

Sept. 15, 1942.

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2,295,614

COIN ACTUATED DEVICE

Filed Oct. 1, 1941

FIG. 1

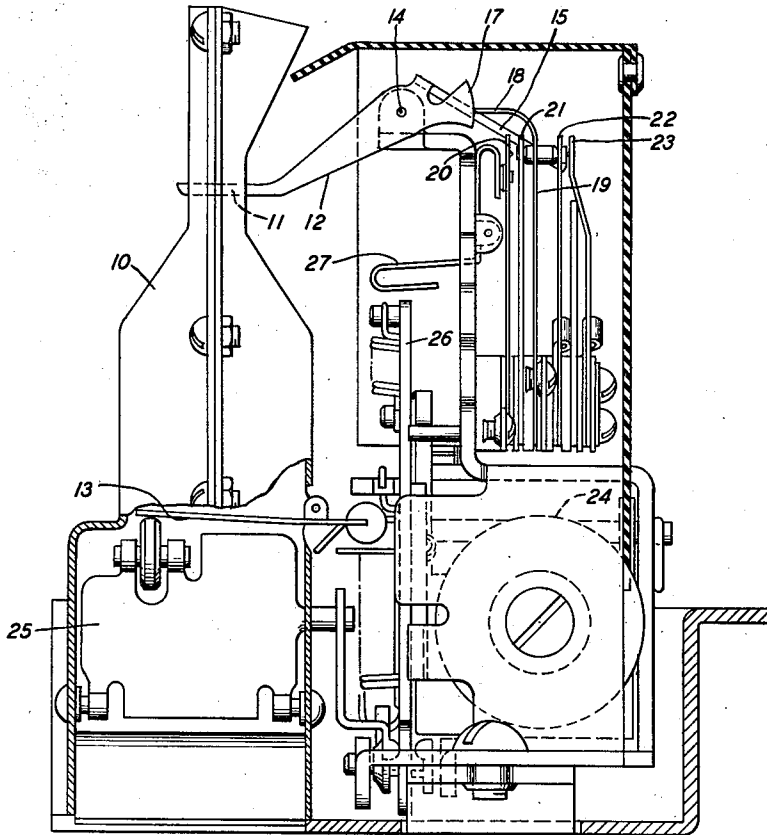


FIG. 2

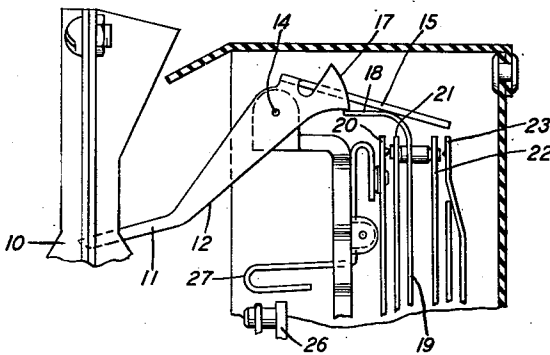
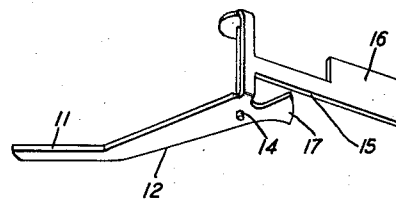


FIG. 3



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2,295,614

COIN ACTUATED DEVICE

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Application October 1, 1941, Serial No. 413,174

2 Claims. (Cl. 194-16)

This invention relates to coin actuated devices and particularly to a trigger for use therein. Its principal object is the provision of a trigger which is not subject to false operation from jarring.

It is common practice in coin actuated devices to employ a pivoted coin trigger which functions under the weight of a falling coin to operate an electrical switching device such as in my earlier United States Patent No. 2,218,609, issued October 22, 1940, where the trigger is provided with a shoulder which acts as a stop for a switch-controlling member. This member is so tensioned that it normally presses against the trigger shoulder but is free to move to a switch-closing position when the tripping of the trigger by a falling coin causes the shoulder to rotate out of the path of the member. It is also customary in such trigger arrangements to have the trigger over-balanced by a counterweight on the shoulder side of the pivot to bias the trigger to its normal position. In such devices it is desirable to make the moving parts light and free from friction in order that the energy stored up in the falling coin may be employed largely in overcoming the pressure on the shoulder by the switch-controlling member, but in attaining this end there is danger that the device will become sensitive to jarring and permit the false operation of the trigger without coin deposit.

