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[54] DISCRIMINATING DEVICE APPLICABLE FOR UNMANNED TICKET EXAMINATION, AUTOMATIC SLOT MACHINE AND THE LIKE

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[52] **U.S. Cl.** ..... **235/61.11 F**

[51] **Int. Cl.** **G06k 7/01**

[58] **Field of Search** ..... 235/61.11 R, 61.116, 61.12 R, 235/61.12 M, 61.7 B, 91.14, 61.6 R; 340/149 A, 174.1 G

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[57] **ABSTRACT**

A discriminating and identifying device which is simple in its structure and permits no forgery in the cases when said devices are utilized for unmanned ticket examination apparatus, automatic slot machines and the like, said device comprising a member to be discriminated, an electric oscillating circuit provided in said member, a passage adapted to pass said member therethrough, and at least one detecting means which is provided in the vicinity of said passage and which cooperates with said oscillating circuit so as to produce an electric signal adapted to operate an assorting mechanism included in said apparatus or machine.

3 Claims, 4 Drawing Figures

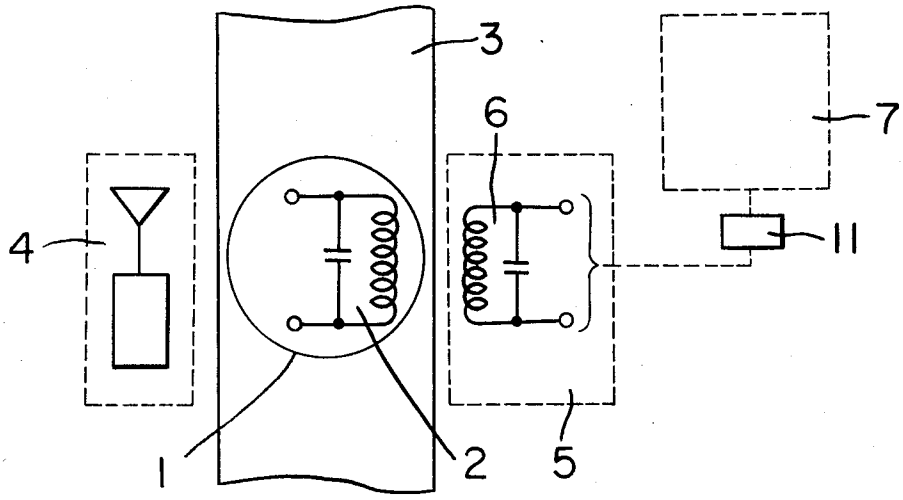

FIG. 1

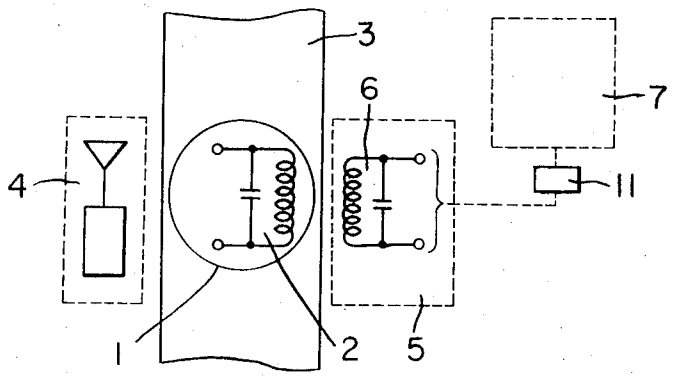

FIG. 2

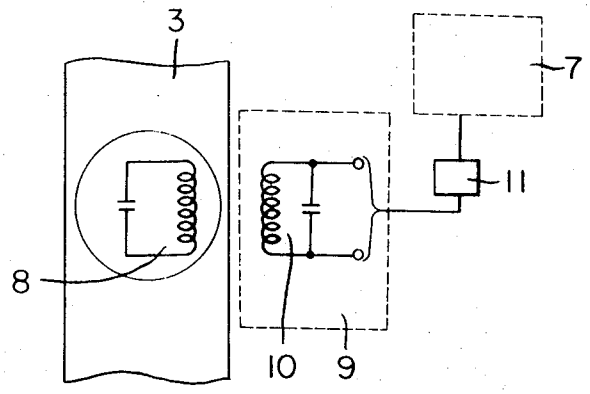

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FIG. 3

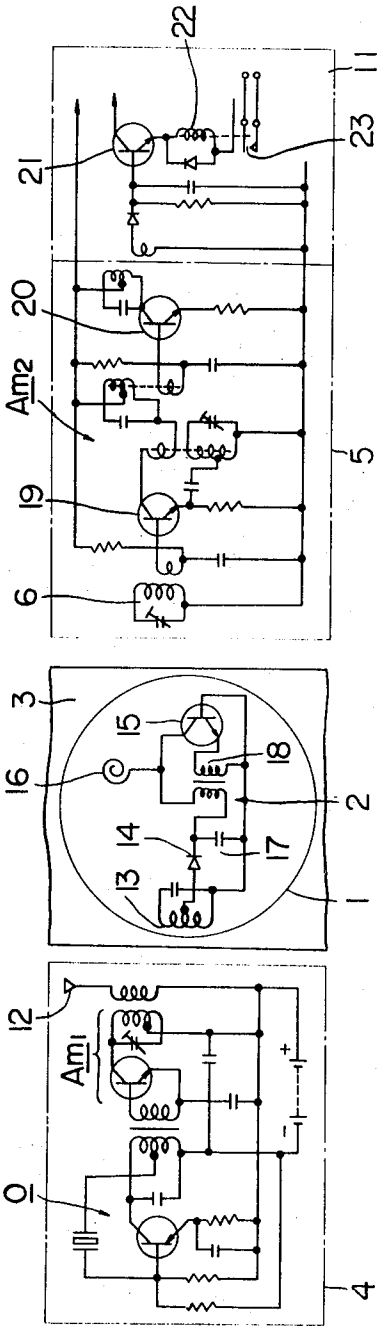
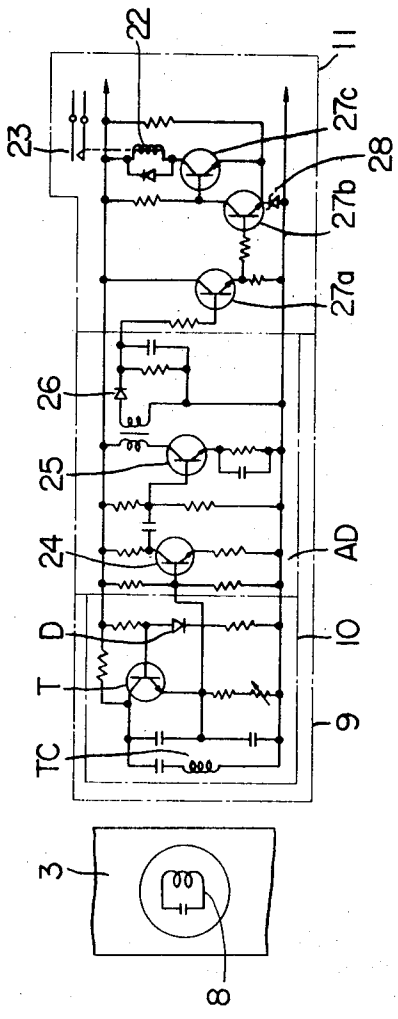


FIG. 4



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DISCRIMINATING DEVICE APPLICABLE FOR UNMANNED TICKET EXAMINATION, AUTOMATIC SLOT MACHINE AND THE LIKE

BACKGROUND OF THE INVENTION

Recently, unmanned ticket examining apparatus adapted to automatically discriminate and identify commutation tickets, and automatic slot machines capable of vending various goods by a token or card substituted for money and the like have been broadly utilized. Accordingly, there has been a great need for simple and effective discriminating devices, in which accurate discrimination can be surely attained to obviate forgery.

The present invention relates to discriminating devices capable of satisfying the above-mentioned requirements.

SUMMARY OF THE INVENTION

An essential object of the invention is to provide a discriminating device in which forgery is made surely impossible, discrimination and identification of various kinds can be easily attained, and operational response velocity is very fast.

The above and other objects of the invention have been attained by a device comprising a member to be identified, an electric oscillating circuit, provided in said member a passage adapted to pass said member therethrough and at least one detecting means which is provided in the vicinity of said passage and cooperates with said oscillating circuit so as to produce an electric signal adapted to operate an assorting mechanism included in an apparatus or a machine in which said discriminating device is utilized.

