June 20, 1967 SHIKANOSUKE OCHI 3,326,223

COIN COUNTING AND CONTROLLING APPARATUS

Filed July 8, 1966 3 Sheets-Sheet 1

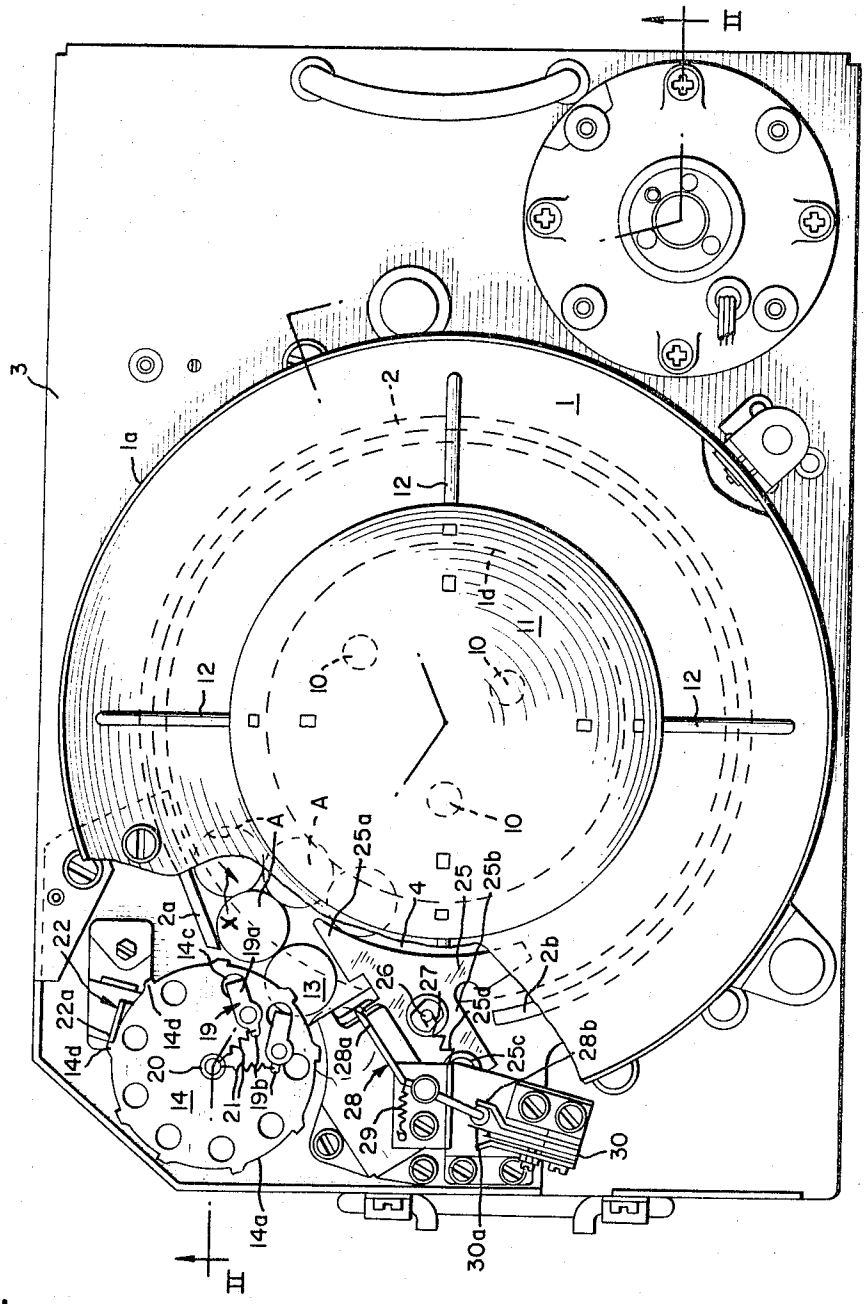


FIG. 1

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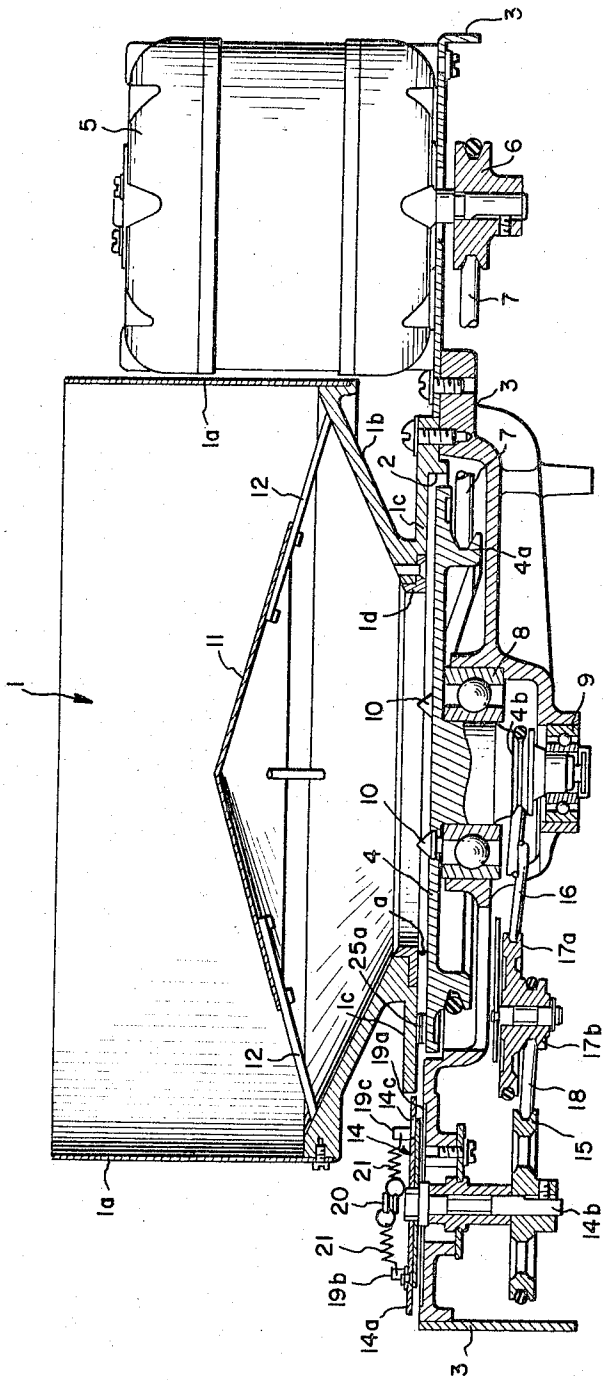
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FIG. 2



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FIG. 3

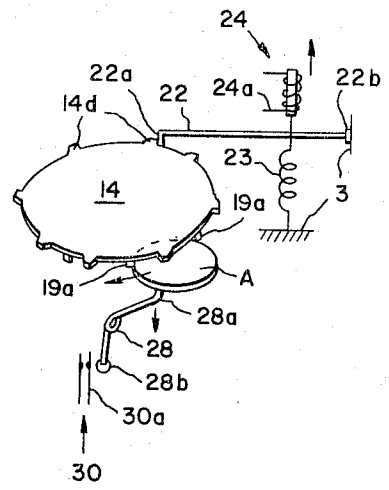
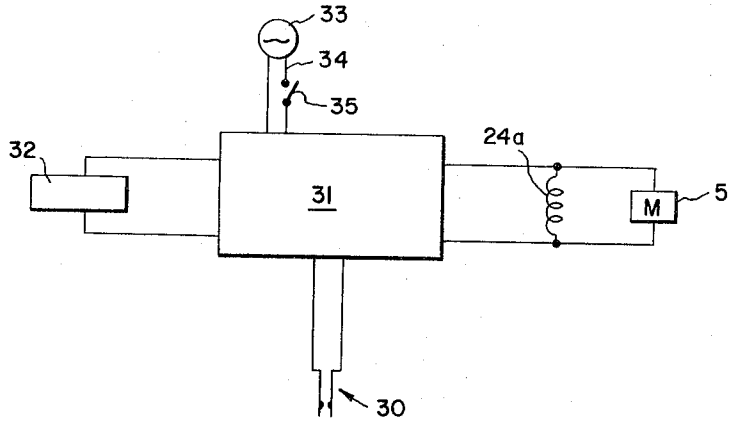


FIG. 4



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3,326,223

COIN COUNTING AND CONTROLLING APPARATUS

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Claims priority, application Japan, July 24, 1965, 40/44,448
5 Claims. (Cl. 133—8)

This invention relates to a coin counting and controlling apparatus which continuously counts coins one by one in an accurate and speedy manner and discharges any desired number of coins.

