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METHOD AND DEVICE OF COUNTING COINS

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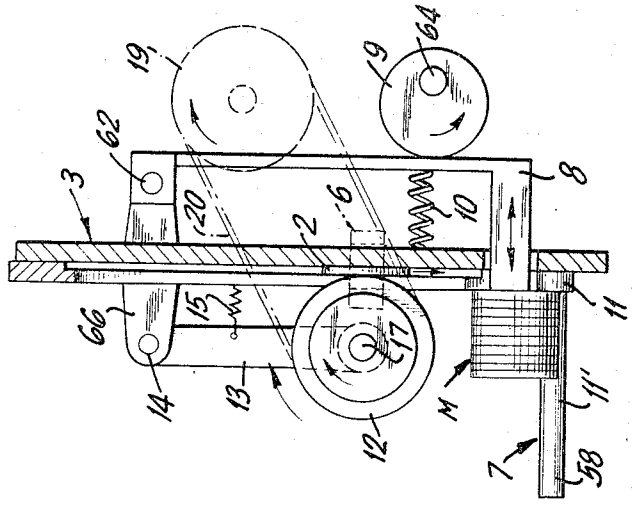


FIG. 2

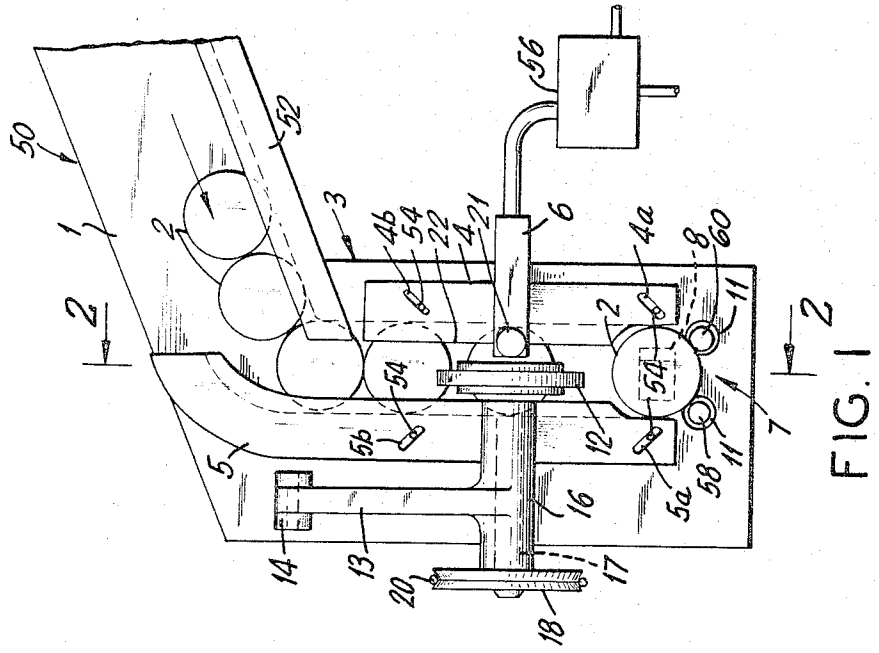


FIG. 1

INVENTOR.
KURT BECKER

BY

McGlew & Toren
ATTORNEYS.

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METHOD AND DEVICE OF COUNTING COINS

Kurt Becker, Berlin-Wilmersdorf, Germany, assignor to Firma F. Zimmerman & Co., Berlin, Germany

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This invention relates, in general, to coin counting machines and, in particular, to a new and useful coin counting and roll wrapping machine having means for rapidly counting coins by an electrically operated sensing head and for conveying them past the sensing head to a wrapping station.

The invention deals with a coin counting machine of a type which includes a drop shaft or chute for delivering coins onto an aligning bar system and with means for counting each coin as it is delivered. The counting means is adapted to be connected to means for triggering a wrapping operation when the coins reach a predetermined number of pieces. The invention provides improved means for conveying the coins past the counting head which ensures that the coins will not re-enter the counting zone after they have been dropped onto the aligning bars.

