.

[0018] The device of the invention is characterised in that the impact element is mounted on the casing of the selector with freedom of movement according to at least a first direction and in that said impact element is configured in such a way that, after the impact, it returns to its initial idle position. The device preferably also comprises at least a second sensor of an acoustic wave which like the first sensor of an acoustic wave, also comprises means of conversion of the acoustic wave into an electric signal, and means of joint analysis of the electric signals of said at least, first sensor and second sensor.

[0019] The invention also relates to a device for obtaining physico-mechanical characteristics of a coin for verification thereof, which is particularly intended to be mounted in a selector, the selector comprising a casing which defines a rolling track for the coin to be verified, an impact element being located in said track, so the coin strikes against said impact element in its journey along the rolling track. The device is characterised in that it comprises at least a first sensor and a second sensor of an acoustic wave produced by the striking of the coin on said impact element, each sensor comprising means of conversion of the acoustic wave into an electric signal, and means of joint analysis of said electric signals.

[0020] For the two devices to which the present invention refers, preferably the impact element has a hardness greater than the maximum hardness of a coin within a group of coins to be verified and in that its characteristic modes of vibration do not interfere with the characteristic modes of vibration of the coin to be verified.

[0021] That is, preferably the conditions that the impact element will fulfil, with respect to its geometry and material, are those that propitiate the generation of the greatest possible number of characteristic modes (frequencies) of the coin, that is, that the impact surface is minimum and that the hardness of its contact surface is very high, in any event greater than that of the coins or tokens to be characterised. Also, the characteristic modes of vibration of the element must be such that they do not interfere in any way with those of the coins to be examined. A possible and not restrictive embodiment of this element is constituted by a steel cylinder the major axis of which is located perpendicular to the direction in which the coin rolls.

[0022] Also preferably, said at least first sensor of an acoustic wave is located in any one of the lateral walls of the rolling track, and at a distance from the point of impact between the coin and the impact element, not greater than the diameter of the largest coin to be verified.

[0023] In the constitution of the device of the invention which comprises at least a first and a second sensor of an acoustic wave, preferably these are located in any one of the lateral walls of the rolling track, and at a distance from the point of impact between the coin and the impact element, not greater than the diameter of the largest coin to be verified.

[0024] More preferably, this at least, first sensor and second sensor consist of a microphone.

[0025] Preferably, the means of joint analysis comprise means of combining said electric signals and means of cancelling the electric signals common to said, at least, first sensor and second sensor.

[0026] Preferably, a kinematic or electric magnitude associated with the impact of the coin on the impact element is used as a useful reference to know the instant at which the vibrations and the sound of the coin to examine commences.

[0027] Another aspect of the present invention is to provide a coin selector which comprises an entrance for the coins and a casing which defines a rolling track for the coins, and characterised in that it comprises a device for obtaining physico-mechanical characteristics of a coin for its verification according to any one of the preferred embodiments which are defined in the foregoing.

[0028] For the devices described, the principle on which the present invention stands, is that the sound produced by the coin has its origin in the modes of vibration thereof and that these depend in a univocal manner on the geometric form and size thereof, on its elasticity and on its density. The manner in which these modes of vibration, and therefore the sound, are excited and evolve in time depend also on the form in which the impact takes place, and on the propagation medium. In the course of this description the word sound will be understood in an extensive way, including those signals propagated through the air be they audible or not to the human ear. Based on this principle, by means of the device of this invention, the following is achieved:

- Suppression of other sounds other than those emitted by the coin after the correct impact, which can be due to undesired impacts, both by the coin itself and by elements located in the rolling track in which the same rolls, or due to the vibrations after the impact of other elements of the selector itself.
- Cancellation, minimisation or compensation of the sounds other than those emitted by the coin after the correct impact by means of the use of at least two microphones mounted in the proximity of the coin and of the impact element and by means of an adequate signal acquisition and processing.
- Obtaining a sound as regular as possible for a given coin, improving the coin stability conditions when it impacts with the desired element.
- Accurate definition of the instant of impact on the element arranged for this and which gives rise to the sound of the coin under controlled conditions.
- Acquisition, and subsequent processing, of the information of the sound of the coin with good spatial and temporal resolution.

[0029] In this way signals are made available unpolluted by other factors which are not those that directly depend on the physicomachanical properties of the coins, which will permit small variations to be appreciated in any one of them: dimensions due to the minting, or elasticity and density due to the employment of other materials.

