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Schweitzer

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[54] **RECEPTACLE FOR CONVEYING COINS**

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[52] **U.S. Cl.** ..... **198/53**; 198/198; 133/3 F; 221/254

[51] **Int. Cl.**[2] **B65G 47/14**

[58] **Field of Search** ..... 198/47, 48, 53, 55, 198, 198/131, 34; 133/3 F, 8 E, 1 R, 3 R, 8 R; 221/160, 218, 254

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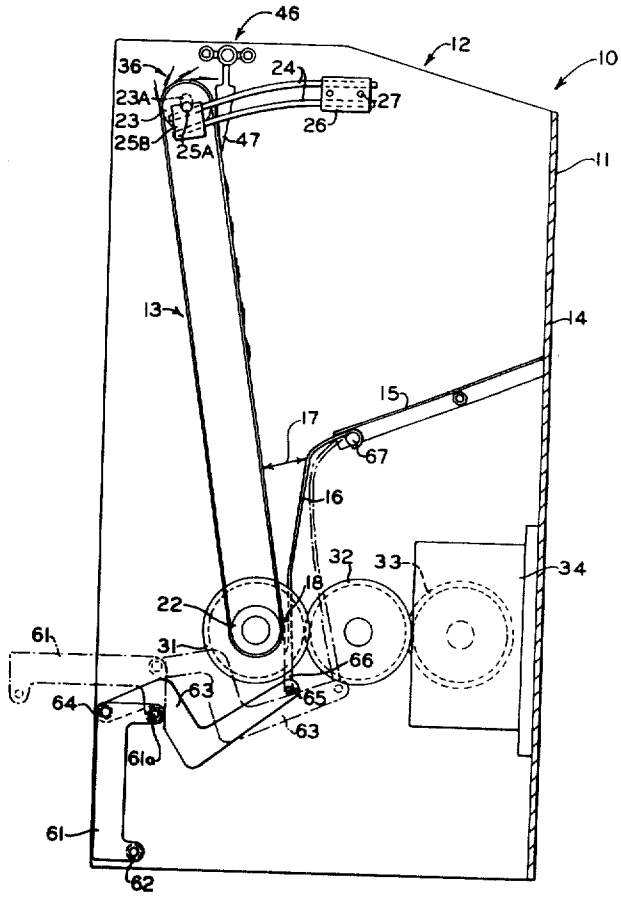
[57] **ABSTRACT**

A receptacle for conveying coins has a hopper, a conveyor member mounted juxtaposition to the hopper for transporting the coins, a chute member at the bottom of the hopper adjacent to the conveyor for directing the coins against the conveyor member and cleats on the conveyor member for holding the coins during transportation.

