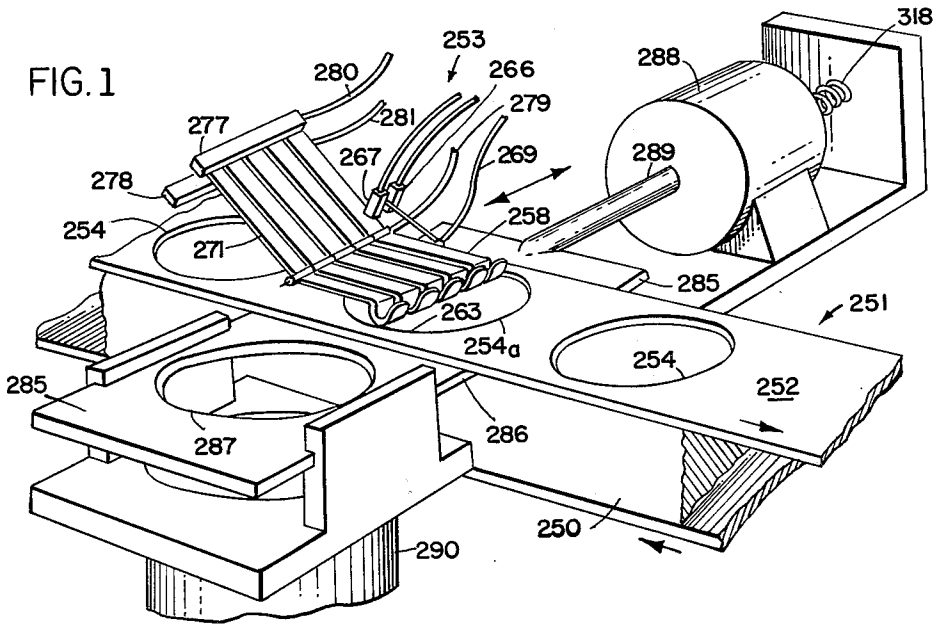
June 29, 1965 B. R. WHITE, JR 3,191,739

COIN TESTER

Original Filed March 9, 1959 2 Sheets-Sheet 1

FIG. 1



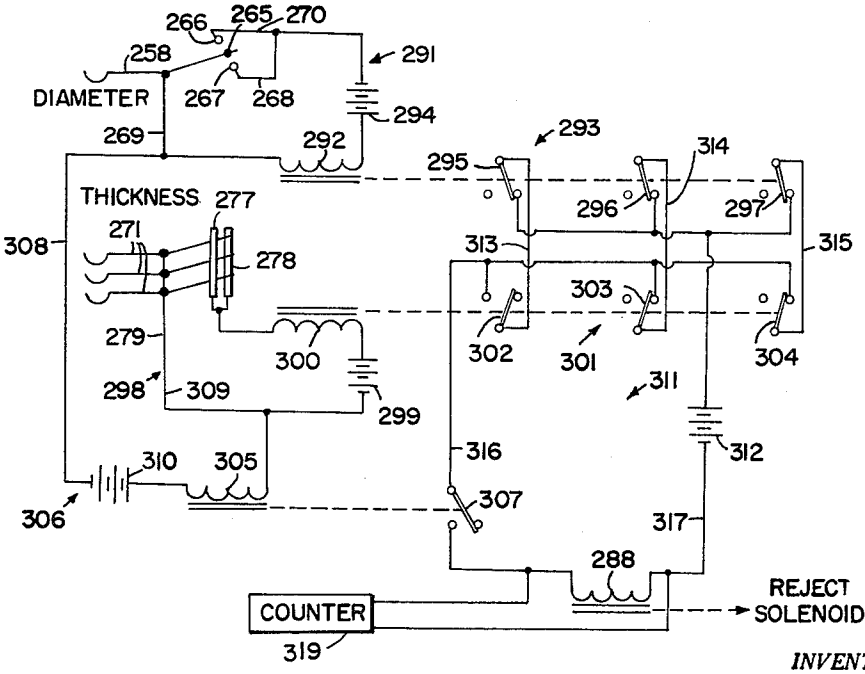


FIG. 7

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FIG. 2

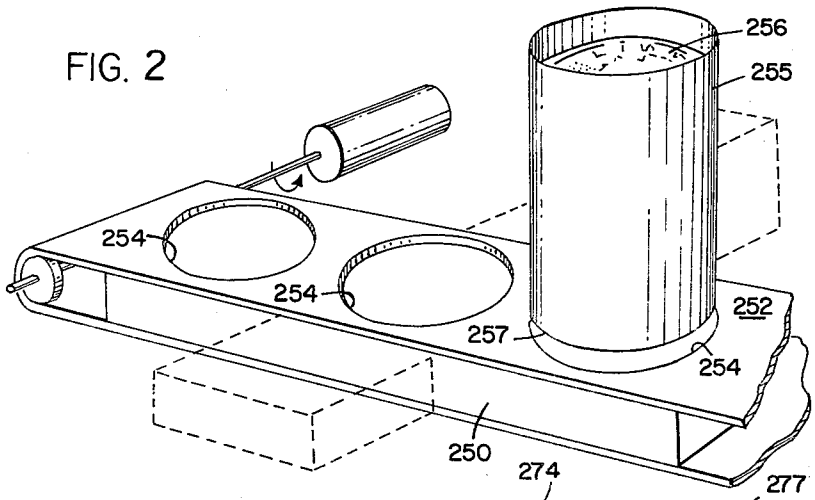


FIG. 6

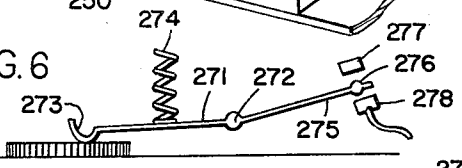


FIG. 5

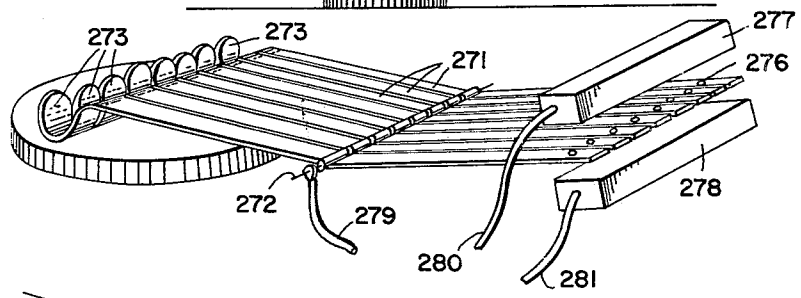


FIG. 3

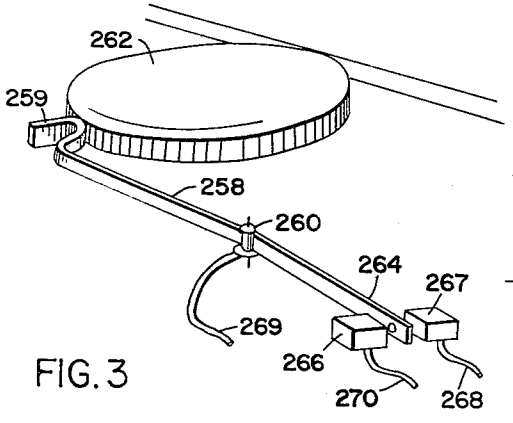
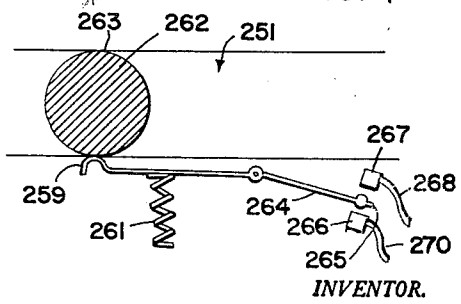


FIG. 4



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3,191,739

COIN TESTER

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Original application Mar. 9, 1959, Ser. No. 798,264. Divided and this application June 10, 1964, Ser. No. 384,276

4 Claims. (Cl. 194—9)

This is a division of application Serial No. 798,264, filed March 9, 1959, now Patent No. 3,147,839.