[0030] To achieve this end, and as has already been described above, in accordance with a preferred embodiment of the invention, the device of the invention comprises an impact element which, in contrast to other inventions described, is not firmly joined to the casing but is instead free, in a "floating" configuration, being able to move with respect to said casing at least in a

preferred direction. Said element has to project slightly into the rolling track so that when the coin strikes against it, it will move in the direction possible, allowing the subsequent passing of the coin, and thereafter returning to its idle position by means of some mechanism like, for example, some flexible metal strips or a coil type spring. The objective of this free disposition of the impact element is that of avoiding that the vibration produced therein by the coin spreads throughout the casing producing sounds which mask that desired. Moreover, this disposition greatly facilitates the determination of the precise instant at which the desired sound, and not another begins, using sensors of piezoelectric, optical, electric or other types which determine the movement, speed or acceleration of the impact element. The device described can have, in the event, any of these types of sensor.

[0031] The device of the invention comprises, also, at least one sensor of an acoustic wave, preferably a microphone which has to be located close to the impact element, at a distance not greater than the diameter of the largest coin to be examined, from the point of impact of the coin with the element. Therefore, this sensor of an acoustic wave will be close to the coin at the instant in which said impact takes place. After the impact, the sound wave produced by the coin is different over time on the two sides of the channel, whereby the sound picked up will also be so. For that reason the subsequent analysis of the signal, although containing the same information, has to be different.

[0032] In accordance with this invention, the sensor element, i.e. the microphone, can be located on either of the two sides of the channel and even on both if it is desired to use the information provided by them in a combined way. A microphone is understood to be any device which permits waves propagated in the air to be detected, be they audible to humans or not.

[0033] Besides this, and given the dimensions of the channel, small variations in the position of the microphone, even on a same side, suffer delays in the propagation of the sound which can be of the order of the period of some of the characteristic frequencies, to which is added the inherent movement of the coin while the sound signal lasts. Therefore, and for a same impact, evolutions can be observed in time that are different in microphones located very closely. The device of the invention also envisages the possibility of incorporating more than one microphone on a same side of the channel, since said sound has properties associated with each measurement point.

[0034] The availability of information from more than one microphone permits:

- On one hand, to emphasize the inherent information of the characteristic modes of vibration of the coin, through their different evolution with time perceived in each of these microphones
- To cancel or to compensate other undesired signals

which appear in a common manner in all of them like, for example, residual vibrations produced in the casing itself, sounds produced externally and which could confuse the device if they had frequencies close to those of the coins, sounds generated by the coin when rolling at points far from the detection area.

[0035] The use of more than one microphone can be specially useful when, due to limitations of a mechanical type, it is not possible to have a totally free impact element. In this case the use of several microphones permit compensation, such as is the objective of this invention, of other sound signals not coming directly from the coin but from the casing.

[0036] Although the device described can be implemented in any point of the channel of the selector, best discrimination results are obtained when it is mounted in an area in which the movement of the coin is developing in a stable manner, since in this case the impact conditions are much more homogeneous for a given coin. Therefore, preferably, the impact element together with the microphone or microphones are arranged at the end of the coin rolling ramp.

[0037] A preferred embodiment of the invention would be that in which the element on which the coin impacts is located on one of the lateral walls of the rolling track, so the coin strikes on the edge of its rim, minimising the contact surface.

BRIEF DESCRIPTION OF THE DRAWINGS

[0038] Next a very brief description is given of a series of drawings which assist in a better understanding of the invention and which are related expressly with an embodiment of said invention which is presented as a non-restrictive example thereof.

Figure 1 shows a first embodiment of the device of the present invention with a free disposition of the impact element in the rolling track, located on one of the side walls of the channel; the instant immediately before impact of the coin is shown.

Figure 2 shows the same disposition and embodiment as figure 1, but in moments following the impact of the coin and with the free element displaced to permit the coin to pass.

Figure 3 shows a similar embodiment to that shown in figure 1, but using two microphones on each side of the casing.

Figure 4 shows the signals obtained with the assembly of Figure 1.

Figure 5 shows the signals that are obtained for the assembly of Figure 3.

Figure 6 shows the signal obtained as the difference between the two signals of Figure 4.

Figure 7 shows the signal obtained as the difference between the two signals of Figure 5.

DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

[0039] Figure 1 shows a possible embodiment of the device of the present invention in the event of the same incorporating one microphone 10 or two microphones 10, 10'.

[0040] In this figure 1 a portion 1 of a coin selector is shown, in which are seen, as elements known in a selector, the casing of the selector with its two lateral walls 3, 3' which define a rolling track 4 for the coins 5. In this case the device has two microphones 10, 10', one in each lateral wall, and an impact element 6 which is located in a free manner in one of the walls of the selector.