19 Claims, 4 Drawing Figures



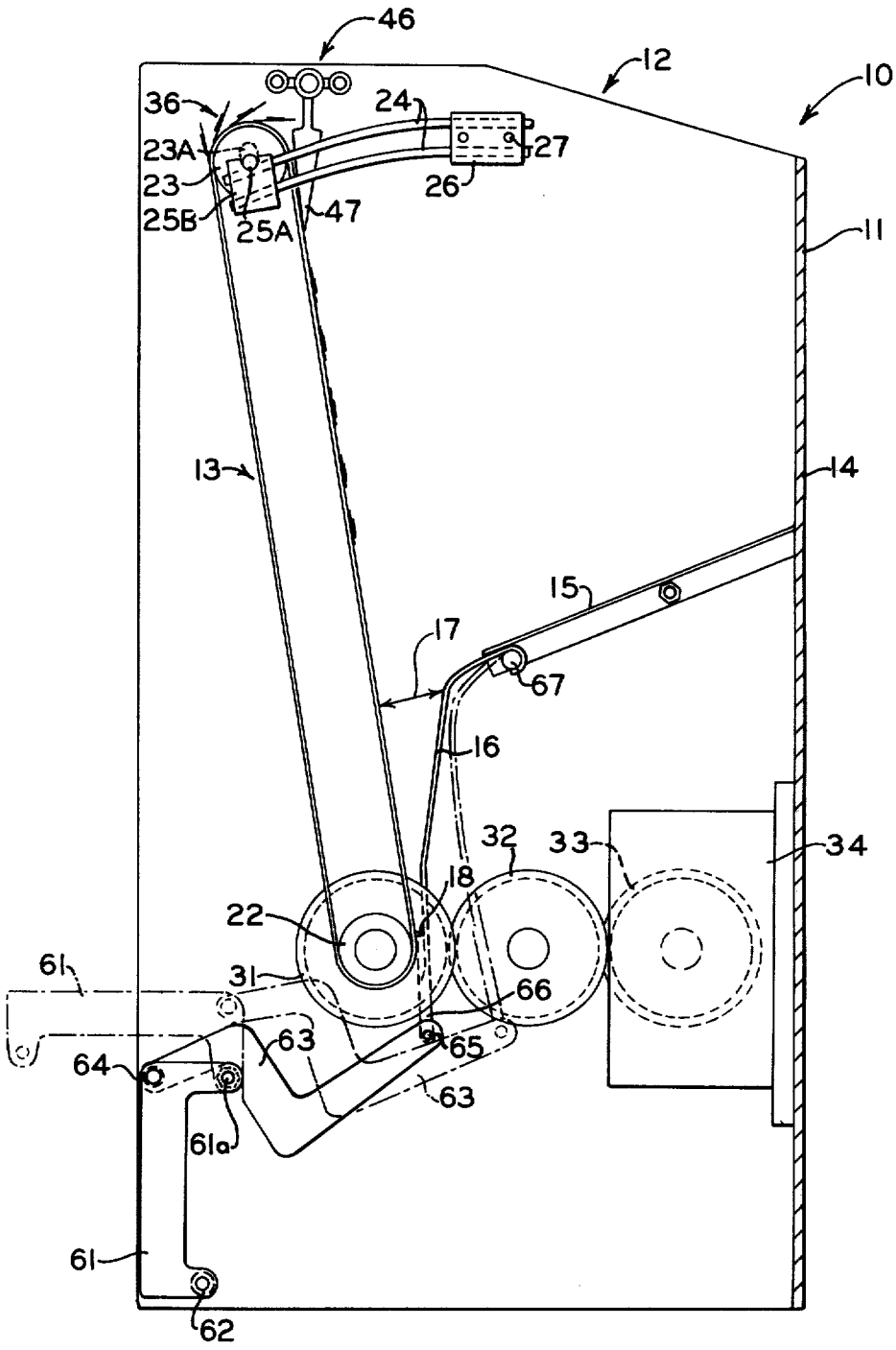

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FIG - 1

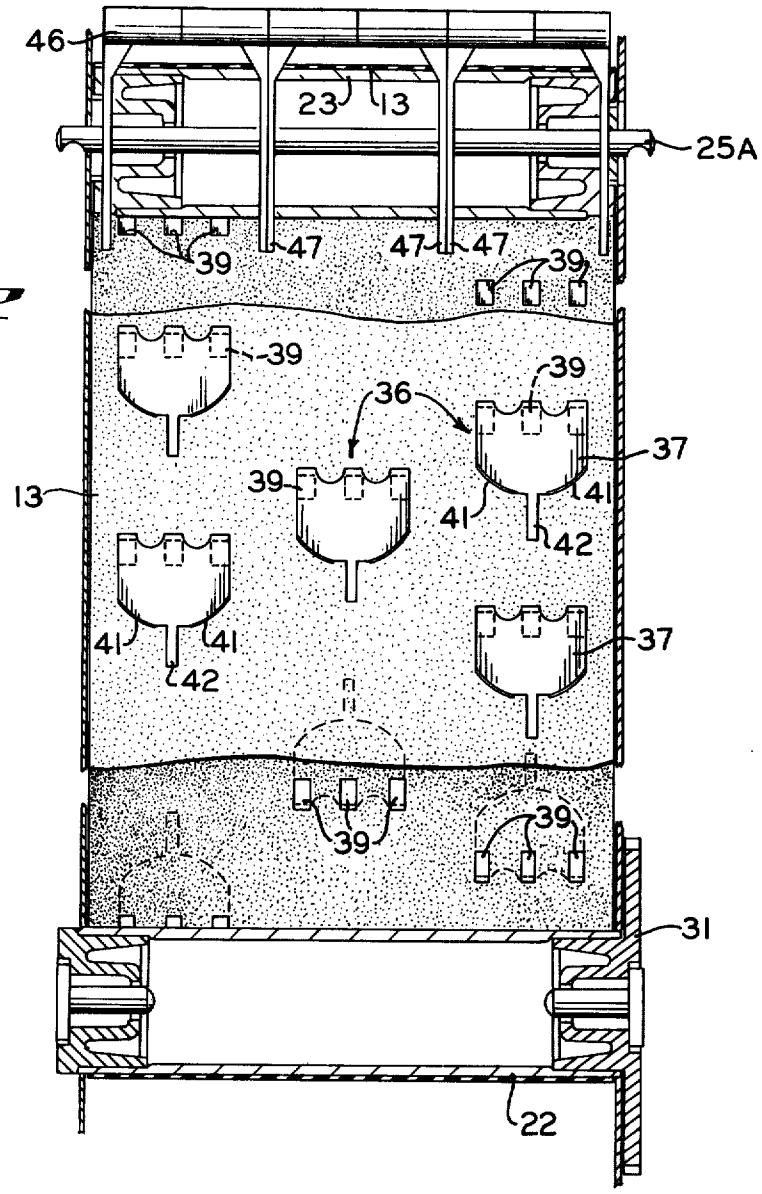

FIG - 2

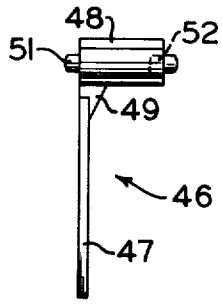

FIG - 3

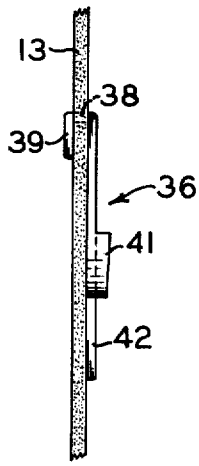

FIG - 4

RECEPTACLE FOR CONVEYING COINS

BACKGROUND OF THE INVENTION

The present invention relates to a receptacle for conveying coins. More specifically, the present invention relates to a receptacle in a paper note-coin changer machine for transporting coins to a dispensing apparatus.

Heretofore, in paper note-coin changer machines, the various sized coins of a particular currency have been stacked in appropriately sized cylinder and dispersed. However, the filling of the various sized cylinders with coins can be very time consuming where the coins have not been presorted. Furthermore, should the coins be sorted and contained in coin stacking cylinders, the possibility of coin foul-up exists when the coin does not lie flat upon one another. Another disadvantage of such prior art coin stackers is the jamming caused by bent coins as they are pushed out of the bottom of the stacking cylinder by a plunger. In order to alleviate this problem, the egress for the coin has often been enlarged. However, where the coins are very thin, such enlarged egress often permits the plunger to push out two coins instead of the desired single coin.

Another coin hopper which separates stacked coins in transporting them to a discharge chute has vibrating ramps covered with a specific material to cause the coins to move in only one direction. Such material may be mohair fabric having slanted pile so as to be resistant to deformation in one direction and compliant in the opposite direction. However, such a coin hopper while separating stacked coins and funneling them one by one into a dischrage chute, is so very sensitive to operate that it is highly impractical for ordinary useages. Moreover, such a hopper cannot handle multiple or various sized coins but only coins of a particular size.

Another form of a coin hopper merely employs a slanted chute which has openings of an increasing size to receive multiple sized coins. The chute is vibrated so as the various sized coins travel downwardly, the smaller coins fall into the corresponding opening and are thereby stacked. However, stacked coins or one smaller coin upon another larger coin will often travel across its designated opening and advance to the next larger size opening. Of course, such hopper is undesirable since it does not accurately separate each coin and thus permits the addition of a coin to the wrong stacking cylinder.

SUMMARY OF THE INVENTION

It is, therefore, an object of the present invention to provide a coin hopper which is capable of transporting coins.

It is another object of the present invention to provide a coin hopper, which transports coins quickly and accurately on a one at a time basis, and which is capable of transporting multiple sized coins received into the same hopper.

