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Kawasaki et al.

[11] **3,841,457**

[45] **Oct. 15, 1974**

[54] **DEVICE FOR AUTOMATIC COLLECTION OF COINS IN COIN-OPERATED APPARATUS**

[75] Inventors: **Sadao Kawasaki; Tadayoshi Kaneda; Mitsuaki Tanaka**, all of Himeji, Japan

[73] Assignee: **Glory Kogyo Kabushiki-Kaisha**, Hyogo-Ken, Japan

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[30] **Foreign Application Priority Data**

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Nov. 24, 1971 Japan ..... 46-110070[U]
Nov. 25, 1971 Japan ..... 46-110382[U]

[52] **U.S. Cl.** ..... **194/1 A**, 194/1 F, 194/1 K
[51] **Int. Cl.** **G07f 1/04**
[58] **Field of Search** ..... 194/98, 1 A, 1 B, 1 F, 194/1 K, DIG. 9; 133/8, 1

[56] **References Cited**

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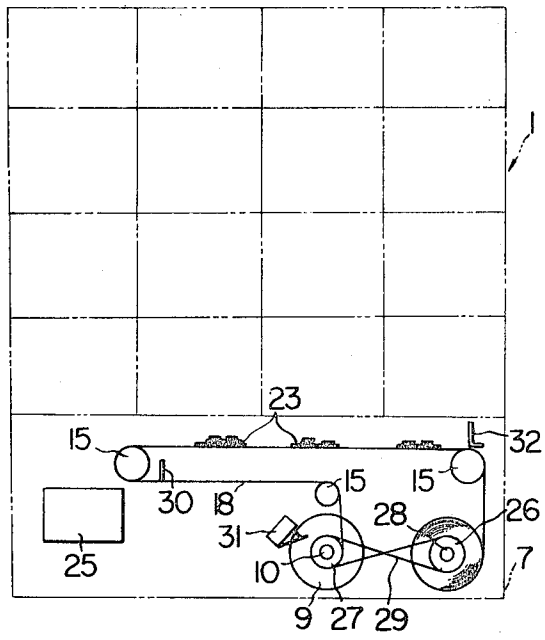
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Primary Examiner—Robert B. Reeves
Assistant Examiner—Thomas E. Kocovsky
Attorney, Agent, or Firm—Holman & Stern

[57] **ABSTRACT**

Coins inserted into the slots of apparatus having a number of coin-operated units in vertical and horizontal arrangement are dropped through vertical chutes onto a conveyor belt housed in a hollow base structure supporting the apparatus thereon. The conveyor belt may be operated intermittently by a timer mechanism to collect the coins dropped thereon during each predetermined length of time into a receptacle positioned adjacent one of its ends.