[0041] In accordance with the preferred embodiment described in figure 1, the impact element 6 is a cylindrical mass of steel.

[0042] In the position shown in this figure 1, the coin 5 has not yet struck the impact element 6.

[0043] The rolling direction of the coin has been shown schematically by means of the arrow M, and the direction of the movement of the impact element against which said coin strikes by means of the arrow E; by means of A and B, the mounting positions for one or two microphones are indicated.

[0044] After the impact, both the coin 5 and the impact element 6 will suffer a lateral displacement due to the reaction force as is shown in Figure 2. At this instant, the coin will begin to vibrate at its characteristic frequencies which will depend on its geometry, mass and modulus of elasticity. As is logical, the impact element will also vibrate and will emit an acoustic signal corresponding to its modes of vibration, however to avoid possible interference with the signals coming from the coins, the dimensions and materials are chosen so that they do not interfere in the frequency bands of interest of the coins. As a preferred embodiment, a resonant frequency is chosen for the impact element substantially greater than that of the coins to be validated, which can even be greater than that of the response of the microphone employed, whereby it is as if to all effects it was not present. This characteristic does not signify any limitation, since there is no problem in exceeding the resonant frequency of 70 kHz with a cylindrical mass of steel, whilst for the coins the frequencies of interest are below 35 kHz and the microphones used at the moment have a marked attenuation above 40 kHz.

[0045] In the case of using only one microphone and the element of free impact in at least one direction, as has been described previously, the election of the position "A" or "B" for the microphones is indifferent, since the behaviour is similar.

[0046] In the event that the impact element were not free, it would be convenient to choose position "A", since the vibrations conducted through the casing would arrive more attenuated at position "A" than at "B".

[0047] In Figure 4 the signals As and Bs are shown obtained by the microphones 10 and 10' in the positions

A and B, respectively, with the assembly shown in Figure 1. And in Figure 5 the signals As and Cs are shown obtained by the microphones 10 and 10" in the positions A and C, respectively, with the assembly shown in Figure 3.

[0048] If two microphones were mounted, one at "A" and another at "B", as the acoustic signal coming from the coin arrives approximately 180° out of phase at position "B" with respect to position "A", as may be appreciated in Figure 4, whilst other undesired signals like sounds due to the coin rolling or coming from other external sources, arrive in the main in phase, if a linear operation is carried out between the signals of both microphones, like for example the subtraction thereof, a noticeable improvement is achieved in the signal obtained from the coin with regard to noise.

[0049] In Figure 6 the signal As-Bs is shown obtained by subtraction between the signals provided by the microphones 10, 10' located in the positions "A" and "B", respectively, for a 2 Euro coin. In the case of incorporating two or more microphones, the preferred embodiment is shown in Figure 3, in which four positions "A", "B", "C" and "D" have been represented for the microphones 10, 10', 10", 10"', respectively. A preferred embodiment with two microphones has already been described in the previous section. Another preferred embodiment also with two microphones, is that corresponding to positions "A" and "C" or to "B" and "D", as is shown in Figure 4. In these two cases, the microphones are mounted preferably on a line parallel to the displacement of the coin. If one of them is mounted near the external edge of the coin and the other in a more centred position with the coin, always in relation with the point at which the coin comes into contact with the impact element, it has been verified that the two microphones provide different signals, as can be seen in Figure 5.

[0050] A difference which has been observed, during the time immediately after impact, consists in that the signal from the microphone near the edge of the coin boosts the lowest resonant frequency, whilst that which is located toward the centre of said coin is more sensitive to the higher resonant frequency modes. As in the previous case, a linear combination of the two signals is very effective for suppressing signals other than those emitted by the coin and moreover in the case of using the signals from the microphones mounted on the same side of the channel, fuller information will be obtained on the different resonant modes of the coin.

[0051] In Figure 7 the signal As-Cs can be seen obtained by subtraction between the signals provided by the microphones 10 and 10" corresponding to positions "A" and "C", respectively, for the 2 Euro coin.

[0052] The use of two microphones located on the same wall of the coin passage, besides the reduction of noise, has the advantage of allowing the coin to be characterised in a brief interval of time and of space travelled by the coin. In the case of trying to make the same anal-

ysis with only one microphone, it is necessary to examine the vibrations of the coin over the time necessary for the coin to move in front of the microphone at least an equivalent distance to the separation between said microphones. At the typical rolling speed of a coin, about 30 cm/s and for a separation between the microphones of 1 cm, the time is 33 ms, excessive in coin selectors in which the coin acceptance or rejection gate is in the proximity of the sensors and therefore the time of analysis has to be decreased as much as possible.