The invention is particularly applicable to a type of coin counting and packaging machine which includes a track or coin conduit which leads from a collecting receptacle for the coins and is provided with a vertical drop or shaft for coins of a selected denomination for facilitating the delivery of the coins onto an aligning bar system on which they are wrapped after a predetermined number of coins are delivered and assembled in a roll on the aligning bars. The counting device is advantageously of a type which includes an electronic or magnetic scanning head which is connected in an electrical circuit to operate a wrapping device for wrapping the coins accumulated on the aligning bar system when the head has counted a predetermined number of pieces. The system further includes means connected to the scanning system for stopping the drop of the coins in the shaft during the wrapping operation. A coin roll packaging machine must operate in a manner to ensure that the coins are wrapped only with the exact number of coins which are specified for each roll. For the really accurate counting of coins, it has been acceptable up to the present time to provide for mechanical counting means. Mechanical money counting devices operate with pawls which have the disadvantage that they do not count fast enough and are very noisy in operation. Attempts have been made to replace the mechanical pawl counting by electrical contacts which can be actuated through a pawl or feeling lever. But the contacts are relatively unreliable and it sometimes happens that because of poor contact making between the contact points that inaccurate counting occurs and this cannot be overcome by the use of microswitches. The counting speed thus is limited with the contact counting. The use of photocells is not entirely satisfactory because the coins, because their collection of dirt particles, after repeated use, will contaminate the photocells during counting. For all these reasons, it has been necessary until the present invention to rely on the very slow but accurate mechanical coin counting and packing machine, but the output of such machines is rather limited.

In accordance with the present invention, the output of such machines is increased by providing a reliable electric counting head which may operate effectively to count coins of all diameters and to ensure accurate counting even at rapid coin feeding. In the preferred arrangement of the invention, there is provided an electronic scanning head preferably an inductive scanning head, which is located in a drop shaft for the coins directly above aligning bars which are adapted to receive the coins from the drop shaft prior to the wrapping thereof. Means are provided to insure a continuous down feeding of the coins to the aligning bars and to prevent the back feeding thereof into the field of the counting head so that no inaccurate counts can be obtained. These means advantageously include an elastically mounted rotationally driven conveyor disc which is adapted to bear against the coins and feed them downwardly. The conveyor disc is advantageously made of a material such as rubber which will not be affected by the electrical pulse counting system. The system is such that there can be no possibility of the coins bouncing on the receiving bars backwardly up into the sensitive area of the electronic counting head.

The aligning bar system advantageously includes means for insuring that after the coin is received at the aligning bar and delivered forwardly, it cannot move backwardly into the receiving area. This is accomplished by providing a widened offset at the receiving area so that the coins can be moved off the offset onto a smaller diameter portion of the aligning bar system and will not be able to move backwardly onto the widened diameter portion. With such an arrangement, it is possible to operate the counting machine at very high speeds and to insure accurate counting at all times.

A further feature of the invention is that the machine advantageously includes adjustable means in the drop chute or shaft for resetting from one kind of coin to another. The mounting of the conveyor disc for the coins will not be affected by the change in the coin dimension which is being handled. This is true because the conveyor disc is advantageously mounted on a pivotal lever which is biased in a direction toward engagement with the coin. The disc is driven by a pulley which is mounted on a common shaft therewith and which, in turn, is belt driven from a pulley on a shaft of rotationally mounted on the housing of the drop shaft. The drive of the conveyor roll from the pulley fixed on the machine frame and to a pulley fixed on the pivot lever is effected by a longitudinal expansible belt.

The conveyor disc is advantageously arranged in proximity to the scanning head and the scanning head is advantageously arranged with its field line center of oscillation field generation located in the median line of the coin interstices or along a line at which the scanning distance across the coins and the spaces between the coins when they are abutting in a row is substantially equal. The mounting of the scanning head is such that it may be adjusted to accommodate the various dimensions of coins to be counted and to be placed on the median line as desired.