9 Claims, 6 Drawing Figures



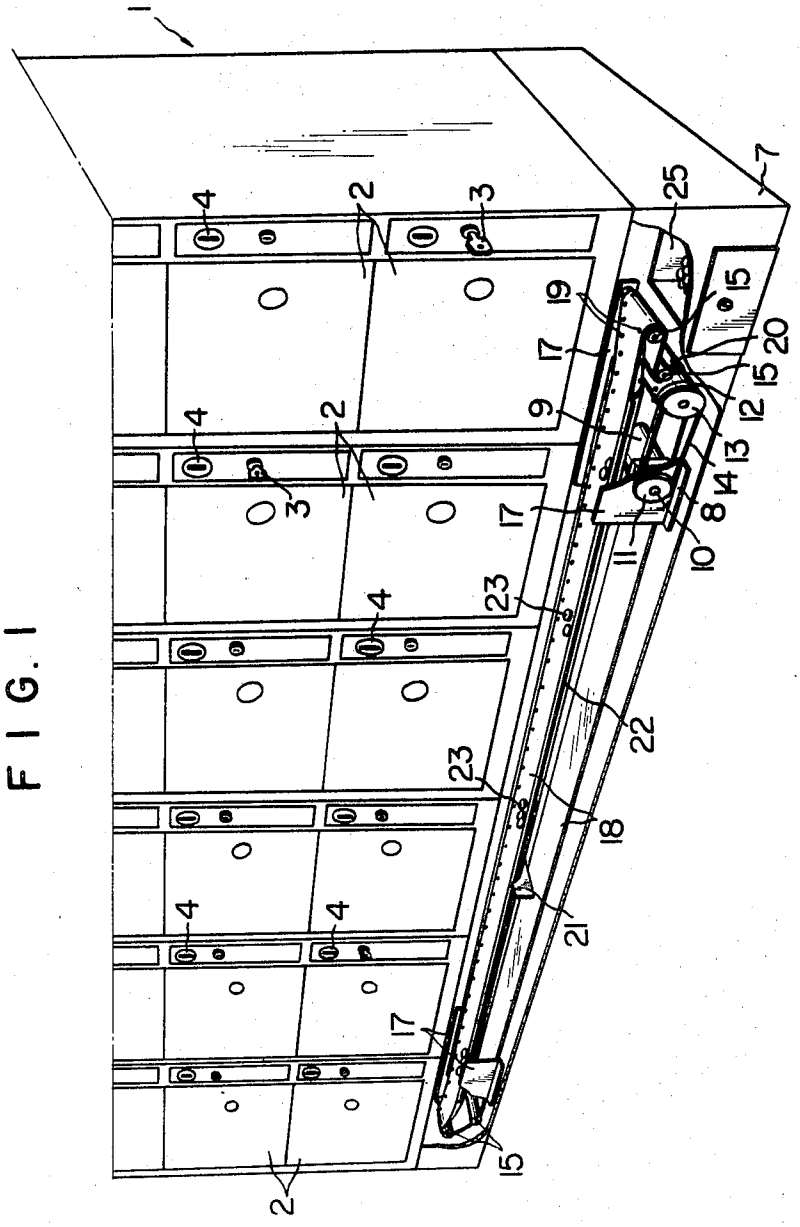


FIG. 1

FIG. 2

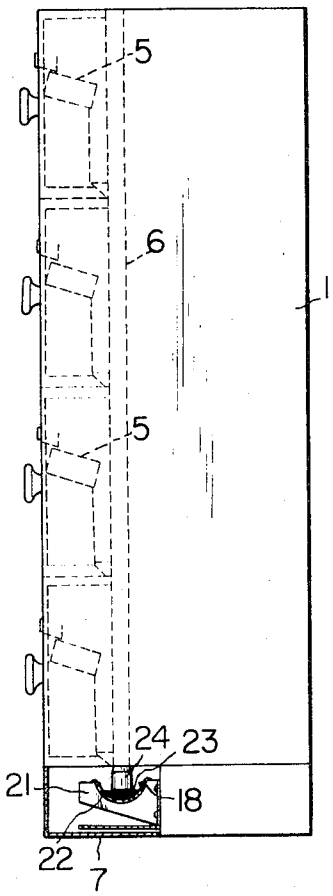