It is a further object of the present invention to provide a coin hopper which transports thin and bent coins of multiple sizes.

It is a still further object of the present invention to provide a coin hopper which transports multiple sized coins one at a time and returns any additional coins.

These and other objects of the present invention are described in detail without attempting to discuss all of the various modifications in which the invention might be embodied; the invention being measured by the appended claims and not by the details of the specification.

In general, a receptacle for conveying multiple sized coins comprises a hopper, a conveyor member mounted juxtaposition to the hopper for transporting the coins, a chute member located at the bottom of the hopper adjacent to the conveyor for directing the coins against the conveyor member and cleats on the conveyor member for holding the coins during transportation.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of a receptacle for conveying multiple sized coins.

FIG. 2 is a front elevation of a conveyor belt showing the coin cleats as well as the rollers.

FIG. 3 is a side elevation of a coin stripper.

FIG. 4 is a side elevational view showing the cleat attached to the conveyor.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A receptacle for conveying multiple sized coins according to the concepts of the present invention is generally indicated by the numeral **10.** Generally, the receptacle has a hopper **11** with a top opening **12** through which the coins are added. Normally only coins of one size or denomination will be supplied to the hopper, but the invention can provide for multiple sized coins, and the same hopper, without any changes, can operate with coins of the size in U.S. denomination from a dime to a quarter. The receptacle also has a conveyor member generally indicated by the numeral **13** for transporting the coins to a sorting and stacking apparatus. In the preferred embodiment shown in FIG. **1,** hopper **11,** which may be rectangular, square and even curvilinear, has sides **14** with generally one side being comprised by conveyor member **13.**

As seen in FIG. **1,** hopper bottom **15** is inclined to allow the coins to slide towards the conveyor member and into hopper chute **16.** The inclination of the hopper bottom with respect to a horizontal is at least 20°. Hopper chute **16** has an opening **17** which is greater than the diameter of the largest coin so that the coins do not jam up at the chute opening. As shown in FIG. **1,** hopper chute **16** is tapered to a point of close proximity to the conveyor member and then continues for a short distance at a very slight taper. Located at the bottom of the chute is a comb **18** preferably made out of plastic which prevents the coins from falling any further.

Conveyor member **13** may be any conventional conveyor belt and is mounted about bottom roller **22** and top roller **23.** Top roller **23** may be mounted to the hopper housing or to the paper note-coin changer apparatus such that it can freely move in vertically orientated slot **23A.** At least one rod spring, and preferably two, generally indicated by the numeral **24,** are attached at one end to top roller axle **25A** via axle housing **25B.** The other end is attached under tension to a bracket **26** which is secured to hopper **11** through fastening members **27.** Thus, an upward tension is applied to axle **25A** to keep the conveyor belt taught and prevents undesirable flapping which causes the coins to fall. A desirable amount of tension has been found to be about **25** pounds.

Conveyor bottom roller **22** is connected to a drive gear **31** by any conventional manner. As seen in FIG. **1**, drive gear **31** receives power from idler gear **32** which is driven by motor gear **33**. Preferably motor **34** which drives gear **33** is operative on DC current and has a reducing gear box such as on the order of roughly 100 to 1 so that motor gear **33** turns at a fairly slow rate such as approximately 24rpms. Preferably, idler gear **32** has a 1 to 1 ratio with motor gear **33** as well as drive gear **31**. These gears, moreover, may be made out of plastic such as nylon although, of course, metal may also be used.

Conveyor belt **13** has a plurality of cleats generally indicated by the numeral **36** attached thereto as shown in FIG. **2**. As seen in FIGS. **2** and **4**, cleat **36** which preferably is made of metal has a back plate **37** with tines **38** preferably extending at obtuse angles therefrom through the conveyor belt with corner portions **39** then bent to further engage the back of the conveyor belt and thereby secure the cleats to the belt. The lower portion of cleats **36** have buckets or flanges **41** which are so designed to hold only a single multiple sized coin of a particular currency. Preferably, flanges **41** are slightly bent more than 90° such as about 95° as shown in FIG. **4** so as to further help retain the coins. If U.S. coins are used, flanges **41** have a laterally inner extent or projection so they will just hold a dime and a laterally outward extent or projection so that they will hold a quarter (FIG. **4**). Due to the radius of curvature of a dime, it will sit on the laterally inner portion of flange **41** while a quarter will sit on the laterally outer portion of flange **41** whereas a nickel will sit on the intermediate portion of the flange. Thus, flange **41** will be incapable of holding two dimes, nickels or quarters. With these denominations, change can be readily made as for a dollar bill. Cleats **36** additionally have tabs **42** extending from the bottom portion thereof to prevent coins from being conveyed or transported which ride upon tines **38** which extend from the upper portion of the cleats as more fully explained hereinbelow.

