

Description

The present invention relates to a coin rejector device of a type utilizing proximity switches.

Such a coin rejector device utilizing proximity switches is disclosed in a Japanese Patent Application Publication No. 16,527/1971. The coin rejector device disclosed in the above Publication includes two proximity switches having detector coils in the form of generator or oscillator coils, respectively, each of which ceases its oscillation when the load impedance becomes lower than a predetermined value upon the approach of a coin to the detector coil and in which the oscillator of one of the proximity switches is preset to such an oscillation frequency that the load impedance upon the approach of the legal or acceptable coin to the detector coil becomes higher than any load impedance upon the approach of at least one of the illegal or unacceptable coins while the oscillator of the other proximity switch is preset to such an oscillation frequency that the load impedance upon the approach of the legal coin to the detector coil becomes lower than the load impedance upon the approach of other illegal coins except the above at least one illegal coin.

However, such a known coin rejector device has a disadvantage that it can not select the legal coin from an illegal coin modified by drilling a small hole or holes therethrough so as to provide the same load impedance as that by the legal coin. For example if an illegal brass coin has a small hole drilled therethrough, it provides the same impedance as that of the legal one-hundred yen nickel coin when the illegal brass coin approaches to the detector coil so that it could not prevent unfair use of such modified illegal coins.

In view of the foregoing, the object of the invention is to provide a coin rejector device employing two or more proximity switches having detector coils in the form of generator or oscillator coils, respectively, each of which generates an output when the load impedance becomes lower than a threshold value upon the approach of a coin to the detector coil and in which each of the threshold values is preset to an impedance which is higher than that provided upon the approach of the legal coin to the detector coil for improving the coin selecting precision and preventing the unfair use of illegal coin having a hole.

Further objects and advantages of the present invention will become apparent as the following description of an illustrative embodiment proceeds in which:

Fig. 1 is a diagrammatical sectional view showing an arrangement of detector coils of the coin rejector device according to the present invention;

Fig. 2 is a graph showing impedance performance curves of coins made of various material; and

Fig. 3 is a block schematic diagram of the coin rejector device according to the present invention.

Referring to Fig. 1 there is shown a coin detecting portion of the coin rejector device utilizing two proximity switches. It will be seen that detector coils 1 and 2 in the form of generator or oscillator coils, respectively, are fixedly arranged along a coin selecting passage 3 so that when a coin 4 inserted into the coin rejector device passes through the passage 3 in the direction as shown by an arrow, the impedance of each of the detector coils 1 and 2 is varied.

Referring to Fig. 2 there are shown impedance performance curves by illegal coins having the same diameter and thickness as that of the legal nickel coin and made of stainless steel (Su), iron (Fe), nickel silver (Ns), lead (Pb), and brass (Bs), while the impedance (Z) on the approach of the legal nickel coin to the detector is 1. The oscillation frequency (f) of the detector coil without the approach of the coin is indicated on the abscissa axis and the impedance (Z) upon the approach of the coin to the detector preset at the oscillation frequency (f) is indicated on the ordinate axis.

Referring to Fig. 2, it will be seen that when one proximity switch may be preset to detect that the impedance ($Z = 1$) by the legal nickel coin (C_n) is lower than the threshold value (Z_0), the legal nickel coin is detected out of the illegal coins. However, in this case, the threshold value (Z_0) at the oscillation frequency (f_0) is located in a narrow range between the upper limit (Z_A) and the lower limit ($Z = 1$) so that when the oscillation frequency (f) is preset to (f_0), it is necessary to provide that the coins pass through the passage constantly on the fixed pass line and resulted in that it is very difficult to form such a passage precisely so as to satisfy the above necessary condition.

According to the present invention, use is made of two proximity switches S_1 and S_2 and the oscillation frequency of the detector coils 1 and 2 of the proximity switches S_1 and S_2 in the form of oscillator coils are preset to f_1 and f_2 , respectively. Thus, when the impedance by the approach of the coin to the detector coil 1 is lower than the threshold value Z_1 , the proximity switch S_1 has an output which is transmitted to an AND circuit through a delay circuit D_1 . At this time, the legal nickel coin and the illegal coins made of brass, nickel silver and lead are detected. When the impedance by the approach of the coin to the second detector coil 2 is lower than the threshold value Z_2 , the proximity switch S_2 has then an output which is also transmitted to the AND circuit through a delay circuit D_2 . At this time, the legal nickel coin and the illegal coins made of iron and stainless steel are detected. Accordingly, the AND circuit has an output only when the inserted coin is the legal nickel coin.

The coin rejector device according to the present invention including two or more proximity switches each of which has an output when the impedance on the approach of the coin to the detector coil is lower than the threshold value and the threshold values being higher than the impedance on the approach of the legal coin to the

detector coils so that it is possible to make a large difference between the impedance by the legal coin and the threshold value as shown in Fig. 2 and thus to prevent the coin selecting precision from affecting by any change of the impedance caused from the change of conditions on the approach of the coin to the detector coil and hence the position of the coil relative to the detector coil and further prevent the unfair use of illegal coin with a hole.