FIG. 3

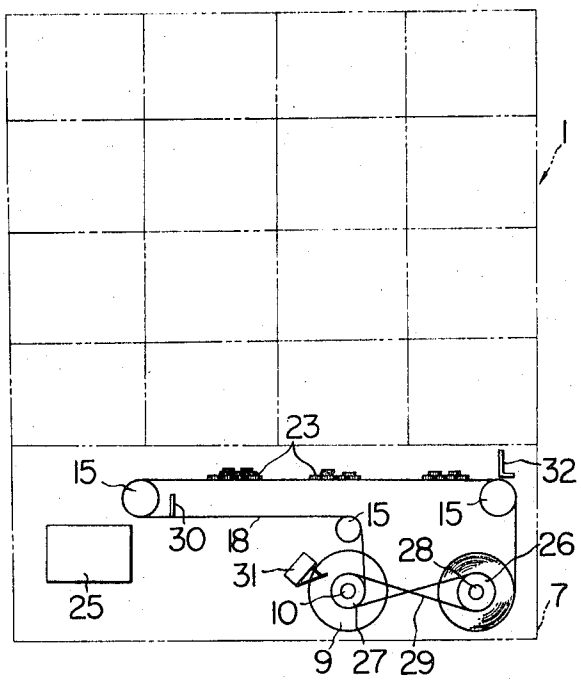


FIG. 4

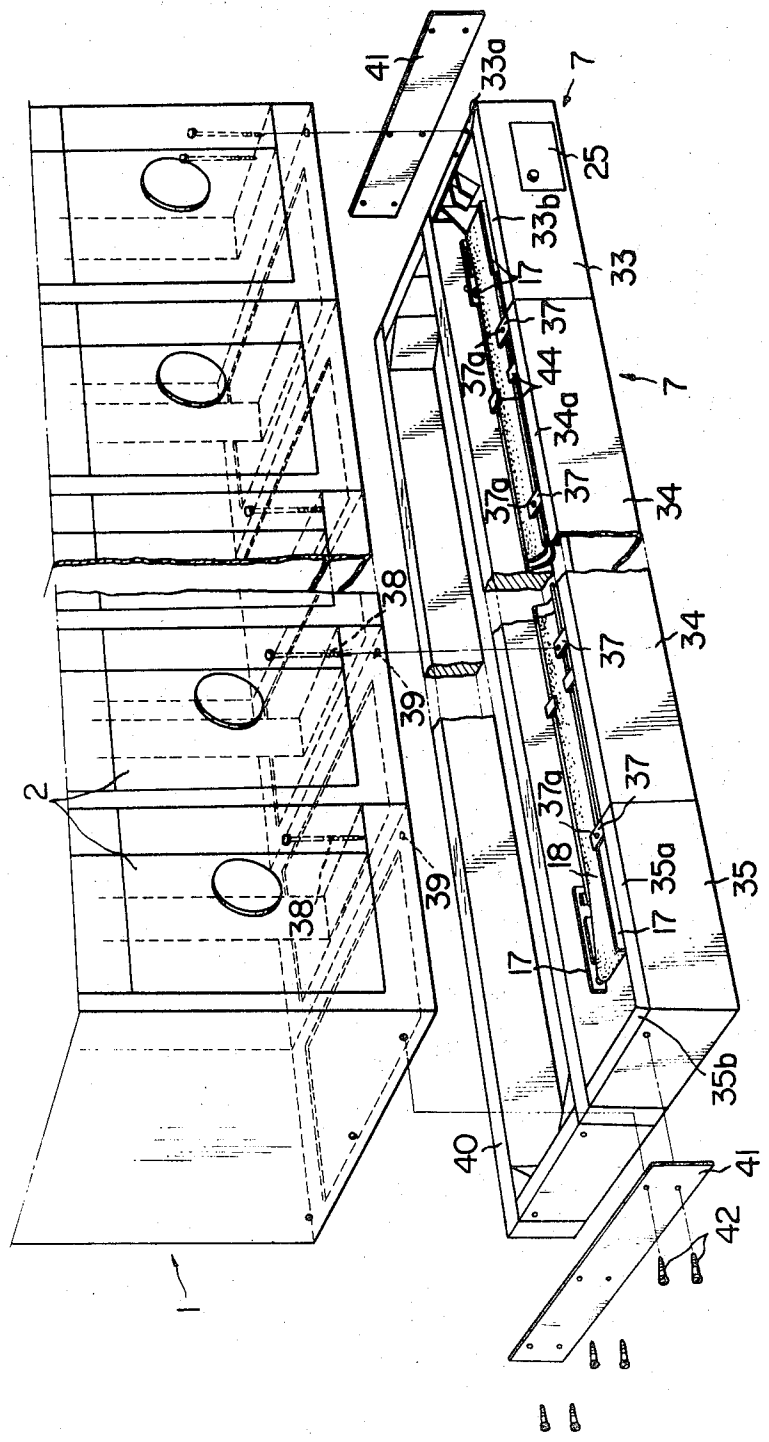

41
33a
7
25
33b
17
33
37
37a
44
34a