The foregoing objects, function, and characteristic features of the invention will become apparent by the description in conjunction with the accompanying drawings in which the same or equivalent members are designated by the same numerals.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic view showing an embodiment of the invention;

FIG. 2 is a schematic view for showing another embodiment of the invention;

FIG. 3 is a circuit diagram showing an actual example of the circuit of FIG. 1; and

FIG. 4 is a circuit diagram showing an actual example of the circuit of FIG. 2.

DETAILED DESCRIPTION OF THE INVENTION

The device illustrated in FIG. 1 comprises a member 1 to be discriminated which is provided therein with an electric oscillating circuit 2 capable of being oscillated by a particular electromagnetic wave radiated thereto, thereby to radiate another specific electromagnetic wave, said member being made to have any form such as a circular disc, a polygonal disc or the like by molding a material such as, for example, a synthetic resin; a passage 3 for passing said member 1 therethrough; a signal detecting circuit 5 and a transmitter 4 which are provided, respectively, at both sides of said passage 3, said detecting circuit 5 comprising a receiver circuit 6 adapted to receive said specific electromagnetic wave radiated from said oscillating circuit 2 and to convert its input electromagnetic wave to a particular electric signal; and a signal converter 11 adapted to convert output wave of said detecting circuit 5 to on a signal adapted to operate an assorting mechanism 7 included in an unmanned ticket examination apparatus, automatic slot machine or the like.

Operation of the embodiment of FIG. 1 will be described as follows.

When the member 1 is passed through the passage 3, the oscillating circuit 2 of the member 1 is operated by a particular predetermined electromagnetic wave radiated thereto from the transmitter 4, whereby another predetermined electromagnetic wave is radiated from the oscillating circuit 2 toward the signal detecting circuit 5 and the receiver circuit 6 of said circuit 5 operates and produces an electric signal which in turn causes operation of the assorting mechanism 7.

In the embodiment of FIG. 1, many kinds of discriminating devices can be obtained by previously varying frequency of the output wave of the transmitter 4 and output frequency of the oscillating circuit 2.

According to the embodiment of FIG. 1, there are advantages in that the assorting mechanism 7 cannot operate unless the three members 1, 4 and 5 are surely cooperated in a previously set manner, thus causing any impossibility of any forgery, various kinds of discrimination can be easily attained by various combinations of the operational signals of the members 1, 4 and the 5, and operational response velocity of the device is very fast.

The invention can be further embodied as illustrated in FIG. 2, in which the device comprises a member 1 to be discriminated which is provided therein with a tuning circuit 8, said member 1 being made in any suitable form as in the case of the device shown in FIG. 1 by molding a material such as a synthetic resin; a passage 3 adapted to pass said member 1 therethrough; a signal detector 9 provided in the vicinity of said passage 3 and comprising therein a tuning-oscillating circuit 10 the output of which will be attenuated by the circuit 8; a signal converter 11 adapted to convert the attentuation degree of the output voltage of said signal detector 9 into an electric signal adapted to operate an assorting mechanism 7. The converter 11 may be incorporated in the signal detector 9 or assorting mechanism 7.

In the embodiment of FIG. 2, if the tuning-oscillating circuit 10 and the tuning circuit 8 are designed so that when said member 1 passes through the passage 3 and approaches the signal detector 9, the tuning circuit 8 is bought into a resonant state with the oscillation frequency of the circuit 10 and oscillation voltage of the signal detector 9 is absorbed by the tuning circuit 8 of the member 1, whereby said oscillation voltage is attenuated degree of attenuation is converted to an electric signal in the signal converter 11 and the assorting mechanism 7 is operated by the output of the signal converter 11.

In the embodiment of FIG. 2 also, many kinds of discriminating devices can be obtained by varying the predetermined resonant frequency between the tuning circuit 8 and the circuit 10, and furthermore, since the device cannot operate unless the tuning circuit 8 and the oscillator 10 are accurately cooperated, forgery is impossible even by chance.

In the above-mentioned embodiments, the transmitter 4 for radiating an electromagnetic wave, oscillating circuits (2, 6, 10), tuning circuit 8, and converter 11 for converting a voltage attenuation degree into an electric signal are not shown in detail and merely shown by schematic views, because various known circuits for respective objects may be used as said circuits. However, actual examples corresponding to the embodiments shown in FIGS. 1 and 2 will be illustrated in FIGS. 3 and 4, respectively, as follows.