[0053] As it is logical, besides the arrangements described, facing on both sides of the channel and adjacent on the same side of the channel, crossed positions are also possible, that is, "A" and "D" or "B" and "C", which can be useful depending on the specific device in which it is incorporated, especially on the space available in relation with other sensors or mechanisms present.

[0054] The assembly of three or four microphones in the locations described, would result in adding the characteristics or advantages explained in the different described embodiments.

[0055] The signals from two or more microphones can also be combined by means of non-linear processes, like correlation, for the purpose of obtaining a representative signal of the coin in course.

[0056] The individual signals from one or more microphones or that obtained by applying linear or non-linear procedures, will be processed according to known techniques for obtaining certain representative parameters of the coin in course, which subsequently will be compared with those representative of acceptable coins in order to determine its validity.

[0057] The signals will be analysed either by analogue procedures based on banks of filters, measuring energy in different bands and its evolution in time, detection of peak values, measurement of rms value, etc., or by digital signal processing, calculating values in the time domain starting from the sampled signal, such as maximums, minimums, inflection points, zero crossovers, envelope, and in the frequency domain other values such as: characteristic frequencies, damping constant, bandwidths. Typically this type of calculation will be carried out by means of a Digital Signal Processor (DSP).

[0058] For using these techniques, it is convenient to determine the time origin accurately or, in other words, the instant at which the coin collides with the impact element and the useful acoustic signal begins to be produced. As has been explained, the use of an impact element free in at least one axis, has the advantage of low transmission of vibrations to the rest of the selector after the impact of the coin. The microphone mounted in the proximity of the coin, receives a high signal level from the coin with respect to the noise generated, the precise determination of the instant of the impact being therefore very simple. Additionally use could also be made of an accelerometer firmly joined to the impact element to

determine said instant. In the case of not using a free mass as impact element, use can be made of a vibration sensor or two microphones, for which as already explained, a combination of the signals thereof greatly suppresses the noise, it being possible therefore to emphasize the sound coming from the coin with respect to the undesired noise.

[0059] As for the classification of the coin within the acceptable valid coins or rejection thereof, use can be made of any one of the known procedures, such as direct comparison with acceptable values, or the use of algorithms based on Neural Networks or on Fuzzy Logic.

Claims

1. Device for obtaining physicommechanical characteristics of a coin (5) for its verification, particularly intended to be mounted in a selector, the selector comprising a casing which defines a rolling track (4) for the coin to be verified,

- in which track is located an impact element (6) which has a initial idle position in which said impact element is at least partially introduced in said track, so the coin strikes said impact element in its journey along the rolling track,

the device comprising

- at least a first sensor (10) of an acoustic wave produced by the coin striking the impact element, which comprises means of conversion of the acoustic wave into an electric signal,

characterised in that

- the impact element is mounted on the casing of the selector with freedom of movement according to at least a first direction and **in that**
- said impact element is configured in such a way that, after the strike, it returns to its initial idle position.

2. Device according to claim 1, **characterised in that** the device comprises at least a second sensor (10') of an acoustic wave which comprises means of conversion of the acoustic wave into an electric signal, and means of joint analysis of the electric signals of said at least, first sensor and second sensor (10,10').

3. Device for obtaining physicommechanical characteristics of a coin for its verification, particularly intended to be mounted in a selector, the selector comprising a casing which defines a rolling track for the coin to be verified,

- in said track is located an impact element, so the coin strikes against said impact element on its journey along the rolling track,

characterised in that the device comprises

- at least a first sensor and a second sensor (10,10') of an acoustic wave produced by the coin striking said impact element, each sensor comprising means of conversion of the acoustic wave into an electric signal, and
- means of joint analysis of said electric signals.

4. Device according to any one of the previous claims, **characterised in that** the impact element possesses a hardness greater than the maximum hardness of a coin (5) within a group of coins to be verified and **in that** its characteristic modes of vibration do not interfere with the characteristic modes of vibration of the coin to be verified.

5. Device according to any one of the previous claims, **characterised in that** said at least first sensor of an acoustic wave is located in any of the lateral walls (3, 3') of the rolling track, and at a distance from the point of impact between the coin and the impact element, not greater than the diameter of the largest coin to be verified.

6. Device according to any one of claims 2-4, **characterised in that** said at least first and second sensors (10,10') of an acoustic wave are located in any of the lateral walls (3, 3') of the rolling track, and at a distance from the point of impact between the coin and the impact element, not greater than the diameter of the largest coin to be verified.

7. Device according to any one of claims 2-4 or 6, **characterised in that** said means of joint analysis comprise means of combining said electric signals and means of cancelling the electric signals common to said, at least, first sensor and second sensor.