In accordance with this invention the danger of false trigger operation by jarring is substantially reduced or eliminated by so forming the trigger that the distance from the pivoting axis of the trigger to the center of percussion for the trigger masses on the coin actuated side of the trigger is substantially equal to the distance from the pivoting axis to the center of percussion for the trigger masses on the counterweight side of the trigger. With such an arrangement and assuming a sudden upward blow on the trigger pivot resulting in a small upward movement of the pivot, both the coin actuated arm and the counterweight arm will simultaneously move upwardly the same distance without developing any turning moment about the trigger axis. However, if, for example, the counterweight arm has its center of percussion closer to the pivoting axis than the center of percussion for the coin actuated arm, the counterweight arm would respond more quickly to the assumed upward blow than the coin actuated arm thereby developing a turning moment about the trigger axis which in some instances might cause the trigger shoulder to free the switch-controlling member and cause a false closure of the coin relay contacts.

Referring to the drawing:

Fig. 1 is a side view partly in section of a coin disposal unit comprising a coin hopper and relay in which the coin trigger of this invention

is shown in its normal position and adapted to be actuated by a coin deposited in the hopper to permit the closure of certain contacts in circuit with the relay winding;

Fig. 2 illustrates the top portion of Fig. 1 with the trigger in its coin actuated position; and

Fig. 3 is a view in perspective of the coin trigger of Fig. 1.

For illustrative purposes the coin trigger of this invention is shown associated with a coin disposal unit of the type disclosed in my earlier United States Patent No. 2,218,609, issued October 22, 1940. The coins deposited in the collector are directed into a coin hopper 10 where they strike arm 11 of a trigger 12 before coming to rest on a coin trap 13 where the coins are held in suspense for subsequent collection or refund depending upon conditions occurring after coin deposit. The coin trigger 12 is shown in its normal position in Fig. 1, while in Fig. 2 the trigger is shown in the position taken by the trigger after it has been knocked downwardly by a falling coin.

As shown in Figs. 1 and 3, the trigger 12 is pivoted about a stationary pin 14 and to the right of the pivot it has an extension 15 of uniform thickness but with its outer end portion 16 of greater width than elsewhere. To the right of pin 14 is also a laterally extending shoulder 17 which is normally engaged by the horizontal tab 18 of a spring member 19 which is spring tensioned against shoulder 17. The counterweight 15 is sufficient to over-balance the trigger tending to cause a clockwise rotative movement but the trigger is normally held in its position of Fig. 1 due to the engagement of arm 11 with the upper end of a vertical slot (not shown) in hopper 10.

When the trigger arm 11 is struck by a falling coin, arm 11 is knocked downwardly to permit the passage of the coin whereby shoulder 17 is moved upwardly out of the path of the spring end 18 to permit spring 19 to move to the left from its position of Fig. 1 to its advanced position of Fig. 2 whereby a pair of normally open spring contacts 20, 21 are closed and a pair of normally closed spring contacts 22, 23 are opened. The opening of contacts 22, 23 may serve to remove a short circuit across the pulsing contacts of the calling dial while the closing of contacts 20, 21 may provide a connection to ground for the winding of coin relay 24 to enable the relay to be energized for coin collection or refund as the case may be. The coin trigger 12 is restrained from being restored to normal by reason of the fact that, as shown in Fig. 2, shoulder 17 is now resting on tab 18 thereby preventing trigger restoral. As described in my above-mentioned patent, the energization of relay 24 in attracting its armature not only moves vane 25

for the correct disposal of the coin but also elevates armature arm 26 to move angular member 27 clockwise, thereby moving springs 20, 21 and 19 to the right a distance sufficient to remove tab 18 from beneath shoulder 17 and permitting trigger 12 to be restored from its actuated position of Fig. 2 to its normal position of Fig. 1 by reason of its over-balanced counterweight 15.

As previously stated, attempts may be occasionally made to produce a false tripping of the trigger by a series of blows delivered on the bottom of the collector housing, each blow tending to move the trigger axis upwardly in a vertical plane. The coin trigger construction of the present invention substantially prevents the possibility that such blows will be able to move shoulder 17 upwardly out of the path of spring tab 18.

