

[54] COIN COUNTING APPARATUS

3,396,737 8/1968 Picollo 133/8 R X

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[57] **ABSTRACT**

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[58] Field of Search 133/8

Coin counting apparatus comprising a centrifugal turntable above which an annular flat member is adjustably mounted. The member covers approximately half the area of the disk about its periphery to form a space in which the coins are arranged in flat, single layer position. Means are provided for adjusting the space to selected thickness coins, for discharge of irregular coins, and for operation of a counting mechanism.

[56] **References Cited**

UNITED STATES PATENTS

1,921,155 8/1933 Donnellan 133/8 R

9 Claims, 6 Drawing Figures

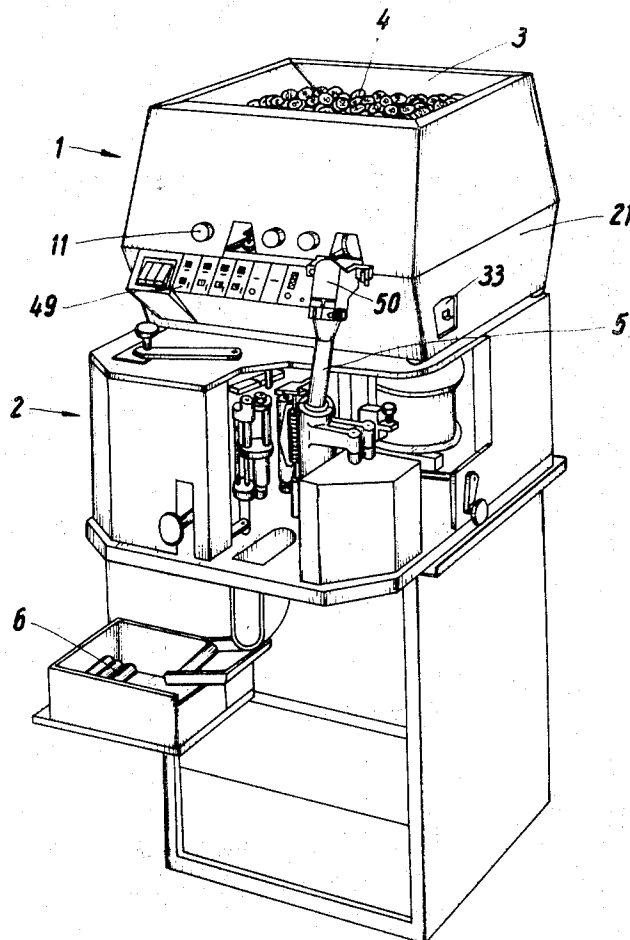
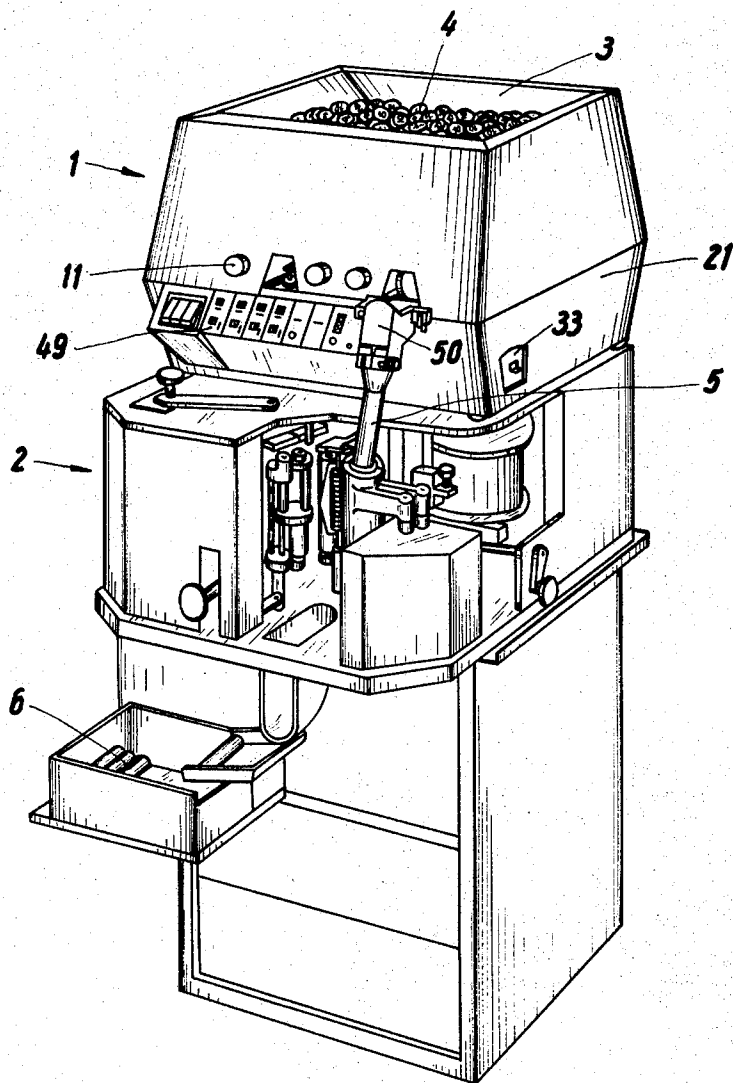
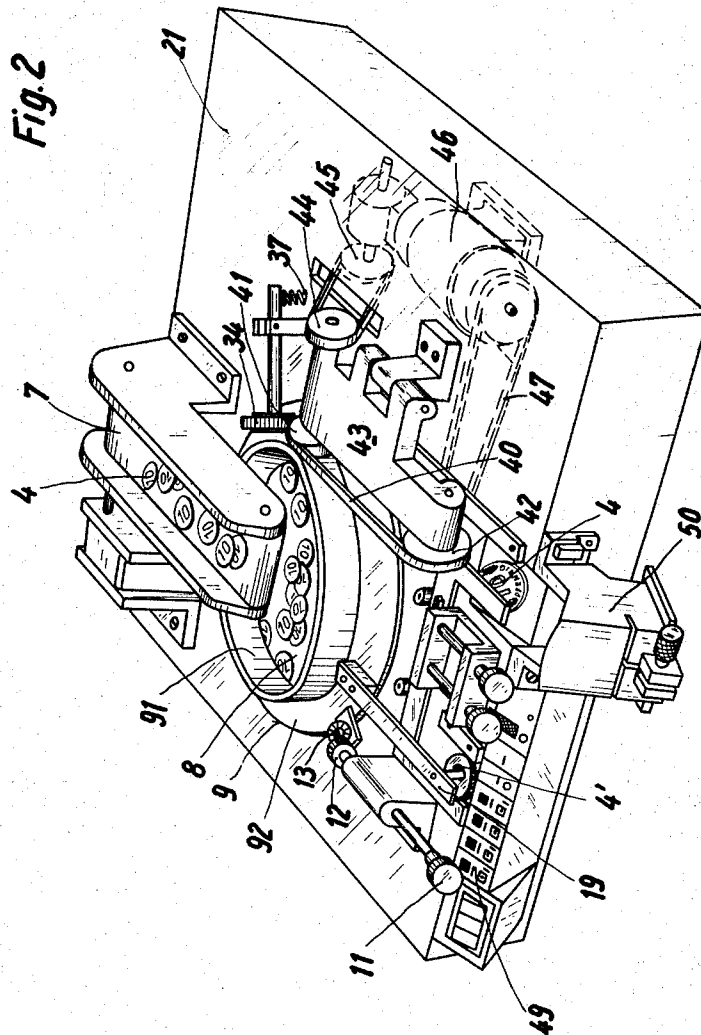