8. Device according to any one of claims 2-4 or 6-7, **characterised in that** said at least, first sensor and second sensor comprise / consist of a microphone.

9. Device according to any one of the previous claims, **characterised in that** it employs as useful reference for knowing the starting time of the vibrations and of the sound of the coin to be examined, a kinematic or electric magnitude associated with the impact of the coin on the impact element.

10. Coin selector which comprises an entrance for the coins and a casing which defines a rolling track (4) for the coins, **characterised in that** it comprises a

device for obtaining physic-mechanical characteristics of a coin for its verification according to any one of claims 1-9.

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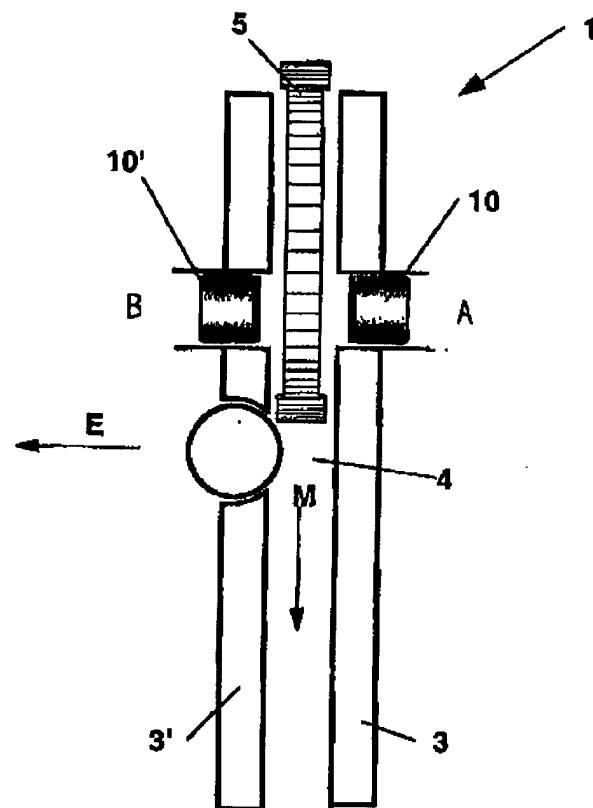