It is an object of the invention to provide a coin counting and controlling apparatus into which a supply of coins can be poured at random, and which will take coins from the supply and count them.

It is another object of the invention to provide such a device which will take coins from the supply of coins and dispense a preset number of coins while at the same time counting the number of coins dispensed.

The coin counting and controlling apparatus of the invention comprises a rotating disc which defines with the apparatus a gap having a dimension just slightly greater than the thickness of the coins to be handled. The disc is positioned below the opening in the bottom of a funnel-shaped coin container and rotates in one direction. An outer wall having the shape of a circular arc depends from the container and extends along the circumference of the disc. The end of the wall toward which the disc rotates extends tangentially of the circular arc, and a discharge driving plate is positioned adjacent said end of the wall. The discharge driving plate has claws at equal intervals along its circumference and is positioned so that the claws will move along an arc which is tangent to said end of the wall.

Coins are taken from the container and moved along the surface of the disc under the effect of centrifugal force until they lie along the outer wall. They are moved along the outer wall by the rotation of the disc until they move along the tangential portion. They are then engaged by the claws on the discharge driving plate and moved out of the machine one by one.

The present invention is explained below with reference to the accompanying drawings, in which:

FIG. 1 is a plan view, partly broken away, showing an embodiment of the coin counting and controlling apparatus of the present invention;

FIG. 2 is a longitudinal cross-sectional view taken on line II—II of FIG. 1;

FIG. 3 is a diagrammatic perspective view showing securing, counting and controlling mechanisms; and

FIG. 4 is a circuit diagram of the circuit for counting coins and discharging any desired number of coins.

The funnel-shaped coin container **1** has a cylindrical side wall **1***a*, a conical bottom wall **1***b* converging downwardly from the lower edge of said side wall **1***a*, and base **1***c* extending in a radial direction from the lower edge of said conical bottom wall *1b*. Said base **1***c* has circular-arc shaped outer wall **2** projecting downwardly from and extending along the circumference thereof and one end **2***a* of the wall extends in a tangential direction to the circle along which the wall **2** lies. The peripheral edge of said base **1***c* is secured to a frame **3**.

A rotating disc **4** is mounted on said frame **3** so as to rotate freely, leaving between it and the downwardly facing surface of base **1***c* of said funnel-shaped coin container a gap *a* (see FIG. 2) slightly larger than the thickness of the coins to be counted and so as to leave a gap *b* between the peripheral edge of disc **4** and said circular-

arc outer wall **2** (see FIG. 1). Pulley **6**, mounted on the shaft of motor **5** which in turn is mounted on frame **3**, is connected to pulley *4a* on the bottom of said rotating disc **4** by means of belt **7**. Said rotating disc is rotated in the same direction as the tangential portion **2***a* of said outer wall **2** extends (counterclockwise in FIG. 1).

Bearings **8** and **9** are mounted on said frame **3** and rotating disc **4** respectively, and three conical projections **10** project from the upper surface of said rotating disc **4**, each of which is spaced outwardly from the center of the disc a different distance.

A baffle plate **11**, having approximately the same diameter as that of the opening **1***d* at the bottom of said funnel-shaped coin container **1**, has four radially extending supports **12** therein spaced therearound at equal intervals and is set at a specific height above lower opening **1***d* of said funnel-shaped coin container **1**, with the ends of said supports **12** resting on the inside of the walls of said conical member **1***b*.

Frame **3** has coin delivery table **13** on the same level as said revolving disc **4** and positioned between said tangential portion **2***a* and the other end **2***b* of said circular-arc outer wall **2**. Discharge driving plate **14** is mounted on frame **3** so as to rotate freely in a plane just above the coin delivery table **13** and with its circumferential portion **14***a* projecting between the end of tangential portion **2***a* and the other end **2***b* of the circular-arc outer wall. The lower surface of the circumferential portion **14***a* of said discharge driving plate **14** is brought at substantially the same level with that of said base **1***c*, and pulley **15** is mounted on shaft **14***b* of said discharge driving plate **14**. A crossed belt **16** is placed around pulley **4***b* on rotating disc **4** and the larger part **17***a* of a double-reduction pulley **17**, while a belt **18** is placed around the smaller part **17***b* of said double-reduction pulley **17** and the pulley **15** on said discharge driving plate **14**, thereby making it possible to rotate said discharge driving plate **14** in a direction opposite (clockwise in FIG. 1) to rotating disc **4** so as to move the circumferential portion **14***a* of said discharge driving plate **14** in the direction in which the tangential portion **2***a* of said circular-arc outer wall **2** extends.