Fig. 1





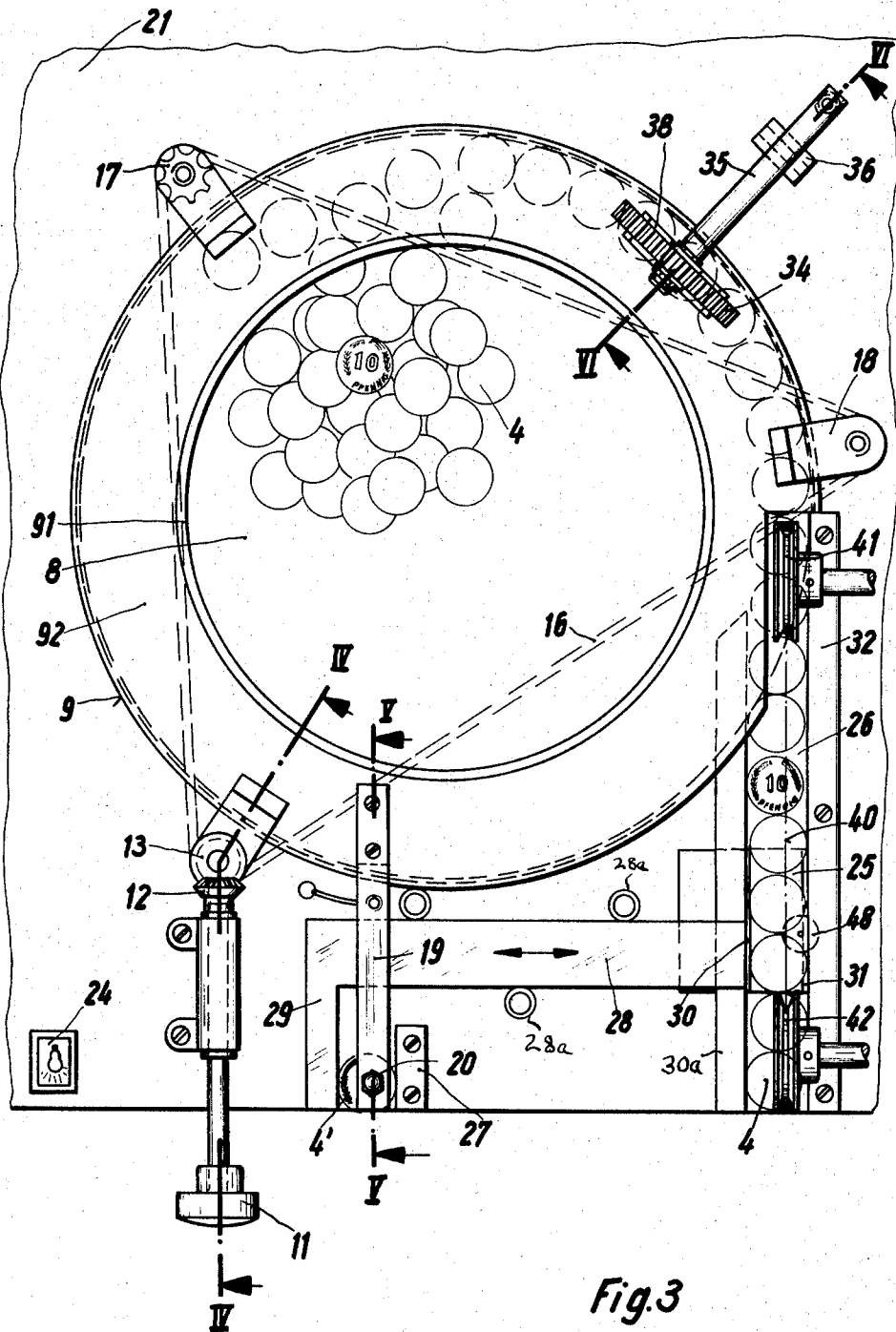
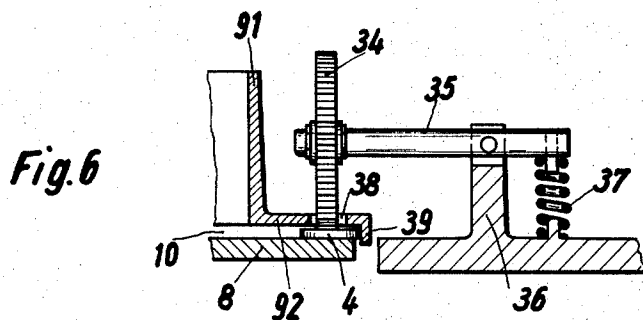
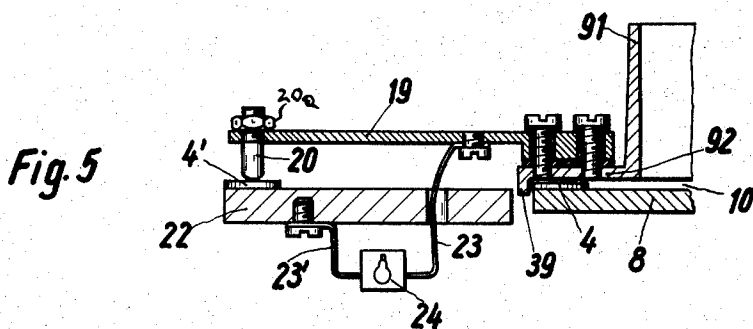
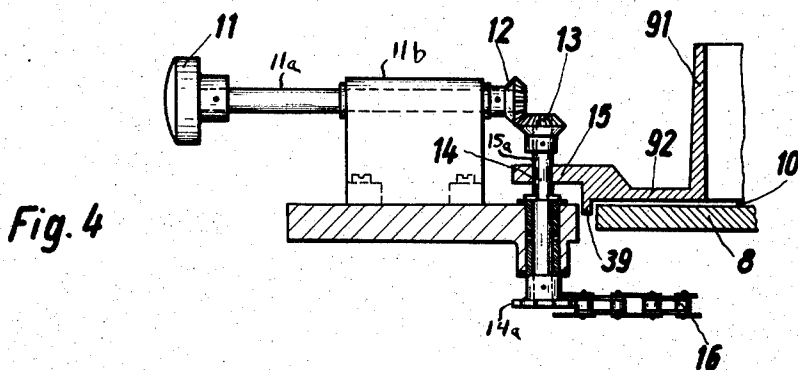