7
34
38
39
2
18
35a
35
17
35b
40
41
42
1

FIG. 5

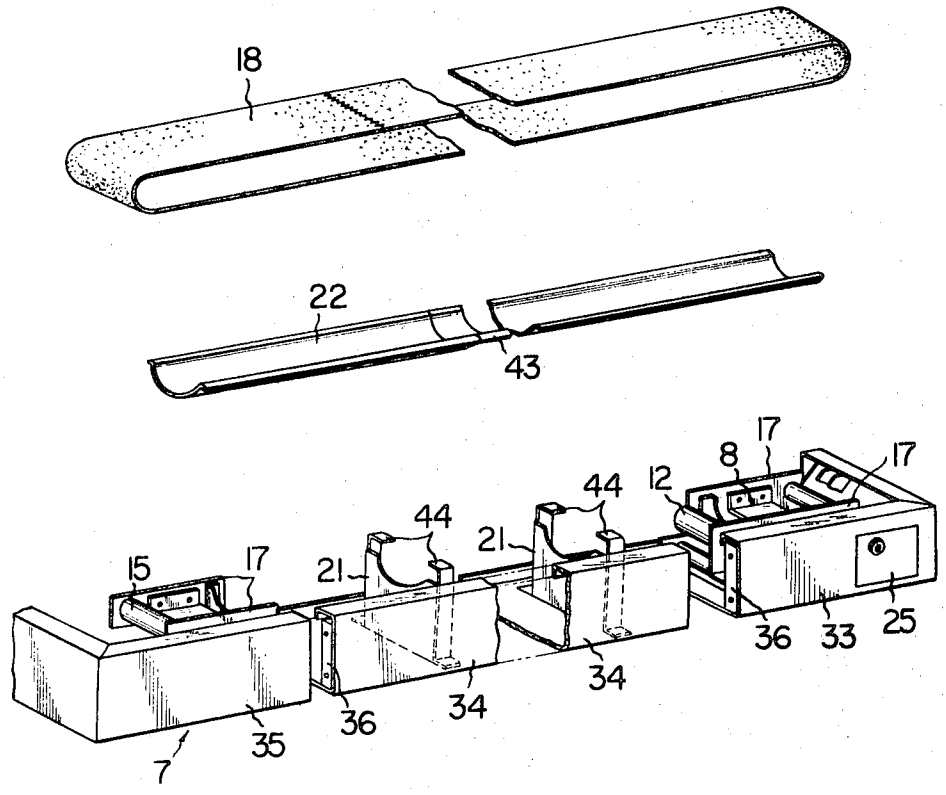
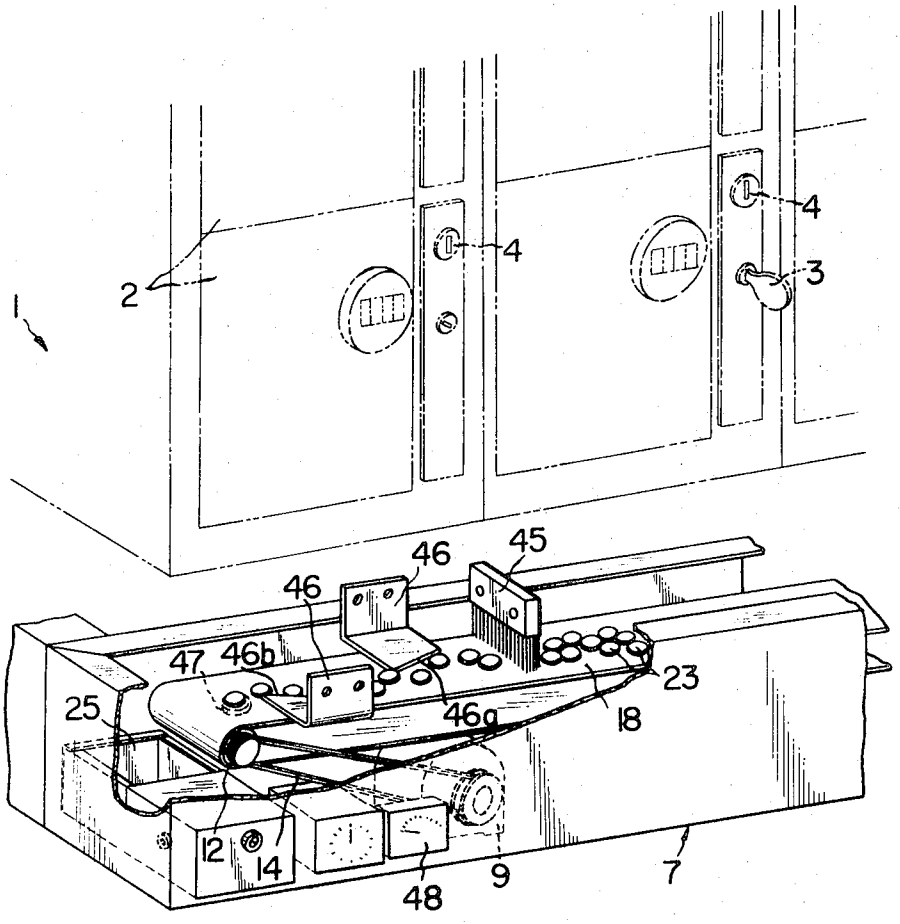