FIGURE 1

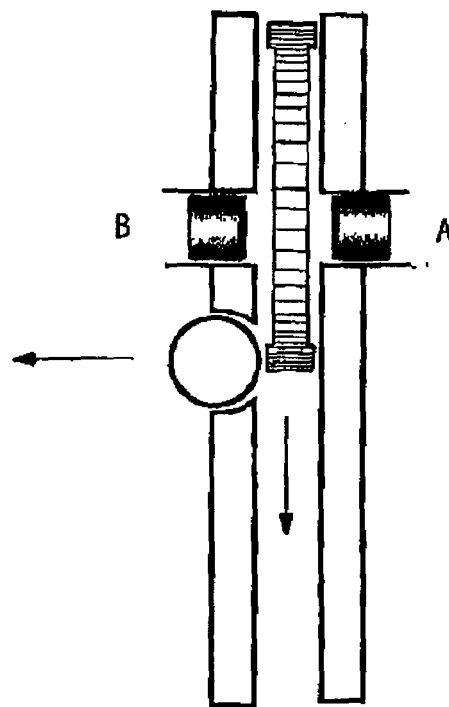


FIGURE 2

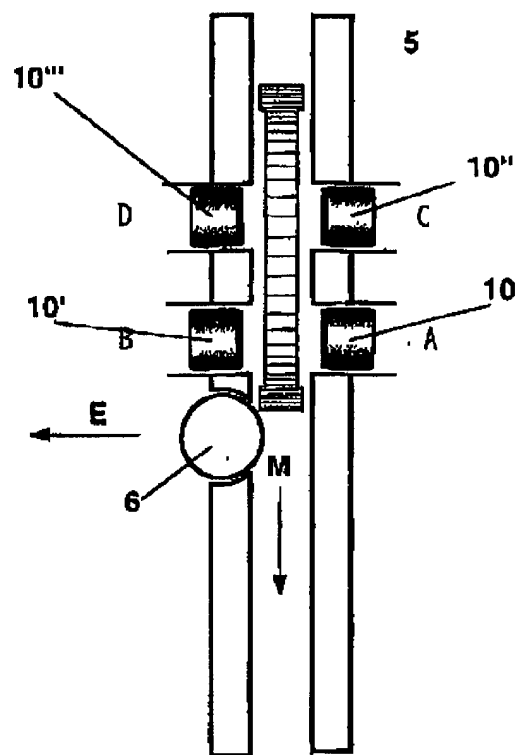