Fig. 3



COIN COUNTING APPARATUS

BACKGROUND OF THE INVENTION

The present invention relates to apparatus for counting coins, money or similar disk-like objects.

Generally, in the known devices of this type, the coins are delivered to a collecting vessel or hopper from which they are fed to a rotating disk or turntable. The turntable delivers the coins, by centrifugal action, to a discharge channel where they are aligned in single row fashion. A driving roller is provided to impel the coins past a coin counting mechanism comprising for example a star wheel. In order to insure that the coins are delivered to the counting mechanism in flat single layer relationship and not one on top of each other, a sheet-metal plate has been mounted over the turntable in front of the entrance to the discharge channel. The plate is spaced from the face of the turntable the thickness of the coins to be counted, thus defining an opening preventing more than one coin at a time from being fed to the channel.

The efficiency of such machines is dependent on several factors, namely the delivery of the coins to the turntable, the flow of coins into the discharge channel, the effectiveness of the driving roller, and the efficiency of the counting mechanism. While the driving roller and the counting mechanism can usually be made to function effectively, it has been noted that the turntable always requires a certain number of coins on it to obtain the optimum effect. If there are too few coins at any one time, not enough are fed at the proper rate to the channel, while if there are too many coins on the turntable at one time, the proper centrifugal action is not obtained. In either case the throughput of the machine is severely reduced. Coincidence in feeding, arrangement of coins and other factors also play an undesirable roll in reducing efficiency. Still another disadvantage arises from the use of the sheet-metal blocking member used to insure a single layer of coins, since by blocking the entrance to the channel undesirable resistance is created which reduces the rate of speed at which the turntable rotates.