FIG. 6



DEVICE FOR AUTOMATIC COLLECTION OF COINS IN COIN-OPERATED APPARATUS

BACKGROUND OF THE INVENTION

This invention relates generally to coin-operated apparatus such as rental locker system of a type having a number of coin-operated lockers or compartments in vertical and horizontal arrangement. More specifically, the invention relates to a device for automatically collecting the coins inserted into the slots of the coin-operated apparatus.

Heretofore, in a rental locker system of this type, the coins inserted into the slots provided for the respective lockers have been stored separately in receptacles mounted therein. With the advent of rental locker systems comprising a large number of lockers, however, the manual recovery of the coins contained in each of the lockers has become a labor that involves a considerable expenditure of time and energy. If this process of coin recovery could be simplified by automation, the labor or expenses of those in charge of such rental locker systems or similar coin-operated apparatus would be greatly curtailed.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a device of novel, simplified and inexpensive construction for automatically collecting the coins inserted into the slots of apparatus such as a rental locker system having a number of coin-operated units arranged in a plurality of vertical columns and at least one horizontal row.

Another object of the invention is to provide a device of the character referred to, in which conveyor means are provided in a hollow base structure at the bottom of the coin-operated apparatus to carry the coins dropped thereon through the slots into a single receptacle positioned at one end thereof. Since the conveyor means can easily be made to operate intermittently by a timer mechanism, all of the coins inserted into the slots during each predetermined length of time can be collected automatically in this receptacle.

A further object of the invention is to provide a device of the character referred to, which can be manufactured inexpensively in a substantially standardized manner irrespective of the number of coin-operated units in each horizontal row of the apparatus to be mounted thereon.

A still further object of the invention is to provide a device of the character referred to, in which provision is made for counting the number of coins being collected automatically in the receptacle.

According to the present invention, briefly summarized, there is provided a device for automatic collection of the coins inserted into slots formed respectively in a number of coin-operated units arranged in a plurality of vertical columns and at least one horizontal row, the said device comprising a plurality of chutes extending respectively along the vertical columns of the coin-operated units for directing the coins downwardly therethrough, a hollow base structure on which the coin-operated units of the above described arrangement are mounted, conveyor means extending horizontally within the hollow base structure for carrying the coins dropped thereon through the chutes toward one and thereof, end a receptacle adjacent the said one end

of the conveyor means for collecting therein the coins carried by the conveyor means.

The novel features which are considered as being characteristic of this invention are set forth in the appended claims. The invention itself, however, together with additional objects and advantages thereof will be best understood from the following detailed description read in connection with the accompanying drawings, in which like reference characters indicate like parts throughout the several views.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings:

FIG. 1 is a partly broken away perspective view of an example of the device of this invention as adapted for automatic coin collection in a rental locker system;

FIG. 2 is a side elevation, partly in phantom view, of the example device of FIG. 1;

FIG. 3 is a schematic front elevation explanatory of another preferred embodiment of the invention;

FIG. 4 is a partly broken away, exploded perspective view of still another preferred embodiment of the invention;

FIG. 5 is also a partly broken away, exploded perspective view showing the essential parts of the example shown in; and

FIG. 6 is a partly broken away, fragmentary perspective view of a further preferred embodiment of the invention.

DETAILED DESCRIPTION

A first preferred embodiment of this invention will now be described with reference to FIGS. 1 and 2. Referring first to FIG. 1 in particular, the rental locker system generally indicated by numeral 1 comprises a number of compartments or lockers in vertical and horizontal arrangement. Doors 2 provided for respective lockers can each be locked by a lock mechanism 5, FIG. 2, when a coin is inserted into a slot 4, and can be unlocked by a key 3 which is released upon insertion of the coin into the slot. The coin thus inserted into each slot 4 is temporarily stored in the corresponding lock mechanism 5 and, at the time of unlocking or upon lapse of a predetermined length of time, is dropped into the corresponding one of chutes 6, FIG. 2, extending vertically along the respective vertical columns of the lockers within the rental locker system 1. Alternatively, the coins may be made to drop immediately into the chutes 6 upon locking of the doors.