This application relates to coin processing devices. More particularly the invention disclosed herein comprises a new and improved assembly for detecting physical abnormalities in coins.

My invention is particularly suited for use by such organizations as telephone companies, transit authorities, vending machine operators, banks, parking meter operators, etc. which handle large quantities of coins. At the present time such organizations authenticate and count coins either manually or semi-automatically which are very slow and tedious processes. Typically, coins from telephone pay stations are processed by telephone companies in the following manner. The coins are removed from the telephones in individual boxes which are carried to a central accounting office. At these offices, the boxes are individually opened, and their contents spread out on small tables and inspected manually to separate the counterfeit from the authentic coins. Thereafter, the authentic coins are counted by machines provided for this purpose. Each telephone station must be credited with the dollar value of the authentic coins received by it so that the proprietor of the premises may receive his commission.

In the telephone system, my invention may be used in several ways. As a portable assembly, it may be taken to the site of each station and coins removed from the individual telephones may be proved and counted at or adjacent the premises. Alternatively, the assembly may be located at the central accounting office and receive the contents of the individual boxes as they are brought to the accounting office from the separate stations. By the use of my assembly, individual handling of the coins may be totally eliminated even to the extent of making the bookkeeping entries and drawing the lease or commission checks to the proprietors where the stations are located. This completely automatic handling is made possible because the machine may readily be connected to a conventional punch card process with no intermediate manual steps.

My portable assembly may also be used to collect coins from parking meters in a manner similar to that described above in connection with the removal of coins from individual telephone stations. For this purpose, a pick-up system is provided which is adapted to extract coins from parking meters and feed them automatically into the coin handling machine. This is carried out in a manner which is in effect pilfer proof.

My invention includes various subassemblies which may be arranged in various orders depending upon the particular application for the device. The subassemblies include a pick-up device for introducing coins to the assembly, a sorting mechanism for separating coins of various denominations according to size, a proving device for determining the authenticity of the coins of each denomination, a device for separating authentic but mutilated coins from those in good condition, and a counting mechanism for totaling the coins of each denomination and those rejected as mutilated, all shown in my parent application Serial No. 798,264, filed March 9, 1959, now Patent No. 3,149,839, dated September 8, 1964.

Obviously, the various subassemblies may be used in different combinations. For example, the portable assembly used to collect coins from telephone stations and parking meters would include a pick-up device for introducing coins to the unit, a sorter for separating the coins of different denomination received by the meters or telephone stations, provers for testing the authenticity of the coins of each denomination received, and the counting mechanism for totaling the value of the coins received. Banks may have several assemblies each one consisting of a sorter, a single prover for the denomination of coin being handled, a mutilated coin rejector, and a counter.

My assembly for detecting physical abnormalities in coins will be better understood and appreciated from the following detailed description, read in connection with the accompanying drawing, in which:

FIGURE 1 is a prospective view of a mechanism used to detect physical abnormalities in coins;

FIGURE 2 is a fragmentary prospective view of the pick-up mechanism employed with the assembly of FIGURE 1;

FIGURE 3 is a detailed prospective view of the mechanism used to detect abnormalities in the diameters of coins in the mechanism of FIGURE 1;

FIGURE 4 is a plan view of the mechanism shown in FIGURE 3;

FIGURE 5 is a fragmentary prospective view of the mechanism used to detect abnormalities in the thicknesses of coins in the mechanism of FIGURE 1;

FIGURE 6 is an elevation view of the mechanism shown in FIGURE 5; and

FIGURE 7 is a schematic diagram of the circuit employed with the mechanism of FIGURES 1–6.

This subassembly detects physical abnormalities in coins and separates coins having such abnormalities from coins in good condition. If coins subjected to its tests have previously passed through a prover, when used in the system this assembly will only receive authentic coins. Thus, if the coins are found to have no physical defects, it must necessarily follow that they are suitable to be reintroduced into circulation. This subassembly may be mounted either in a mobile unit or be permanently installed at a fixed location.