It is the object of the present invention to provide a coin counting machine which overcomes the disadvantages of the prior art.

SUMMARY OF THE INVENTION

According to the present invention a counting device is provided comprising a hopper and a turntable receiving coins from said hopper. Located above the turntable is an annular ring member having a flat horizontal disk portion spaced from the face of the turntable. The annular disk defines a space forming a flat slot for the passage of the coins and is provided with means for adjustably mounting the ring above the disk so as to vary the space for different thickness coins.

The horizontal portion of the annular ring is preferable formed so large that it covers approximately half of the area of the surface of turntable. Thus a very large area is provided in which the coins must be forced to lie flat and in a single layer. Consequently a large number of coins are arranged in optimum condition, under high centrifugal force, ready for discharge into a tangential channel.

Preferrably, the annular ring has an L-shape cross section having in addition to the flat horizontal portion a central vertical portion defining an opening onto the

turntable from the hopper. The means for mounting the ring are preferably plural in number, arranged about the ring, but driven from a single activating mechanism so as to provide uniform adjustment.

Further according to the present invention the adjustment of the annular ring is effected by manipulation relative to a standard or comparison coin and with the use of electrical contact sensors, so that the space between the ring and the turntable can be accurately obtained.

A pressure roller is provided contacting the coins along the outer edge of the turntable. This insures that the coins are properly aligned and that there is no slippage or spacing between coins as they are discharged into the tangential channel.

A counting mechanism is arranged within the discharge channel, and an endless belt is located along the path of movement to insure proper flow. A discharge opening for small coins is also arranged in the discharge channel. Preferrably the counting mechanism is an electrical inductive device sensing the presence of a coin as it passes and producing a signal impulse which is fed to a counter register. Star wheel mechanical counters may also be used but they are not as fast.

The counting apparatus according to the present invention produces a startling increase of throughput, at least several times that of the known devices. The specific objects and advantages, as well as full details will be seen from the following description and the accompanying drawings.

BRIEF DESCRIPTION OF DRAWINGS

In the drawings:

FIG. 1 is a perspective view of the counting apparatus of the present invention shown in combination with a stacking and packing machine,

FIG. 2 is a perspective view of the present apparatus with the housing cover removed,

FIG. 3 is a plan view of the mechanism of the apparatus seen in FIG. 2,

FIG. 4 is a sectional view, along lines IV—IV of FIG. 3,

FIG. 5 is a sectional view along lines V—V of FIG. 3, and

FIG. 6 is a sectional view along lines VI—VI of FIG. 3.

DESCRIPTION OF INVENTION

The counter 1 of the present invention is seen in FIG. 1 arranged in combination with a packing machine 2 in which a predetermined number of coins are stacked and rolled. A typical packing machine is shown in copending U.S. application Ser. Nos. 61,757 and 61,758 filed Aug. 6, 1970. The counter 1 comprises a housing built on a chassis 21 which forms hopper 3 in which a plurality of coins 4 are deposited. As will be seen in connection with the other drawings, the coins 4 are arranged and counted in predefined numbers and expelled into a tube 5 to be stacked and packed in the packing machine 2 in the form of rolls 6. Alternatively the coins may be expelled into bags, sacks or other containers instead of to the roll forming or packing machine.