The circumferential portion **14***a* of said discharge driving plate **14** has holes **14***c* therein spaced at equal intervals. Claw members **19** are pivotally mounted on said discharge driving plate **14** and have claws **19***a* extending downwards into said holes **14***c* so that only a very small space is left between the ends of the claws and said coin delivery plate **13**. Tension springs **21** are stretched between the ends **19***b* of said claw members **19** and a ring **20** provided at the center of discharge plate **14**, so as to urge said claw members **19** to rotate clockwise against discharge driving plate **14**. As a result, coins moved in the direction of arrow X by the rotation of said rotating disc **4** are each held between adjacent claws **19** and delivered one by one. Even when friction between coins or between the coins and the coin delivery table **13** causes coins to move in a direction opposite to the direction X, said claws **19***a* rotate in a counterclockwise direction against springs **21**, adjusting themselves to the resisting force, thus delivering coins in the direction of arrow X without undue strain and causing no damage to claw members **19** and discharge driving plate **14**.

Moreover, said discharge driving plate **14** has a number of projections **14***d*, corresponding to the number of said claw members **19**, and arranged at equal intervals along the circumferential portion **14***a* thereof. As seen in FIG. 3, one end **22***b* of a securing member **22** is mounted on frame **3** so as to move the frame in such a manner that tip **22***a* can be made to engage with and freely disengage from said projections **14***d*. Spring **23** is stretched between frame **3** and securing member **22** to keep tip **22***a* of said securing member **22** engaged with

said projections **14***d*, and a solenoid **24** is positioned adjacent securing member **22**. When current passes through winding **24***a* of said solenoid **24**, securing member **22** moves against the force of said spring **23** to disengage tip **22***a* of said securing member **22** from said projections **14***d*, thereby leaving driving plate **14** free to rotate in the clockwise direction in FIGS. 1 and 3.

A guide member **25** is provided in the gap *a* formed between the lower surface of base **1***c* of said funnel-shaped coin container **1** and the upper surface of the rotating disc **4** and the coin delivery table **13**, and is movable in both directions parallel to the length of said tangential portion **2***a*. Tip **25***a* on said guide member **25** has one side substantially parallel with said tangential portion **2***a* and has the other side in the shape of a circular-arc concentric with said rotating disc **4**. A tension spring **27** is stretched between a projection **25***c* on an end portion **25***b* on said guide member **25** and shaft **26** (see FIG. 1) attached to frame **3** through a groove **25***d* which extends parallel to the direction of arrow X, so that said guide member **25** is always urged in a direction opposite to the direction of arrow X. As shown in FIG. 1, therefore, coins A, which are arranged irregularly in the circumferential direction in the groove formed by the inner circumferential surface of the circular-arc outer wall **2** and the downwardly facing surface of base **1***c* of the funnel-shaped coin container and the upwardly facing surface of the rotating disc **4** are moved counterclockwise (in FIG. 1), and are separated, coins A in the outermost circumferential row being moved in a row in the tangential direction of arrow X, and the coins A at the inner part now being returned into said groove. When the coins A are separated, said guide member **25** can be moved backwards resiliently to ensure a very smooth separation.

Furthermore, a contact strip **28** is provided opposite the discharge driving plate **14**, and has a tip **28***a* which is near the guide member **25**. A spring **29** is mounted on frame **3** and is connected to contact strip **28** to force contact strip **28** to turn toward the discharge driving plate **14** (counterclockwise in FIGS. 1 and 3). Switch **30** is mounted on frame **3** in such a manner that it is closed by the end **28***b* of the contacting strip **28** when contacting strip **28** moves clockwise against the force of spring **29** when a coin A passes it. In this manner, every time a coin A from the row of coins moves past the tip **28***a* of contact strip **28**, switch **30** is closed to generate a pulse, and, as shown in FIG. 4, energizes a preset coin counter **31** (any known coin counter) to cause it to count and memorize the number of coins which have been thus sensed and to make count indicator **32** indicate the number of coins which have been sensed. Said preset coin counter **31** is designed to cause any desired number of coins to be discharged from the coin counter. By closing switch **35** on lead wire **34** from power source **33**, motor **5** is energized to rotate disc **4**, and solenoid winding **24***a* is energized to unblock discharge driving **14** and permit it to discharge coins A from the row of coins onto coin delivery table **13** one by one, and causing said count indicator **32** to indicate the number of coins discharged. When the desired number of coins has been discharged, the power circuit to said motor **5** and solenoid winding **24***a* is automatically cut off to stop the operation of motor **5** and instantaneously bring discharge driving plate **14** to a stop, so that any desired number of coins can be discharged.