This rental locker system 1 is mounted on a hollow base structure 7 of rectangular shape having an open upper end. An electric motor 9 is mounted on a mount 8 adjacent one end of the base structure 7. An endless belt 14 is passed around a pulley 11 fixedly mounted on an output shaft 10 of the motor 9 and another pulley 13 fixedly attached to one end of a drive roller 12 rotatably supported adjacent the same end of the base structure 7, in order to impart the rotation of the motor output shaft 10 to the drive roller 12. A plurality, two in this embodiment of the invention, of guide rollers 15 are rotatably supported by members 17 at each end of the base structure.

An endless conveyor belt 18 stretched around these drive roller and guide rollers has a number of perforations 19 formed at predetermined spacings along both edges thereof to receive pins 20 formed correspondingly on the drive roller 12, so that the conveyor belt

moves with the rotation of the drive roller as guided by the guide rollers 15. The upper stretch or span of this conveyor belt is positioned immediately below the lower ends of the aforesaid chutes 6. A channel-shaped guide 22 on a plurality of spaced apart supports 21 (only one of these supports is shown in FIG. 1) extends along the lower surface of the upper stretch of the conveyor belt 18 to keep the same substantially U-shaped in cross section and thus to prevent coins 23 from falling off the lateral edges of the conveyor belt during transportation thereof hereinafter described.

As seen in FIG. 2, a guide cylinder 24 is provided at the lower end of each of the chutes 6 so that the coins may drop unfailingly on the U-shaped upper stretch of the conveyor belt 18. The coins thus transported by the conveyor belt is collected in a receptacle 25, FIG. 1, in the form of a drawer which can be locked and unlocked in the illustrated position in the conventional way.

Although not shown in the drawings, it is assumed that a timer mechanism is provided to operate the electric motor 9 at a time interval of, say, every 6 hours so that the coins dropped onto the conveyor belt 18 during that time interval may be collected in the receptacle 25 in one batch. This timer mechanism may be of such type, for example, that a pin is adjustably mounted on a dial which makes one complete revolution in every 24 hours, the pin being adapted to operate a switch connected in the circuit supplying electrical energy to the motor 9. The length of time the motor is thus operated each time is regulatable by adjusting the surface of the pin which makes contact with the switch actuator or by adjusting the surface of the switch actuator which makes contact with the pin. Alternatively, a manual switch may be provided in parallel connection with the time switch to operate the conveyor belt 18 as desired.

In the operation of the instant example device, proceeding to the description of operation of the coins inserted into the slots 4 by the users to make use of the lockers are dropped onto the conveyor belt 18 through the lock mechanisms 5 and the chutes 6. As this conveyor belt is moved by the motor 9 at predetermined time intervals as aforesaid, the coins 23 are collected in the receptacle 25 at one end of the base structure 7. A person in charge of this locker system 1 will then unlock the receptacle 25 to draw the same out of the base structure and to remove the coins contained therein.

FIG. 3 illustrates another preferred embodiment of the invention, in which a conveyor belt 18 in the form of a long strip of steel plate is wound on a supply roller 26 fixedly mounted on a revolvable shaft 28 and energized by suitable means in the rewinding direction thereof, which is clockwise as viewed in FIG. 3. The conveyor belt 18 extends over guide rollers 15 to be wound, at the other end thereof, on a drive or take-up roller 27 fixedly mounted on an output shaft 10 of an electric motor 9. An endless belt 29 is stretched crosswise between the take-up roller 27 and the supply roller 26 in order to impart the rotation of the motor output shaft 10 to the supply roller 26.