In accordance with this invention, the trigger is so dimensioned that the distance from the pivoting axis 14 to the center of percussion for the trigger masses on the coin actuated side 11 of the trigger is substantially equal to the distance from pivoting axis 14 to the center of percussion for the trigger masses on the counterweight side 15 of the trigger. The following analysis will be of aid in determining how to proceed in obtaining such an equality, and in the following discussion the counterweight side 15 of the trigger will be called the "right" side and the coin actuated side 11 of the trigger will be called the "left" side.

Let it be assumed that on the right side of axis 14 the trigger is equivalent to three concentrated masses W_1 , W_2 and W_3 located at distances R_1 , R_2 and R_3 , respectively, from the pivoting axis so that the moment of inertia, I_c for the right side of the trigger is given by the expression:

$$I_c = W_1 R_1^2 + W_2 R_2^2 + W_3 R_3^2 \quad (1)$$

It also follows that X_c the distance from the pivoting axis of the trigger to the center of gravity of all bodies on the right side of the pivot will be given by the expression:

$$X_c = \frac{W_1 R_1 + W_2 R_2 + W_3 R_3}{W_1 + W_2 + W_3} \quad (2)$$

By definition the distance L_c from the pivoting axis to the center of percussion for the trigger masses on the right-hand side of the trigger will be given by the expression:

$$L_c = \frac{I_c}{(W_1 + W_2 + W_3) X_c} \quad (3)$$

Similarly we may assume that on the left side of the pivoting axis the trigger is equivalent to two concentrated masses W_4 and W_5 located at distances R_4 and R_5 , respectively, from the pivoting axis 14 so that the moment of inertia I_t for the left side of the trigger would be given by the expression:

$$I_t = W_4 R_4^2 + W_5 R_5^2 \quad (4)$$

The distance X_t from the pivoting axis to the center of gravity of all bodies on the left side of the pivot will be:

$$X_t = \frac{W_4 R_4 + W_5 R_5}{W_4 + W_5} \quad (5)$$

The distance L_t from the pivoting axis to the center of percussion for the masses on the left side of the trigger will be:

$$L_t = \frac{I_t}{(W_4 + W_5) X_t} \quad (6)$$

In accordance with this invention, the value of L_c is made substantially equal to the value for L_t and when the trigger is so dimensioned that such equality is realized, any sudden blow on the collector housing tending to move the pivoting axis 14 upwardly in a vertical plane will produce no turning moment in the trigger so that the normal relation between shoulder 17 and tab 18 will remain unchanged.

If, on the other hand, the length of arm to the center of percussion for the masses on one side of the point of support is substantially greater than the length of arm to the center of percussion for the masses on the other side and a sudden upward blow is transmitted to the trigger support, that body with the longer arm will tend to move downwardly or opposite to the relative motion of the point of support and the direction of the blow. It may also be considered under the assumed conditions that the point of application of the blow moves upwardly with the blow and the trigger body with the longer arm to its center of percussion stands still. In either case a motion of rotation occurs in a direction determined by the mass with the longer arm which mass will have an instantaneous motion opposite to the direction of the blow, while the mass with the shorter arm will have an instantaneous motion in the same direction as the blow. However, as stated previously, if the trigger masses on the coin actuated side of the trigger and the trigger masses on the counterweight side of the trigger have equal arms to their respective center of percussion which is the center of percussion of the whole mass, there will be no rotation but only vibration of the trigger when the trigger is jarred by an upwardly directed blow on the housing.

What is claimed is:

1. In a coin collector, a coin channel for receiving deposited coins, a pivoted trigger having on one side of its pivot an arm normally projecting into said channel for actuation by a deposited coin and having on the other side of its pivot a counterweight, the moment of inertia of the mass of the trigger on the counterweight side of the pivot being substantially greater than the moment of inertia of the mass of the trigger on the arm side of the pivot, said arm side of said trigger having a center of percussion located substantially the same distance from the pivoting axis as the center of percussion for the counterweight side of said trigger.

2. In a coin collector, a coin channel for receiving deposited coins, a pivoted trigger having on one side of its pivot an arm normally projecting into said channel for actuation by a deposited coin and having on the other side of its pivot a counterweight, a shoulder on said trigger, a spring tensioned member engaging said shoulder in the normal position of said trigger but released from said shoulder when said trigger is actuated by a deposited coin, the moment of inertia of the mass of the trigger on the counterweight side of the pivot being substantially greater than the moment of inertia of the mass of the trigger on the arm side of the pivot, said arm side of said trigger having a center of percussion located substantially the same distance from the pivoting axis as the center of percussion for the counterweight side of said trigger.

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