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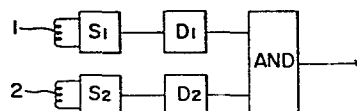
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54 Coin rejector device.

57 A coin rejector device includes two or more proximity switches having detector coils (1,2) in the form of generator or oscillator coils, respectively. Each of the detector coils (1,2) has an output when the impedance on the approach of the coin to the detector coil (1) is lower than a threshold value. The threshold values of the proximity switches are preset higher than the impedance on the approach of the legal coin to the detector coils (1, 2), respectively to improve the coin selecting precision and also prevent the unfair use of illegal coin with a drilled hole.

FIG. 3



COIN REJECTOR DEVICE

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 the 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 the threshold value 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 the 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 coin relative to the detector coil and further prevent the unfair use of illegal coin with a hole.

CLAIMS

1. A coin rejector device including two or more proximity switches having detector coils (1, 2) in the form of generator or oscillator coils, respectively, each of which has an output when the impedance on the approach of the coin to the detector coil (1) is lower than a threshold value and the threshold values of the proximity switches being preset higher than the impedance on the approach of the legal coin to the detector coils (1, 2), respectively.

2. A device as claimed in claim 1, use is made of two proximity switches.

3. A device as claimed in claim 1, said legal coin is nickel coin.

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FIG. 1

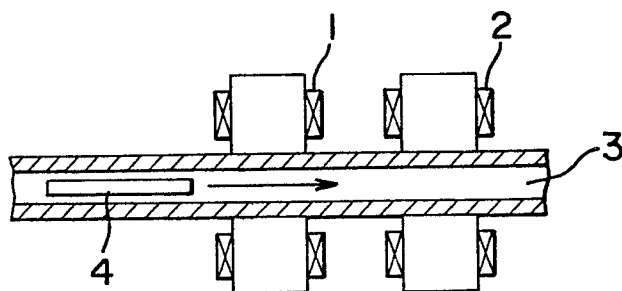


FIG. 2

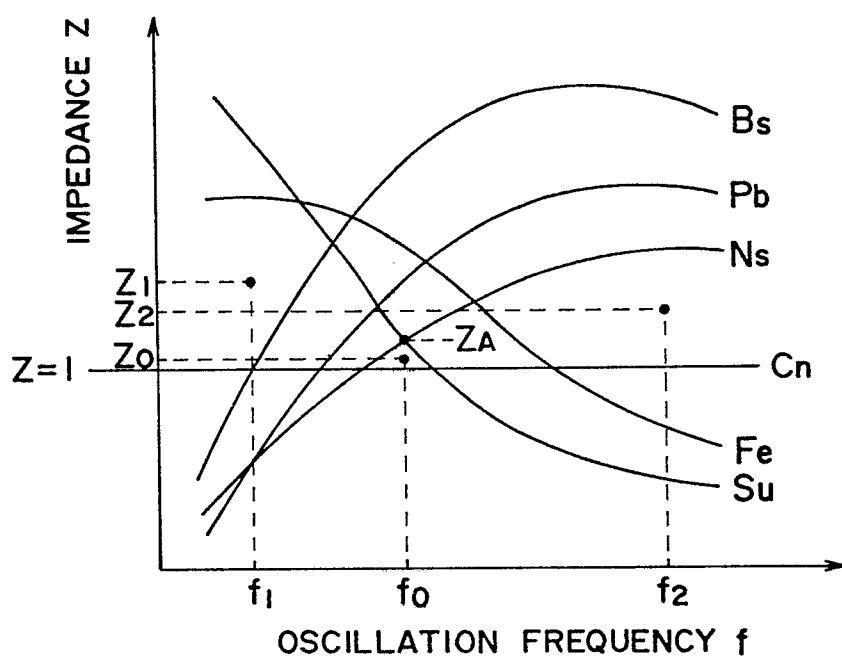


FIG. 3