In FIGURE 1, the detecting device is shown organized about a support 250 over which a belt 251 travels. The upper horizontal run 252 of the belt passes beneath a testing mechanim 253 which inspects the thickness and diameter of the coins carried on the belt.

The belt 251 is provided with longitudinally aligned circular cavities 254 which are adapted to carry coins to be tested over the support 250 and beneath the mechanism 253. The coins are deposited one at a time in the cavities 254 by the pick-up mechanism shown in FIGURE 2. The pick-up mechanism includes a cylinder 255 disposed above the upper run 252 of the belt and houses a stack of coins 256 to be tested. As the belt travels beneath the cylinder 255 each recess 254 picks up one coin and carries it to the test position beneath the assembly 253. Thus, a coin disposed in the recess 254*a* in FIGURE 1 would be subjected to the tests.

The bottom edge 257 of the cylinder 255 is spaced from the top surface of the belt and is less than the thickness of a coin. Therefore, only when a cavity 254 is aligned with the cylinder will a coin leave it and be carried to the testing device 253.

The belt 251 is substantially thinner than the coins to be carried by it so that they extend a substantial distance above its surface. As will become apparent below, this is necessary to afford the testing device 253 the opportunity to make all of the necessary inspections of the coin.

In FIGURES 3 and 4, a portion of the test mechanism

253 is shown which inspects the diameter of the coins to determine if the diameter is within allowable limits. This mechanism includes a finger 258 having a curved tip 259 which is adapted to bear against the side of the coin carried to the position of cavity 254*a* in FIGURE 1. The finger 258 is pivotally mounted on a support 260 and as shown in FIGURE 4 is loaded by a spring 261 which urges the tip 259 against the coin 262 to be tested. As stated above, the belt 251 is thinner than the coin and, therefore, the edge of the coin does extend above the belt surface. Thus, the finger 258 is free to swing over the surface of the belt and engage the edge of the coin which extends out of the cavity 254. Of course, the spring loaded finger urges the coin against the side 263 of the cavity opposite the finger so that the reference position is established by that side for each coin.

The end 264 of the finger 258 acts as a switch blade and carries a movable contact 265 between a pair of fixed contacts 266 and 267. If the coin 262 being tested has an acceptable diameter, the contact 265 will remain in the position illustrated in FIGURES 3 and 4 between and not engaging either of the fixed contacts 266 and 267. However, if the coin diameter is larger than normal, the contact 265 will pivot with the finger 258 and engage the contact 267 to complete the circuit between leads 268 and 269 connected respectively to the contact 267 and the pivotal support 260 in electrical communication with the finger. It is understood that the finger 258 is made of electrically conductive material. On the other hand, if the diameter of the coin being tested is below an acceptable limit, the contact 265 will engage the contact 266 and close the circuit between the lead 269 and a lead 270 secured to the fixed contact 266.

A similar arrangement is provided to test the thickness of the coins. In FIGURE 5, a series of eight fingers 271 are carried on a common pivotal support 272 and each is provided with a tip 273 adapted to bear against the surface of the coin carried beneath them. Although the fingers 273 are illustrated diagrammatically in line form in FIGURE 1, it is to be understood that they have appreciable thickness as shown in FIGURE 5 so that the series of tips 273 substantially cover the full diameter of the coin. Each of the fingers 271 operates independently of the others and in the same manner as the finger 258 which inspects or measures the diameter of the coin. Referring to FIGURE 6, the reader will note that the finger 271 illustrated is spring loaded by the coil spring 274 and its tip 273 bears against the surface of the coin. The other end 275 of the finger 271 forms a switch blade and carries a contact 276 which is adapted to move between the two fixed contact bars 277 and 278. When an unworn and unmutilated coin passes beneath the tip 273 of the finger, the contact 276 remains in the position illustrated in FIGURE 6 spaced between the two fixed contact bars. A coin thinner than what is acceptable will cause the contact 276 to engage the bar 277 while a thicker than average coin will cause the finger 271 to pivot around its support 272 and move the contact 276 into engagement with the fixed contact bar 278.