With the apparatus constructed as described, a large number of coins is put in said funnel-shaped coin container **1**, and when switch **35** is closed the coins are stirred by conical protrusions **10** on rotating disc **4** and are moved in the radial direction under the action of centrifugal force. A row of coins A are gently led into the groove formed by the lower surface of base **1***c* of said funnel-shaped coin container and the upper surface of said revolving disc. The coins in the outermost part are continuously led in a row onto coin delivery plate **13**, moving in the direction of arrow X along the tangential portion **2***a* of the circular-arc outer wall **2**. Individual coins are held one at a time between adjacent claws **19***a* on discharge driving plate **14** that rotates on said coin delivery table **13** in the direction of the flow of coins A, and are discharged one by one in succession. The number of coins A can be counted correctly and indicated on count indicator **32** by the action of switch **30** intermittently closed by contact strip **28** that is moved every time it is contacted by passing coins. It is also possible to have the desired number of coins counted and discharged correctly and speedily by setting preset coin counter **31** at that number and causing discharge driving plate **14** to stop simultaneously with the discharge of that number of coins.

Furthermore, the provision of the conical baffle plate **11** which is smaller than the inside diameter of the funnel-shaped coin container **1** at a specific height above the lower opening **1***d* of said coin container insures that no matter how high coins may be piled up, coins above said baffle plate **11** are supported by it and coins on said rotating disc **4** are subjected to a substantially constant pressure of coins below said baffle plate **11** so that they are given a smooth anti-vortex motion in a radial direction outwardly from the center thereof. Coins on the baffle plate **11** will fall successively from around the circumferential edge thereof. Accordingly, a large number of coins can be counted at one time.

When coins on the rotating disc **4** are successively discharged, by said anti-vortex motion, through the groove defined by the inner circumferential surface of said circular-arc outer wall **2** and the upper surface of said rotating disc **4**, it sometimes occurs that coins stand upright and side-by-side on the lower end surface of said funnel-shaped coin container and are unable to move into the gap on the rotating disc. According to the present invention, coins on said rotating disc **4** are constantly stirred and laid flat by the projections **10** irregularly spaced on the upper surface of the disc.

It is thought that the invention and its advantages will be understood from the foregoing description and it is apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing its material advantages, the form hereinbefore described and illustrated in the drawings being merely a preferred embodiment thereof.

What is claimed is:

1. An apparatus for counting coins, comprising a coin container having an inverted conical inside bottom surface having a lower opening therein, a laterally extending substantially horizontal base on the bottom of said coin container, a rotating disc mounted rotatably below said coin container substantially concentric with said lower opening, and spaced from said base a distance only slightly greater than the thickness of the coins to be counted, a wall depending from said base and having a circular-arc shape and extending along the periphery of said rotating disc, said wall having a gap therein, one end of the wall adjacent said gap extending tangentially of the circular arc along which the remainder of said wall lies, a coin delivery table in said gap on a level with the upper surface of said disc, a coin discharge driving plate rotatably mounted on said coin delivery table and having the periphery thereof on the tangent along which said one end of said wall extends, claws on said coin discharge driving plate spaced along the circumference thereof at distances substantially equal to the size of the coins being counted, and drive means coupled to said rotating disc and said coin discharge driving plate for rotating them simultaneously.

2. An apparatus as claimed in claim **1** in which said coin container includes a conical baffle plate having about the same diameter as said lower opening and positioned

in said container above said lower opening with the apex thereof pointing upwardly.

3. An apparatus as claimed in claim 1 in which said rotating disc has projections on the upper surface thereof at different distances from the center thereof and spaced from each other in the circumferential direction of said disc.

4. An apparatus as claimed in claim 1 further comprising counting means adjacent said discharge driving plate and actuated by each coin which is moved by said discharge driving plate.

5. An apparatus as claimed in claim 4 further comprising stop means engageable with said coin discharge driving plate for stopping the rotation of said plate and blocking further rotation thereof, and control means coupled to said counting means, said driving means and said stop means for controlling the actions of said means to unblock said driving plate and energize said driving means for running said apparatus until a predetermined number of coins are counted by said counting means.

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