Accordingly, it is an object of the invention to provide a coin counting machine with an electronic scanning head with conveyor means for feeding the coins downwardly past the head in a manner to ensure that they will be counted only once and permitting the coining thereof at very high speeds.

A further object of the invention is to provide a coin counting machine which includes passage means such as a vertical drop shaft for delivering coins of a selected denomination onto spaced aligning bars upon which they are wrapped together in a roll; and with further means connected to the scanning head for setting off the wrapping operation after a selected number of coins has been delivered and wherein there is provided a conveyor disc which frictionally bears against the coins in the drop shaft and delivers them downwardly past the scanning head in a manner preventing their back feeding and which further includes means at the aligning station for ensuring that the coins will be fed forwardly on the station and will not back into the area of the counting head.

A further object of the invention is to provide a coin

counting machine which is simple in design, rugged in construction and economical to manufacture.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, its operating advantages and specific objects attained by its use, reference should be had to the accompanying drawings and descriptive matter in which there is illustrated and described a preferred embodiment of the invention.

In the drawings:

FIG. 1 is a partial side elevational view of coin counting and packaging machine constructed in accordance with the invention; and

FIG. 2 is a section taken on the line 2—2 of FIG. 1.

Referring to the drawings, in particular, the invention embodied therein comprises a coin counting machine generally designated **50** which includes a housing **1** having an inclined track **52** at its bottom end along which coins **2** are permitted to roll. The track **52** advantageously includes openings along its length for selecting coins of a desired size, but the one indicated in the drawings is for the coin of smaller dimension which has already moved past the openings (not shown) provided for coins of larger dimensions.

The housing **1** provides means for adjustably positioning guide elements or ledges **4** and **5** which are advantageously provided with spaced slots **4***a* and **4***b* and **5***a* and **5***b*, respectively, which permit the adjustable lateral displacement thereof on mounting pins **54** which are formed as inward projections of the housing **1**.

In accordance with the invention intermediate the length of the guides **4** and **5**, there is arranged an inductive scanning head **6** which is advantageously fork-shaped and includes elements which will be disposed on each side of the coins which are delivered downwardly between the guides in the drop shaft **3**. Means are provided to adjustably position the scanning head **6** so that it will sense the passing coin **2** in the most desirable manner and deliver the sensed pulse to a control mechanism generally designated **56** which is schematically indicated. The control **56** is connected to a coin wrapping mechanism (not shown) for initiating and stopping actuating the latter in accordance with the selected number of coins which are sensed. The field line center of the inductive scanning head **6** is indicated at **21** and is advantageously oriented so that it will intercept the coins along a median line of the oscillation field generated which will be located at the center line of the coin interstices, that is, along a line at which the space across the coin and between adjacent coins when they are abutting is substantially equal.

After the coins pass the scanning head **6**, they fall onto an aligning bar system generally designated **7**.

In accordance with the invention, the aligning bar system **7** advantageously includes spaced cylindrical rod members **58** and **60** which form a support therebetween for the coins which are delivered through the drop shaft **3** and the coins are assembled between the rods **58** and **60** into a roll M. A feature of the construction is that the rods **58** and **60** are provided with a widened end portion **11** directly below the chute for the coins **2** upon which the coins are first delivered after they are fed past the scanning head **6**. An ejector mechanism is provided for advancing the coin off the widened portion **11** which includes an ejector lever or pusher **8** which is pivotally mounted on an extension of the housing **1** at pivot **62** and which is oscillated about the pivot **62** by means of an eccentric **9** carried on a shaft **64** which is rotated constantly. A return compression spring **10** urges the lever **8** against the eccentric **9**, and the lever **8** is oscillated sufficiently to move each coin as it appears on the widened portion **11** along the rods **58** anad **60** onto a smaller dimensioned portion **11'**. A feature of this construction is that once the coin is pushed by the ejector **8** off the widened portion **11**, it will not be able to move backwardly onto the widened portion since it will be stopped by the abutment formed between the portions **11** and **11'**.