The coins 4 are deposited from the hopper 3 onto a moving feed belt 7 which extends over an annular ring member 9 through the center of which the coins fall onto a rotating plate or turntable 8. The free upper face of the turntable is defined by the annular ring 9 which

has an L-shaped cross section formed by a vertical portion 91 and a flat horizontal portion 92. The vertical portion 91 defines the central opening through which the coins 4 drop, while the horizontal portion 92 extends outwardly therefrom over approximately half the diameter of the turntable to cover approximately half its area adjacent the peripheral edge. The horizontal portion 92 has a circumferential depending lip 39 (FIGS. 4-6) which defines the peripheral extent of the turntable 8. The lower face of the horizontal portion 92 of the annular ring is spaced a distance 10 from the face of the turntable so that the coins 4 can be freely passed therebeneath. Because of the width of the horizontal portion 92 several rows of coins may thus be located within the space 10.

As seen in FIGS. 2 and 4 the annular ring 9 is adjustably mounted at at least three points by horizontal tabs 15, 17 and 18 to the horizontal frame portion of the chassis 21 so that the space 10 can be varied to accommodate coins of differing thicknesses while maintaining the flat horizontal portion parallel to the face of the turntable. The mounting means at each of the three points 15, 17, and 18 is the same although FIG. 4 shows the means in conjunction with tab 15. It comprises a thumb screw 11 secured to the end of a shaft 11a journaled on a bearing block 11b. The thumb screw 11 extends outwardly of the housing for easy manipulation. At the inner end of the shaft 11a a bevel gear 12 is vertically arranged to mesh with a horizontal bevel gear 13. The bevel gear 13 is fixed at the end of a threaded shaft or screw rack 14 which is rotatably secured but fixed against axial movement within a bore formed in the chassis 21. The thread shaft 14 extends through a threaded bore or hole 15a in a radially extending tab 15 fixed or integral with the horizontal portion 92 of the annular ring. (Similarly, the thread shaft 14 would extend through threaded holes in the respective tabs 17 and 18). According to the preferred form of the invention, multiple thumb screws are not necessary since the three or more adjusting mechanisms can be commonly actuated by one thumb screw. Thus as seen in FIGS. 3 and 4, the lower end of each of the thread shafts is provided with a cog wheel 14a to which an endless chain 16 connecting each of the mechanisms is fixed. Thus as the one thumb screw 11 is actuated the thread shaft 14 of each of the adjustment and mounting mechanisms is simultaneously moved. It will be obvious that the rotation of the shafts 14, being otherwise fixed in the chassis 21, will cause the annular rings 9 to move up or downwardly via the action on the thread hole 15a. Adjustment of the space 10 is thus obtained about the entire ring 9 simultaneously.

The correct adjustment of the space 10 for any one of the various coins to be counted is obtained through the mechanism depicted in detail in FIG. 5. An electrically conductive contact arm 19 is insulatingly mounted on the horizontal portion 92 of the annular ring 9, so as to rigidly extend radially outward, parallel to the horizontal portion. At the outer end of the contact arm 19 there is arranged a vertically slidable feeler 20 below which, on the chassis 21, is located a fixed contact plate 22. The contact arm 19 and the contact plate 22 are electrically connected by leads 23 and 23' having interposed therebetween a bulb 24 such as a low voltage mini-lamp. A circuit is completed by connecting the members to a source of current in the known and conventional manner. The desired or predefined

space 10 is adapted to be obtained by placing a comparison coin 4', as a defined standard, between the feeler 20 and the contact plate 22. By rotating the thumb screw 11 and thus vertically moving the annular ring 9, until the extending feeler barely makes contact with the coin 4' and the bulb lights, the space 10 can be defined with accuracy. The feeler 20 is mounted with a screw nut 20a, so that its position may be accurately located. However, it is preferable that the feeler 20 have a small degree of play so that the actual distance of the space 10 is slightly larger than that of the comparison coin 4'. This allows the real coins 4 to pass freely in the space 10.