FIGURE 3

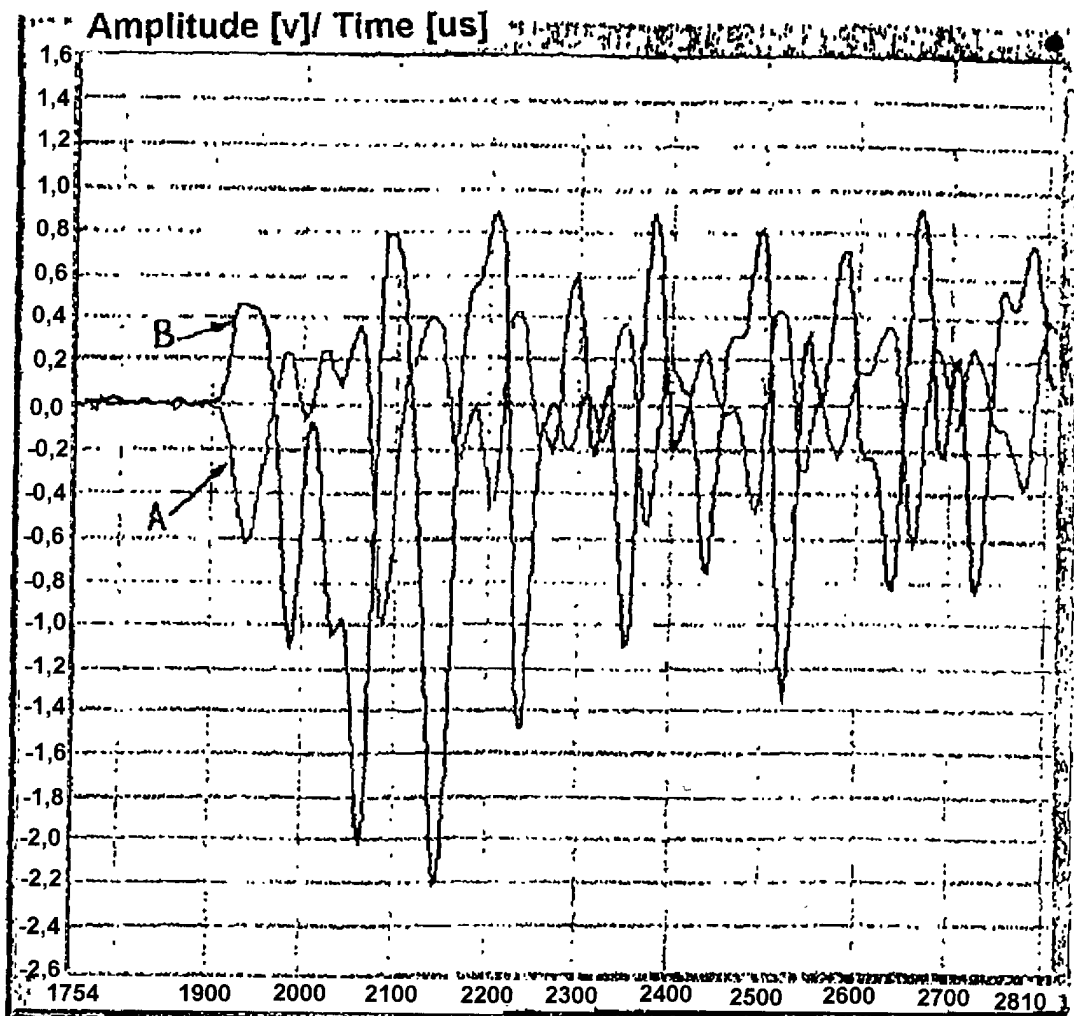


FIGURE 4

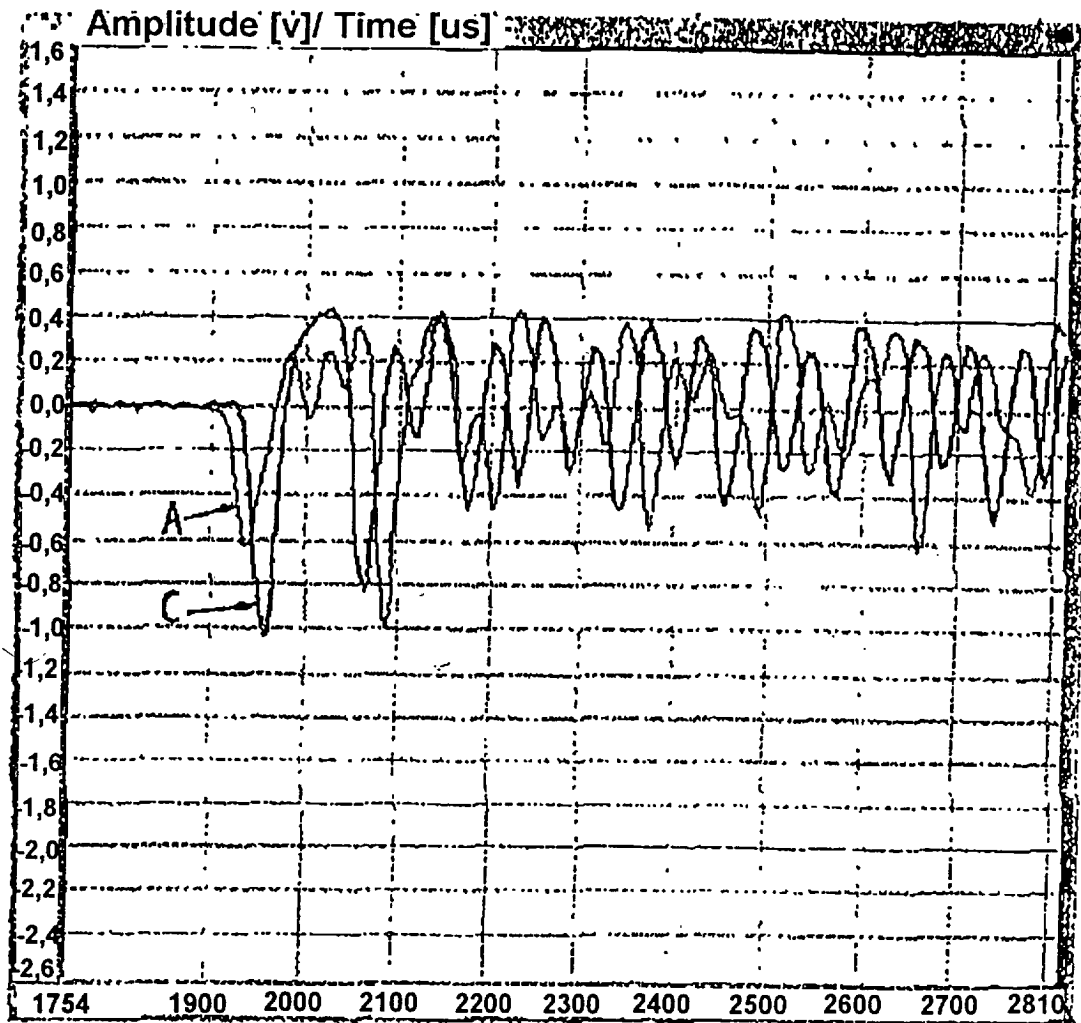


FIGURE 5