A switch actuating member 30 is fixed in such a position on the conveyor belt 18 that when the belt has been moved to such an extent that the coins 23 thereon are all dropped into a receptacle 25 in the form of a drawer, the switch actuating member 30 operates a suitably supported switch 31 connected in the circuit supplying electrical energy to the motor 9. A stop 32 is provided at one end of the upper stretch of the conveyor belt 18 opposite to the receptacle 25 in order to prevent the coins from falling off the said one end of the upper belt stretch during the rewinding operation of the conveyor belt, as hereinafter described in more detail.

In this second embodiment of the invention constructed substantially as hereinbefore described, the supply roller 26 is rotated counterclockwise, as seen in FIG. 3, against a force tending to turn the same in the opposite direction when the electric motor 9 is operated to wind the conveyor belt 18 on the take-up roller 27. As the conveyor belt is thus moved over the guide rollers 15, the coins 23 dropped onto its upper stretch through the chutes 6, FIG. 2, are collected in the receptacle 25 as above stated. When all of the coins on the upper belt stretch been dropped into the receptacle, the switch actuating member 30 operates the switch 31 to stop the operation of the motor 9. Thereupon the conveyor belt is automatically rewound on the supply roller 26 due to the aforesaid force tending to turn the same clockwise as seen in FIG. 3. Although the coins dropped onto the upper stretch of the conveyor belt during this rewinding operation hereof are carried in the direction opposite to the receptacle 25, they are prevented from falling off the belt by the stop 32 and are collected in the receptacle 25 when the conveyor belt is moved the next time in the winding direction thereof.

The rewinding of the conveyor belt in this second embodiment of the invention may be effected by utilizing the elasticity of the belt itself, or by reversing the direction of revolution of the motor output shaft 10. Further, if the total length of the conveyor belt 18 is suitably increased, the belt can be driven in the winding or coin-collecting direction several times before being driven in the opposite or rewinding direction.

In a third preferred embodiment of the invention illustrated in FIGS. 4 and 5, which may be considered as a modification of the example devices shown in FIGS. 1 and 2, the length of the base structure 7 is made variable to adjust for locker systems having a various number of compartments or lockers in each horizontal row. Referring generally to both of these drawings, the base structure 7 is divided into three sections consisting of a first outer section 33, an intermediate section 34 and a second outer section 35. The upper edges of these sections are all bent inwardly at 33*a*, 33*b*, 34*a*, 35*a* and 35*b* to provide flange surfaces on which the locker system 1 is mounted. Further, as best shown in FIG. 5, these sections are fixedly provided with side flanged edges 36 thereby to be horizontally joined together in a suitable manner, as by rivetting.

The intermediate section 34 of the base structure has a plurality of members 37 projecting inwardly from its upper edge 34*a*, each of the members having a hole 37*a* into which a bolt 38 is to be inserted through a hole 39 formed correspondingly through the bottom of the locker system 1. The locker system thus mounted on the base structure 7 and a wooden framework 40 on its back may then be securely interconnected by a pair of plate members 41 attached to the side surfaces of the locker system and the first and second outer sections 33 and 35, respectively, by screws 42.

An electric motor, not shown in FIGS. 4 and 5, is positioned on a mount 8 to impart rotation to a drive roller 12 in the first outer section 33 in a manner substan-

tially as previously set forth in connection with FIG. 1. Extending between this drive roller 12 and a guide roller 15 in the second outer section 35 is a conveyor belt 18 formed by sewing together both ends of a strip of suitable material to adjust for the distance between the drive roller and the guide roller. A channel-shaped guide 22 having a length adjusted by a junction piece 43 in accordance with the aforesaid distance between the drive and guide rollers is mounted on a plurality of spaced apart supports 21 secured to the bottom of the intermediate section 34 of the base structure. Additional supports 44 may be provided adjacent the first mentioned supports 21 to prevent lateral displacement of the conveyor belt 18 on the channel-shaped guide 22. Other details of construction and operation are substantially as above described with reference to FIGS. 1 and 2.

In this manner, locker systems having a various number of lockers in each horizontal row can be mounted on the base structure 7 only if the length of its intermediate section 34 and of the conveyor belt 18 and the guide 22 is adjusted according to the lengths of the repsective locker systems. The intermedaite section may be manufactured in various lengths to make possible the ready assemblage of base structures having correspondingly varied lengths.