Claims

1. A coin rejector device including first and second proximity switches (S_1 , S_2) each of which has a detector coil in the form of an oscillator coil and produces an output when impedance produced upon approach of a coin to the detector coil becomes lower than first and second threshold values (Z_1 , Z_2) thereof, said proximity switches being preset to first and second predetermined oscillator frequencies (f_1 , f_2), means for examining the output signals from the proximity switches (S_1 , S_2) as a test for coin acceptability, the outputs of said first and second proximity switches (S_1 , S_2) being input to an AND gate so that an output is produced from the AND gate only when the coin is legal or acceptable, characterised in that the oscillator of the first proximity switch (S_1) is preset to such oscillator frequency (f_1) that the impedance produced upon approach of the legal or acceptable coin and the impedance produced upon approach of at least one of first type non-acceptable coin becomes lower than said first threshold value (Z_1) while the oscillator of the second proximity switch (S_2) is preset to such oscillator frequency (f_2) that the impedance produced upon approach of the legal or acceptable coin and the impedance produced upon the approach of nonacceptable coins other than the said at least one first type becomes lower than said second threshold value (Z_2).

2. A device as claimed in Claim 1, wherein said legal or acceptable coin is a nickel one.

Patentansprüche

1. Münzabweisungsvorrichtung, enthaltend erste und zweite Annäherungsschalter (S_1 , S_2), von denen jeder eine Detektorspule in der Form einer Oszillatorschule aufweist, und einen Ausgang erzeugt, wenn die Impedanz, die bei Annäherung einer Münze an die Detektorspule erzeugt wird, niedriger ist, als erste und zweite Schwellenwerte (Z_1 , Z_2) derselben, wobei die Annäherungsschalter auf erste und zweite vorbestimmte Oszillatorfrequenzen (f_1 , f_2) eingestellt sind, Einrichtungen zum Prüfen der Ausgangssignale der Annäherungsschalter (S_1 , S_2) als ein Test für die Münz-akzeptabilität, wobei die Ausgänge der ersten und zweiten Annäherungsschalter (S_1 , S_2) einer UND-Schaltung eingegeben werden, sodaß ein Aus-

gang von der UND-Schaltung nur dann erzeugt wird, wenn die Münze echt oder akzeptabel ist, dadurch gekennzeichnet, daß der Oszillator des ersten Annäherungsschalters (S_1) auf eine solche Oszillatorfrequenz (f_1) voreingestellt ist, daß die bei Annäherung der echten oder akzeptablen Münze erzeugte Impedanz und die bei Annäherung wenigstens einer ersten Art nichtakzeptabler Münze erzeugte Impedanz niedriger wird, als der erste Schwellenwert (Z_1), während der Oszillator des zweiten Annäherungsschalters (S_2) auf eine solche Oszillatorfrequenz (f_2) voreingestellt ist, daß die bei Annäherung der echten oder akzeptablen Münze erzeugte Impedanz und die bei Annäherung von nichtakzeptablen Münzen anderer als der genannten wenigstens einen ersten Art erzeugte Impedanz niedriger wird, als der zweite Schwellenwert (Z_2).

2. Vorrichtung nach Anspruch 1, bei der die erste oder akzeptable Münze eine Nickelmünze ist.

Revendications

1. Dispositif de rejet de pièces de monnaie comportant des premier et second commutateurs de proximité (S_1 , S_2), chacun desquels ayant une bobine de détection sous forme d'une bobine oscillatrice et produisant une sortie quand l'impédance produite lors de l'approche d'une pièce de monnaie de la bobine de détection devient inférieure à des première et seconde valeurs de seuil (Z_1 , Z_2) de celle-ci, lesdits commutateurs de proximité étant pré réglés à des première et seconde fréquences (f_1 , f_2) d'oscillation prédéterminées, des moyens pour analyser les signaux de sortie des commutateurs de proximité (S_1 , S_2) sous forme d'un test d'acceptabilité des pièces de monnaie, les sorties desdits premier et second commutateurs de proximité (S_1 , S_2) étant reliées à une porte ET de sorte qu'une sortie est produite à partir de la porte ET seulement quand la pièce est légale ou acceptable, caractérisé en ce que l'oscillateur du premier commutateur de proximité (S_1) est pré réglé à une fréquence d'oscillation (f_1) telle que l'impédance produite lors de l'approche de la pièce légale ou acceptable et l'impédance produite lors de l'approche d'une pièce non acceptable d'au moins un premier type devient inférieure à ladite première valeur de seuil (Z_1) tandis que l'oscillateur du second commutateur de proximité (S_2) est pré réglé à une fréquence d'oscillation (f_2) telle que l'impédance produite lors de l'approche de la pièce légale ou acceptable et l'impédance produite lors de l'approche de pièces inacceptables autres que celles dudit premier type devient inférieure à ladite seconde valeur de seuil (Z_2).

2. Dispositif selon la revendication 1, dans lequel ladite pièce de monnaie légale ou acceptable est une pièce en nickel.



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detector coils so that it is possible to make a large difference between the impedance by the legal coin and the threshold value as shown in Fig. 2 and thus to prevent the coin selecting precision from affecting by any change of the impedance caused from the change of conditions on the approach of the coin to the detector coil and hence the position of the coil relative to the detector coil and further prevent the unfair use of illegal coin with a hole.

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