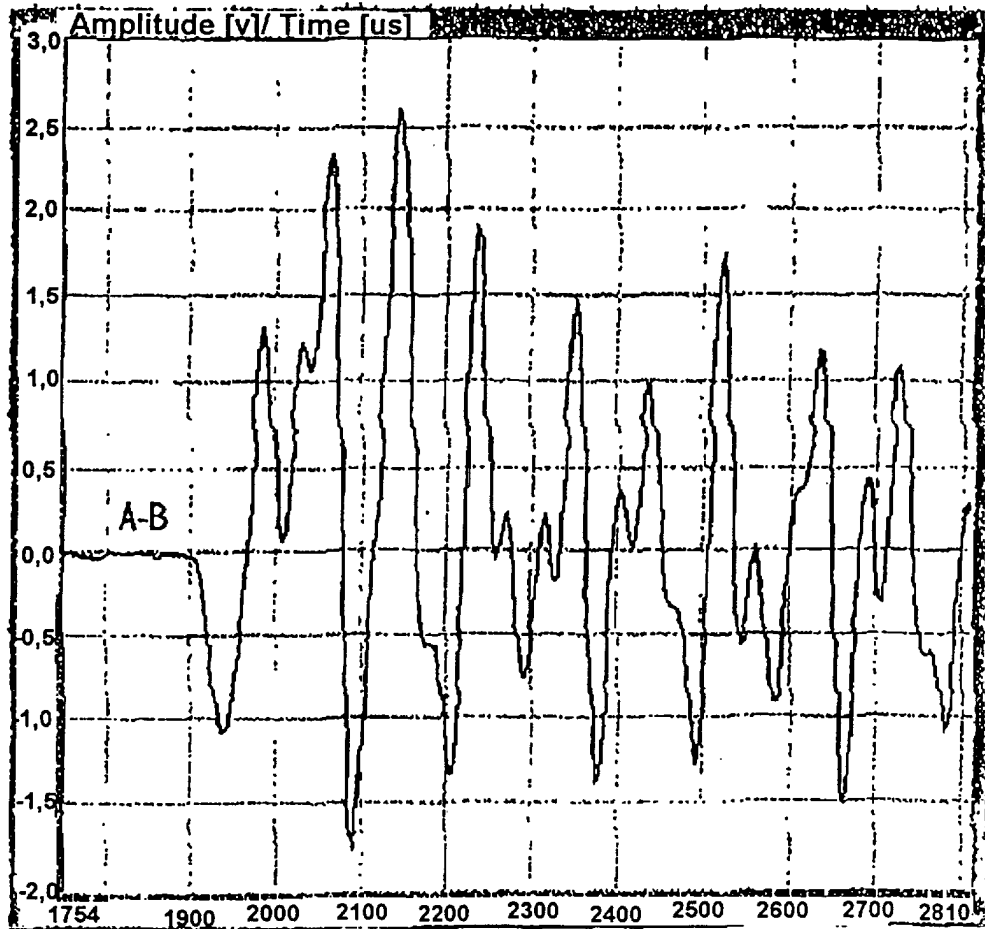


FIGURE 6

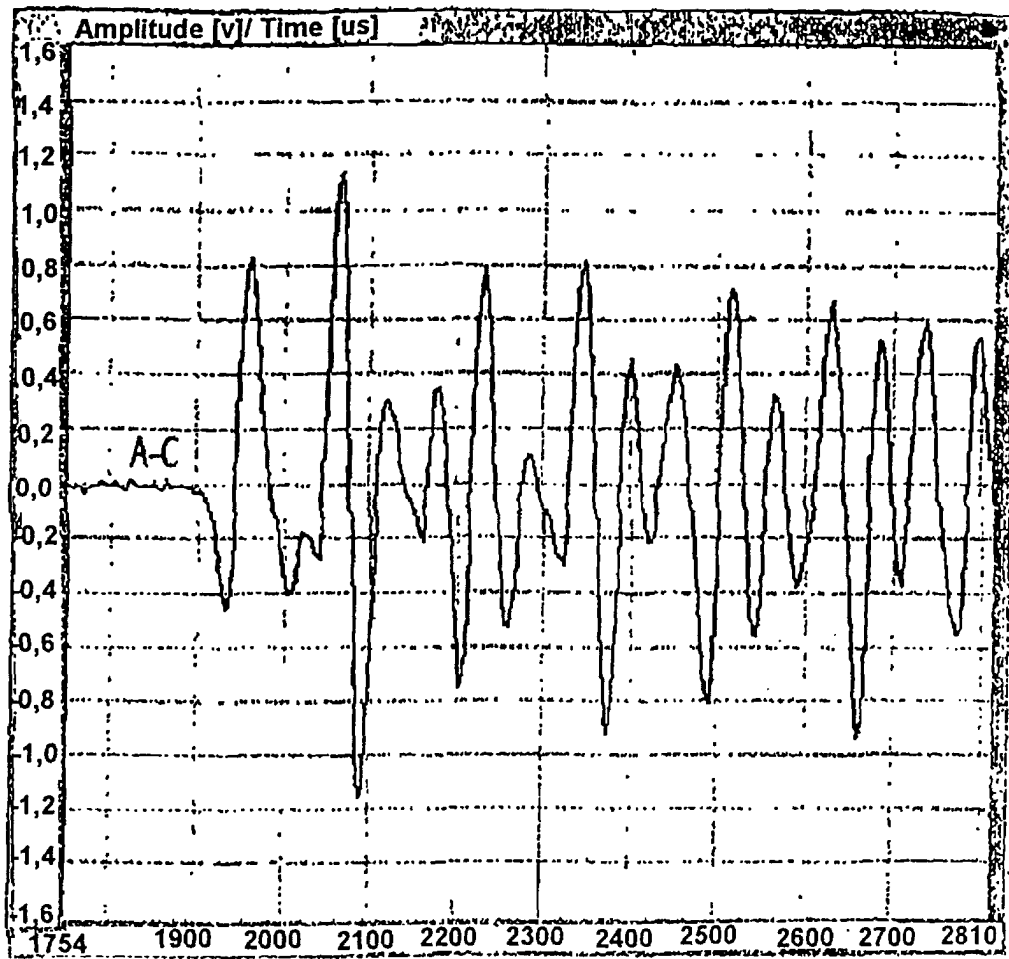


FIGURE 7