In order to prevent the coins from landing on the widened portion and then bouncing backwardly upwardly into the field of the scanning head and to insure proper feeding past the head, the invention provides conveyor means for the coins **2** which includes a rotatable friction disc or disc conveyor **12** which is rotatably mounted on an arm **13** which is pivotally mounted at pivot **14** on a bracket **66** which is mounted on the housing **1**. A tension spring **15** urges the lever **13** in a direction to cause it to frictionally drive the coin **2** which is being delivered through the drop shaft **3**. The disc **12** is constantly driven through a pulley **18** affixed to a shaft **17** which also carries the disc. The pulley **18** is driven by a round belt **20** from a constantly rotating pulley **19** (driven by means not shown) which is rotatably mounted on the housing **1**. In some instances, it is preferable to substitute for the round belt, a longitudinally extensible belt (pese belt) which renders attraction spring **15** unnecessary.

In accordance with the transmission speed which is adapted to the coin passage, the conveyor disc **12** effects the movement or feeding of the coins through the scanning head zone at constant speed and prevents with absolute certainty any rebound of the coin as well as even a brief stay in the limit zone of the scanning head. Thus, with such an arrangement it is possible to eliminate all incorrect counts and to increase the counting speed and packaging operation of the device.

When the scanning head counts a predetermined number of coins, the control **56** is effected to cause the wrapping mechanism (not shown) to wrap the roll of coins which have accumulated on the aligning system **7**. In addition, means are provided in the control **56** for stopping the further down feed of the coins through the drop shaft **3**.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the inventive principles, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. A method of counting coins using a drop shaft having a passage size for a single coin only and an electronic inductive scanning head producing a sensing field in the drop shaft with an aligning bar system below the drop shaft in a position to receive and support the coins in an upright position for assembly into a roll comprising delivering the coins to the drop shaft and permitting them to fall one by one by gravity to the vicinity of the scanning head, and positively advancing the coins past the head and away from the head by frictionally engaging each coin while it is advanced in a manner to keep the coin in the sensing field only for the time necessary to sense its presence and to feed it away from the field and prevent its reentry thereto.

2. A coin counting and wrapping machine, comprising means defining a drop shaft for delivering the coins downwardly, and an aligning bar system located below said drop shaft to receive the coins and to support them upright, a scanning head located intermediate the length of said drop shaft and providing a sensing field to sense each of the coins as they are fed therepast, and a disk rotatably mounted directly adjacent said drop shaft and said scanning head and oriented with its circumference extending into said drop shaft at a location to engage each coin when it arrives at the location of said scanning head to positively feed each coin in succession past said scanning head and to prevent any subsequent movement of said coin into the sensing field of said scanning head.

3. A coin counting and wrapping machine, comprising means defining a drop shaft of a size for delivering one coin at a time downwardly in said shaft, and an aligning bar system located below said drop shaft to re-

ceive each coin in succession and to support them upright, an inductive scanning head located intermediate the length of said drop shaft to sense the coins which are fed along said drop shaft, and a disk rotatably mounted directly adjacent said drop shaft and said scanning head and oriented with its circumference extending into said drop shaft at a location to engage each coin when it arrives at the location of said scanning head and to positively feed each coin in succession past said scanning head and to prevent any subsequent movement of said coin into the sensing field of said scanning head.

4. A coin counting and wrapping machine, comprising means defining a drop shaft for delivering the coin downwardly, and an aligning bar system located below said drop shaft including two spaced aligning bars located to receive the coins therebetween and to support them upright, said aligning bars including a widened portion directly below said drop shaft for receiving the coins initially, ejector means to move the coins along said aligning bars off the widened portion, said widened portion preventing the return of the coin in a position below the drop shaft, a scanning head located intermediate the length of said drop shaft and providing a sensing field to sense the coins as they are fed therepast, and a disk rotatably mounted in a position so that its periphery engages each coin in succession and feeds it in a downward direction only past said scanning head and prevents its subsequent upward movement.