Any one of the fingers 271 is adapted to complete the circuit between the lead 279 connected to the pivotal support 272 and either lead 280 or 281 connected to the upper and lower fixed contact bar 277 and 278, respectively. Thus, if but one portion of the coin is thicker than normal, the finger which senses the abnormality and raises against the bias of its spring 274 as it slides over the thicker portion of the coin will cause its contact 276 to engage the contact bar 278 and complete the circuit between the leads 279 and 281. Similarly, should one of the fingers 271 and more particularly its tip 273 sense a depression or hole in the coin, its contact 276 will engage the bar 277 and complete the circuit between the leads 279 and 280.

Referring again to FIGURE 1, the reader will note that a plate 285 rests in a depression 286 formed in the upper surface of the support 250 and is provided with an opening 287 adjacent one end substantially the same size as the cavities 254 in the belt 251. The upper surface of the plate 285 is coplanar with the surface of the support 250 and thus does not interfere with the travel of the belt along its run. The plate 285 is adapted to move transversely of the run 252 of the belt in the depression 286 and is controlled by a solenoid 288 having a plunger 289 secured directly to the plate. When the solenoid 288 is energized, it retracts its plunger 289 and draws the plate 285 toward the coil so that the cavity 287 lies beneath and in alignment with the cavity 254*a* bearing the coin being tested. When this occurs, the coin in cavity 254*a* drops into the opening 287 and upon deenergization of the solenoid the plunger returns the plate 285 to the position illustrated and the coin is carried to and discharged into the reject chute 290. When the solenoid 288 fails to energize, the coin after being tested is carried with the belt 251 along its run 252 and ultimately deposited at a point of collection.

The electrical circuit controlling the solenoid is illustrated in FIGURE 7. It will be noted in that figure that the finger 258 which tests or measures the diameters of the coins being inspected controls a circuit 291 which includes the coil 292 of relay 293 and a power supply 294. When the contact 265 engages either of the fixed contacts 266 and 267, the coil 292 of the relay is energized and moves the blades 295, 296 and 297 from the position illustrated to the alternative position wherein they engage the other set of contacts.

The fingers 271 control a second circuit 298 similar to the circuit 291. The circuit 298 includes a power source 299 and the coil 300 of a relay 301. Thus, when the contacts 276 of any of the fingers 271 engage either of the two fixed contact bars 277 and 278, the coil 300 energizes and throws the switches 302, 303 and 304 from their illustrated position to the alternate position.

A coil 305 forms part of a third circuit 306 which responds to the presence of a coin in the cavity 254*a* of the belt, that is, in a position to be inspected by the testing mechanism 253, regardless of the diameter or thickness of the coin. When a coin is engaged simultaneously by the finger 258 and one of the fingers 271, the coil 305 becomes energized and closes the switch 307. The coin forms a conductive path between the fingers 258 and at least one of the fingers 271 and completes the circuit 306 through leads 269, 308, and 309 and the power source 310. The switch 307 forms part of a fourth circuit 311 which contains the solenoid 288 which operates the ejector plate 285.

The circuit 311 contains a power source 312 and is closed in response to energization of either of the coils 292 and 300 of relays 293 and 301, respectively, assuming of course that switch 307 is closed. It will be noted that switches 295 and 302 are connected by lead 313, switches 296 and 303 by lead 314, and switches 297 and 304 by lead 315. Each of these leads with their switches is adapted to complete the circuit 311 to energize the solenoid 288 under certain conditions, as follows: Assume that the finger 258 senses a coin of abnormal diameter and energizes the coil 292 of relay 293. When the bank of switches 295, 296 and 297 are thrown to the left as viewed in FIG. 7 in response to energization of the coil 292, the circuit 311 will be energized through switches 296 and 303 and lead 314 electrically connecting leads 316 and 317. If one of the fingers 271 senses an abnormal thickness, the coil 300 will become energized and draw the bank of switches 302, 303 and 304 to the left. In this case, assuming that no abnormality is sensed by the finger 258, the switches 302 and 295 and the lead 313 will complete the circuit 311 and energize the solenoid 288. If the finger 258 and one of the fingers 271 sense an abnormal condition, all of the switches of relays 293 and 301 will be thrown, and the switches 297 and 304 and the lead 315 will complete the circuit 311 and energize the solenoid.