The comparison coin 4' serves also to structure and adjust a counterfeit, small, or irregular coin discharge opening 25 arranged beneath an elongated counting channel 26. The counting channel 26 is formed by a pair of fixed parallel spaced rails extending tangentially from the turntable 8 and is adapted to receive the coins in single file and to enable their movement to the counting mechanism. Mounted on the chassis 21 is a fixed straight angle bracket 27 adapted to tangentially abut one side of the comparison coin 4'. A slidable bracket 28, having an L-shape is arranged opposite to the bracket 27 on the chassis 21 to abut the other side of the comparison coin 4'. The bracket 28 has a short leg 29 adapted to move parallel to the fixed bracket 27 to engage the coin diametrically opposite to it, and a perpendicular long leg at the end of which is mounted one rail 30a of the channel 26. Adjacent the discharge opening 25, the rail 30a is provided with a guide ledge 30 extending slightly over the opening and coplanar with the bottom of the channel 26. The opposite side of the channel 26 is defined by a fixed rail 32 which has a similar guide ledge 31 opposite that of the guide ledge 30 and which similarly extends slightly over the opening 25. The width of the channel 26 may thus be adjusted by the comparison coin 4' to accommodate the desired coins and to permit undesirable coins of a small size to drop and be discharged through the opening 25. The length of the long arm of the slide 28 is chosen so that when the short arm 29 abuts against the comparison coin 4', as seen in FIG. 3, the distance between rails 30a and 32 equals the diameter of the coin 4'. The opening between the guide ledges 30 and 31 is sufficient to allow smaller coins to fall, but to allow the ledges themselves to hold or carry the properly sized coins. The smaller size or counterfeit coins thus sorted from the desired coins are caused to drop through opening 25 into a passage leading to a receptacle 33 conveniently formed on the exterior of the housing (FIG. 1). Rotatable guide posts 28a are arranged on either side of the long leg to insure accurate adjustment of the bracket 28. The end of the short leg 29 can extend outward of the housing, which may be cut, as seen in FIG. 1, to permit its manipulation.

A pressure roller 34 is arranged above the circumferential edge of the turntable 8, extending through a slot 38 in the annular horizontal portion 92 of ring 9 and acts to insure that the coins 4 are properly aligned for entry into the counting channel 26. The roller 34 is freely mounted at the end of a shaft 35 which is pivoted along its length on a post 36. A compression spring 37 is arranged at the end of the shaft 35 opposite the roller 34, to normally bias the pivoting shaft upwardly at that end, so that the roller 34 is pressed against the coins 4 or the face of the turntable, through the slot 38. The

roller 34 forces the coins 4 into engagement with the depending lip 39 formed on the annular ring 9, setting the coins in a single file without spaces between them along the periphery of the turntable. The coins are thus given a rotational speed equal to the speed of the turntable at the peripheral edge and are carried to the mouth of the counting channel 26 where they are tangentially discharged between the rails 30a and 32. The lip 39 is cut at this point to allow passage of the coins. Coins larger than the comparison coin 4' pass by the channel 26 while those of small diameter are received, but to later fall into the discharge opening 25.

Arranged above the channel 26 and in line therewith is an endless belt 40 adapted to engage the top of the coins 4, and to impel them forward at a higher speed so as to rapidly clear the mouth of the channel 26. The belt 40 is arranged over a pair of spaced pulleys 41 and 42 mounted on a pivotal holder 43. The holder is pivotable about an axis parallel to the channel 26, so that the belt 40 may be easily lifted so as to clear the channel 26, should coins become jammed therein. The pulley 41 is connected by a shaft to a drive pulley 44 which is linked by another belt and pulley 45 to a motor 46 through which the belt 40 is driven. The motor 46 is also connected by suitable belt means 47 to the turntable 8. Thus the turntable 8 and belt 40 can be driven from the same power source at selectively corresponding speeds.