An actual example of the circuit shown in FIG. will be described in connection with FIG. 3. In FIG. 3, the transmitter 4 comprises an oscillator $\underline{0}$, an amplifier circuit $\underline{Am}_1$ for amplifying output of the oscillator $\underline{0}$, and an antenna 12; the oscillating circuit 2 in the member 1 comprises a tuning coil 13, a diode 14, a transistor 15, an antenna 16, a condenser 17 and a transformer 18; the signal detecting circuit 5 comprises a detecting circuit 6, an amplifier circuit $\underline{Am}_2$ comprising transistors 19, 20 and various circuit elements as shown; and the signal converter 11 comprises a wave detecting transistor 21, a relay coil 22 and a contact 23 operated by said coil 22 and connected with input side of the assorting mechanism 7 not shown. Referring to FIG. 3, output wave of the circuit including the coil 13 is rectified by the diode 14 and supplied to the circuit including the transistor 15 and output wave of the oscillating circuit 2 is radiated from the antenna 16. This radiated wave is detected by the circuit 6 and amplified by the amplifier circuit $\underline{Am}_2$ and then supplied to the signal converter 11, whereby the coil 22 is excited through the transistor 21

and the contact 23 is operated, thus causing operation of the assorting mechanism 7, not shown.

An actual example of the circuit shown in FIG. 2 will be described in connection with FIG. 4. In FIG. 4, the signal detector 9 comprises a tuning-oscillating circuit 10 and an amplifying-detecting circuit AD. The tuning-oscillating circuit 10 comprises a tuning circuit TC, a transistor T, a diode D and other elements forming the circuit and resonates with the tuning circuit 8 when the tuning circuit 8 passes through the position of said circuit 10. Output wave of said circuit 10 is detected and amplified by the amplifying-detecting circuit AD comprising transistors 24, 25, a diode 26 and other circuit elements forming the circuit, and output of said circuit AD is detected by a level detecting circuit 11 corresponding to the signal detecter 11 in the example of FIG. 3 and comprising transistors 27*a*, 27*b*, 27*c*, a relay coil 22, a diode 28, and other circuit elements forming the circuit. In the example of FIG. 4, upon resonance of the tuning circuit TC with the tuning circuit 8, an oscillation voltage is generated in the tuning-oscillating circuit 10, but said voltage attenuates. This attenuating voltage is amplified and detected by the amplifying-detecting circuit AD and then detected by the succeeding level detecting circuit 11, thus causing excitation of the coil 22. As in the case of the circuit shown in FIG. 3, upon excitation of the coil 22, a contact 23 is operated, thus causing operation of the assorting mechanism 7.

As a whole, according to the present invention, as clear from the description relating to the embodiments and examples shown in FIGS. 1, 2, 3 and 4, effective discriminating devices having very simple structure and permitting no forgery are obtained and therefore said devices can be effectively utilized for unmanned ticket examination apparatus, automatic slot machines and the like.

We claim:

1. An apparatus for unmanned token identification comprising in combination a token member to be identified which has therein a tuned electrical circuit, and a token-identifying device for identifying genuine tokens, in which said token-identifying device comprises: a passage adapted for allowing said token member to pass therethrough; a detecting means which is provided adjacent a detecting zone of the passage to cooperate with said tuned circuit to produce an electric signal; and means utilizing said signal, causing operation of a further means associated with the apparatus to actuate an assorting mechanism.

2. An apparatus as claimed in claim 1, which further includes: an electromagnetic wave transmitting unit adjacent said detecting zone for emitting a signal of a predetermined frequency which the said tuned circuit is to receive; and wherein said tuned circuit includes means to receive said predetermined frequency and emit electromagnetic waves of known output frequency; and wherein said detecting means includes a receiver-circuit which receives electromagnetic waves of said known output frequency and emits output signals, said signal utilizing means including a signal converter to receive said output signals and convert them to actuate an assorting mechanism.

3. An apparatus as claimed in claim 1 wherein said detecting means comprises an oscillator circuit having a frequency resonating with that of the tuned circuit of the token member whereby an output signal of the oscillator circuit is attenuated, and wherein said means utilizing the signal is adapted to utilize a degree of attenuation of the output signal of the oscillator circuit to actuate the assorting mechanism.

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