Thus, it is seen that any one of the fingers which senses an abnormal condition will cause the plate 285 to retract and allow that coin to drop into the opening 287. When the coin tested drops into the opening 287, the continuity of the circuit 306 which contains the coil 305 is broken. Thus, the coil 305 deenergizes and the switch 307 opens, deenergizing the circuit 311 and its solenoid 288. The solenoid then releases its plunger 289 and the spring 318 returns the plate to the position shown in FIGURE 1. When this occurs, the coin is discharged into the chute 290. The number of coins rejected may be recorded by the counter 319 connected across the solenoid 288. This counter of course may take any conventional form and moves one unit each time the solenoid 288 is energized.

From the foregoing description, those skilled in the art will appreciate that numerous modifications may be made of the inventions disclosed without departing from the spirit of my invention. Therefore, I do not intend to limit the breadth of my invention to the specific embodiment illustrated and described, but rather, it is my intention that the scope of my invention be determined by the appended claims and their equivalents. What I claim as new and desire to secure by Letters Patent of the United States is:

1. Means for separating and detecting abnormally shaped and sized coins from coins of normal size and shape comprising a bed, a belt thinner than coins of normal thickness and driven over said bed, a series of longitudinally aligned circular openings in the belt larger in diameter than a coin of normal diameter, a plurality of spring loaded fingers disposed over the belt and each adapted to run over the upper surface of a coin drawn over the bed by the belt, an additional spring loaded finger disposed above the belt and adapted to engage the edge of a coin in an opening in the belt drawn over the bed, a plate disposed between the bed and the belt, a recess formed in the plate adapted to receive coins from the openings in the belt when the recess is disposed beneath one of the openings, means biasing the plate to a position wherein the recess is removed from beneath the openings, means including an electrical circuit when energized moving the recess under an opening, and normally opened switches in the circuit controlled by the fingers and closed when said fingers move a preselected distance from a normal position determined by the diameter and thickness of a normal coin.

2. A device for separating mutilated from unmutilated coins comprising a support, a plurality of parallel fingers disposed above the support and spring loaded in the direction of the support, a carrier for moving coins one at a time over the support beneath the fingers causing the fingers to slide side by side over a face of each coin, an ejector adapted to remove coins from the carrier, means including an electrical circuit for operating the ejector, a plurality of parallel switches in said circuit anyone of which when closed energizes the circuit, and means interconnecting each finger with one switch causing any finger which senses an abnormality in the face of the coin to close its switch.

3. A device as defined in claim 2 further characterized by an additional finger disposed above the support and in the path of the edge of coins drawn by the carrier over the support, said finger sensing the diameter of each coin which it engages, another switch in the circuit when closed energizing the circuit, and means interconnecting the additional finger and the last-mentioned switch causing said switch to close when the diameter of the coin engaged by the finger is outside normal limits.

4. In a device for separating coins of abnormal size from coins of normal size, an ejector, a solenoid for actuating the ejector, an electrical circuit for energizing the solenoid, a relay operated normally opened first switch in the circuit, a second circuit having a pair of spaced contacts for energizing the relay to close the first switch, said contacts adapted to be closed by a coin simultaneously engaging each for closing the second circuit, a plurality of parallel lines in the first circuit and each containing a pair of switches in series, sensing means responsive to an abnormal thickness of a coin for closing one of the parallel lines for energizing the first circuit, additional sensing means responsive to an abnormal diameter of a coin for closing another of the parallel lines, and means responsive to an abnormal condition sensed by each sensing means for closing a third parallel line, whereby when said first switch is closed and one of the parallel lines is closed, the solenoid is energized.

References Cited by the Examiner

UNITED STATES PATENTS

Re. 22,229	12/42	Smith	194—97
1,795,287	3/31	Bottome	194—99

SAMUEL F. COLEMAN, *Primary Examiner.*