A counter initiator 48 is arranged in the channel 26 to the exit side of the discharge opening 25. The counter is preferably an inductive device or micro-switch providing an electrical signal for each passing coin. A mechanical device, such as a star wheel or other known counting device may be used, although such is not as fast. One such mechanical device is described in U.S. Pat. No. 2,746,464, dated May 22, 1956, to Eugen Reis. The inductive or electrical counter initiator 48 is arranged along the edge of the rail 32 and is engaged, tripped, or senses the presence of a coin 4 as it passes through the channel 26. The initiator 48 is connected to a suitable counter, multiplier, computer or other device which registers and accumulates the desired totals, which are then visual depicted on one or more of the registers 49 located on the front face of the housing. At the end of the channel 26 the coins 4 pass through the mouth 50 of the coin stacking tube 5 where they are then packed in the known manner.

It will be seen that the coins 4 deposited on the turntable 8 from the feed conveyor 7 pass under the annular ring 9 into the wide annular space 10, where centrifugal action of the turntable and the roller 34 act to arrange the coins in endless files or rows. The fact that the space 10 covers more than half of the turntable face, prevents the coins from overlapping and, once so arranged, from becoming dislodged. Under the effect of the roller 34 the coins are then impelled into the channel 26 without any slippage, permitting the belt 40 and the coin counting initiator to work properly.

Various modifications, changes and embodiments will suggest themselves to those skilled in the art. The various objects and advantages are furthermore useful for any disk-like object and not just coins. Accordingly the present disclosures is to be taken as illustrative and not as limiting the scope of the invention.

What is claimed:

1. Apparatus for counting coins or similar disc-like objects comprising a centrifugal turntable, an annular ring having a flat horizontal portion arranged above and spaced from said turntable, said annular horizontal portion extending above the peripheral edge of said turntable, means for adjustably mounting said ring to selectively vary the space between said flat portion and said turntable to accommodate coins of predetermined thicknesses and means for impelling said coins toward the periphery of said turntable, said impelling means comprising a freely rotatable roller extending through an opening in the horizontal portion of said annular ring, and spring means for normally biasing said roller in pressure contact against the coins resting on said turntable.

2. The apparatus according to claim 1 wherein said annular ring includes a central opening and said horizontal portion of said annular ring covers approximately half the area of said turntable.

3. The apparatus according to claim 1 wherein said horizontal portion includes a depending circumferential lip defining the peripheral extent of said turntable.

4. The apparatus according to claim 1 wherein said means for adjustably mounting said annular ring comprise a plurality of threaded shafts located about the periphery thereof, each of said thread shafts extending through a threaded bore formed on a tab extending from said horizontal portion of said ring, an endless chain connecting each of said shafts and means for rotating at least one of said shafts to thereby jointly rotate each of said shafts.

5. The apparatus according to claim 4 wherein the rotating means comprises a thumb screw mounted at the end of a rod, and gear means connecting said rod with said threaded shaft.

6. The apparatus according to claim 1 including means for sensing adjustment of said annular ring with respect to a standard coin comprising an arm extending radially from said ring, a feeler mounted at the end of said arm, a horizontal contact plate located oppositely of said feeler, said contact plate adapted to receive a standard coin thereon, and electrical means responsive to the sensing of said coin by said feeler to produce the signal therefor.

7. The apparatus according to claim 1 including means for delivering said coins from said turntable to an elongated channel, an opening in said channel to permit coins to fall therethrough, said channel being defined by a pair of opposed guide rails aligned across said opening, means for adjusting the position of at least one of said guide rails with respect to the other, to thereby vary the width thereof to permit coins of selected diameter to fall therethrough.

8. The apparatus according to claim 7 including means for determining the adjustment of said guide rails as a function of the diameter of a comparison coin including means for determining the diameter of said coins and means for transmitting said determination to one of said rails.

9. The apparatus according to claim 8 wherein said determining means comprises a fixed bracket, and a slidable bracket, said coin being adapted to be located between said brackets with said brackets abutting diametrically opposed points on the edge thereof, said slidable bracket having an arm extending to and fixedly connected with said one movable rail.

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