5. A coin counting and wrapping machine, comprising means defining a drop shaft for delivering the coins downwardly, and an aligning bar system located below said drop shaft including two spaced aligning bars located to receive the coins therebetween and to support them upright, said aligning bars including a widened portion directly below said drop shaft for receiving the coins initially, ejector means to move each coin along said aligning bars off the widened portion, said widened portion preventing the return of the coin in a position below the drop shaft, a scanning head located intermediate the length of said drop shaft, said scanning head including a leg portion positioned on each side of the coins which are fed along said drop shaft, means mounting said scanning head for adjustable positioning in respect to the diameter of the coins fed thereby, and conveyor means for feeding said coins past said scanning head including a rotatable disc adapted to bear against the coin in the vicinity of said scanning head and to move the coin downwardly in the drop shaft and to prevent its subsequent upward movement.

6. A coin counting and wrapping machine, comprising means defining a drop shaft for delivering the coins downwardly, and an aligning bar system located below said drop shaft including two spaced aligning bars located to receive the coins therebetween and to support them upright, said aligning bars including a widened portion directly below said drop shaft for receiving the coins initially, an ejector mechanism including a pivotal lever movable against the coins on the widened portion of said aligning bar system to move each one along said aligning bars off the widened portion, said widened portion preventing the return of the coin in a position below the drop shaft, means for moving said ejector after each coin is delivered to said aligning system, a scanning head located intermediate the length of said drop shaft and conveyor means for feeding said coins past said scanning head including a rotatable disc adapted to bear against the coin in the vicinity of said scanning head and to move the coin downwardly in the drop shaft and to prevent its subsequent upward movement.

7. A coin counting and wrapping machine, comprising means defining a drop shaft for delivering the coins downwardly, and an aligning bar system located below said drop shaft including two spaced aligning bars located to receive the coins therebetween and to support them upright, said aligning bars including a widened portion directly below said drop shaft for receiving the coins initially, an ejector mechanism including a pivotal lever movable against the coins on the widened portion of said aligning bar system to move each one along said aligning bars off the widened portion, said widened portion preventing the return of the coin in a position below the drop shaft, means for oscillating said ejector mechanism including a constantly driven eccentric spring means biasing said ejector against said eccentric, a scanning head located intermediate the length of said drop shaft, said scanning head including leg portions positioned on each side of the coins which are fed along said drop shaft, means mounting said scanning for adjustable positioning in respect to said coins for accommodating the diameter of the coins fed thereby, and conveyor means for feeding said coins past said scanning head including a rotatable disc adapted to bear against the coin in the vicinity of said scanning head and to move the coin downwardly in the drop shaft and to prevent its subsequent upward movement.

8. A coin counting and wrapping machine, comprising means defining a drop shaft for delivering the coins downwardly, and an aligning bar system located below said drop shaft including two spaced aligning bars located to receive the coins therebetween and to support them upright, said aligning bars including a widened portion directly below said drop shaft for receiving the coins initially, an ejector mechanism including a pivotal lever movable against the coins on the widened portion of said aligning bar system to move it along said aligning bars off the widened portion, said widened portion preventing the return of the coin in a position below the drop shaft, means for oscillating ejector including a constantly driven eccentric spring means biasing said ejector against said eccentric, a scanning head located intermediate the length of said drop shaft, said scanning head being substantially fork-shaped and including leg portions positioned on each side of the coins which are fed along said drop shaft, means mounting said scanning for adjustable positioning in respect to the coins fed, and conveyor means for feeding said coins past said scanning head including a rotatable disc adapted to bear against the coin in the vicinity of said scanning head and to move the coin downwardly in the drop shaft, said conveyor means including a pivotal lever member mounted on said housing, said pivotal lever member carrying said rotatable disc at its one end and pulley means mounted on said housing driving said rotatable disc including a first rotatable pulley mounted on said lever member end and a second driving pulley rotatably mounted on said housing and constantly driven, and belt means connected between said driving pulley and said first pulley.

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ROBERT B. REEVES, *Primary Examiner.*

STANLEY H. TOLLBERG, *Examiner.*