FIG. 6 illustrates a further preferred embodiment of the invention in which means are provided for counting the coins as they are conveyed successively to the receptacle 25. The base structure 7 in this embodiment is fixedly provided with a brush 45 for setting apart any coins lying in a superposed manner on a conveyor belt 18 which extends between a drive roller 12 and one or more guide rollers, not shown, mounted adjacent the other end of the base structure and which is kept substantially U-shaped by the guide 22 shown in FIGS. 1 and 2. On that side of the brush 45 which is closer to the receptacle 25, a pair of substantially L-shaped members 46 are supported by the base structure to form coin-aligning means in combination with the brush 45. The L-shaped members have edges 46*a* and 46*b*, respectively, in slidable contact with the upper surface of the upper stretch of the conveyor belt 18. As illustrated, these edges 46*a* and 46*b* of the members 46 project from both sides of the belt toward its center with such relative angles that the coins 23 passing therealong are neatly aligned as they leave the edge 46*b*.

Under the upper stretch of the conveyor belt 18 there is provided a proximity switch 47 to detect the successive passage thereon of the coins aligned as above described by the brush 45 and the edges 46*a* and 46*b* and to correspondingly operate an electromagnetic counter 48 in a known manner, the electromagnetic counter being mounted at the bottom of the base structure 7. It is thus possible to automatically count and duly register the number of coins collected in the receptacle 25 each time the conveyor belt 18 is moved by the timer mechanism described in relation with the first preferred embodiment of the invention. Other details of construction and operation are substantially as set forth with reference to FIGS. 1 and 2.

We claim:

1. A coin collecting apparatus for use in rental lockers, automatic vending machines, and the like which have a plurality of coin-operated units disposed in a plurality of rows and columns, said apparatus comprising in combination with said coin-operated units:

a hollow base structure for mounting said plurality of coin-operated units;

a plurality of members for fixing said coin-operated units onto said base structure;

a plurality of chutes extending vertically along the respective columns of said coin-operated units for directing the coins downwardly therethrough;

coin conveyor means extending horizontally within said hollow base structure for carrying the coins discharged thereon through said chutes toward one end thereof;

driving means for driving said conveyor means;

drive-control means for controlling the starting and stopping of said drive means, said drive-control means including a timer means for controlling the automatic operation of said driving means at predetermined time intervals; and

a coin receptacle disposed adjacent said one end of said conveyor means for collecting therein the coins carried by said conveyor means.

2. A coin collecting apparatus as claimed in claim 1, further comprising a lock and a key which allow removal of coins collected in said coin receptacle by particular individuals.

3. A coin collecting apparatus as claimed in claim 1, further comprising means for protecting the coins from jumping out of said coin conveyor means.

4. A coin collecting apparatus as claimed in claim 1, in which said conveyor means comprises a drive roller, means for imparting rotation to said drive roller, a plurality of guide rollers, and a conveyor belt disposed around said drive roller and said guide rollers.

5. A coin collecting apparatus as claimed in claim 4, including a channel-shaped guide extending under the upper stretch of said conveyor belt to keep the same substantially U-shaped in cross section and thus to prevent the coins from falling off the lateral edges of said conveyor belt.

6. A coin collecting apparatus as claimed in claim 4, in which said conveyor belt has a number of perforations along both later edges thereof to receive a plurality of pins formed correspondingly along both lateral edges of said drive roller.

7. A coin collecting apparatus as claimed in claim 1, in which said conveyor means comprises a supply roller, a take-up roller, a plurality of guide rollers, a conveyor belt extending from said supply roller to said take-up roller over and around said guide rollers, and means for intermittently imparting rotation to said take-up roller to move said conveyor belt over said guide rollers by winding the same on said take-up roller, said supply roller being kept energized in a direction such as to cause said conveyor belt to be rewound thereon.

8. A coin collecting apparatus as claimed in claim 7, further comprising switch means capable of preventing said means from imparting rotation to said take-up roller when actuated, and a switch-actuating member mounted in such a position on said conveyor belt as to move into contact with said switch means to actuate the same when said conveyor belt has been moved a predetermined distance from said supply roller to said take-up roller to collect the coins dropped thereon in said receptacle.

9. A coin collecting apparatus as claimed in claim 7, further comprising a stop for preventing the coins from falling off said conveyor belt during the rewinding operation thereof.

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