As seen in FIG. **1**, conveyor member **13** is slightly slanted with respect to a vertical axis so as to permit coins which are picked up by cleats **36** to lie against the belt during transportation. The substantially upright arrangement of the member **13** also compresses the packaging size to a convenient dimension to cooperate with the coins dumped into the hopper.

In the particular embodiment shown, the conveyor belt is reinforced with Dacron, a polyester made by DuPont, and is coated with an elastomer to prevent the surface from being abraided. Depending upon the particular currency utilized the width and various dimensions of the belt vary. For use with U.S. currency, the preferred embodiment of the belt is 3 ½ inches wide, 0.03 inch thick, rides about bottom roller **22** and top roller **23** which have their axis 12 inches apart, and has a tensile strength in the neighborhood of approximately 1,100 lbs. per inch although the actual loading is very slight, as on the order of 20 pounds per inch.

Referring to FIG. **2**, cleats **36** are attached to the belt on a diagonal relationship at equally longitudinal linear spaced increments so that as the cleats reach top roller **23**, one coin at a time is transported to a next operation of the paper note-coin changer apparatus. It is highly desirable that only one coin is transported to the next operation which may be either stacking or sorting so that jam-ups and the like are prevented. Cleats **36** are therefore laterally spaced close enough to one another to discourage the transportation of small sized coins such as dimes which may hang up on the conveyor belt between two diagonally adjacent cleats.

To further insure that no coins are transported to the next operation by being carried on the conveyor belt between adjacent cleats, coin strippers generally indicated by the numeral **46** are located at the top of the conveyor member and exist between cleats **36** as well as at the edges of the belt as shown in FIG. **2**. Coin strippers **46** generally have an acute projection **47** which is connected to a base portion **48** by spring **49**. The width of the base portion is so designed so that adjacent strippers may be connected to each other with acute projections **47** being centered between cleats **36**. Connection of the coin strippers may be readily effected by a projection **51** - recess **52** type connection as shown in FIG. **3**. Thus, any coin not located within buckets or flanges **41** of cleats **36** will be removed by coin strippers **46** which may be located on the hopper housing or on the paper note-coin changer apparatus as the cleats approach the vicinity of top roller **23**. Such coins will be peeled off of the conveyor and fall back into the hopper.

In addition to coins between diagonally adjacent cleats, a coin may be located between vertically adjacent cleats by sitting edgewise upon the top of a coin located in a bucket. To prevent such coins from being transported, previously noted tabs **42** extends from the bottom of a cleat a sufficient distance so that it will engage the coin which may be seated upon the bucket located coin. Since cleats **36** are secured to conveyor belt **13** through tines **38** and tines end portions **39** which securely grip the back of the belt, the lower portion of the cleats including tab portions **42** will be conveyed about top roller **23** in a tangential manner. Thus, once the tine portion commences travel about the top roller, tab **42** will be kicked outwardly and thus will flip off any coins situated upon the top of another coin and fall back into the hopper. Moreover, only one coin can be carried by a particular bucket since the vertical inclination of the conveyor belt and the extent of the bucket flange is such that two coins, even thin coins, as two dimes, cannot be carried. Hence, the elements of the disclosed embodiment insure that only one coin at a time per cleat is transferred to the next operation and thus assures smooth, easy and accurate operation of the paper note-coin changer apparatus.

Turning now to the operation of receptacle **10** for conveying various multiple sized coins, when the paper note-coin changer apparatus detects a low supply of coins in the various stackers, not shown, a signal is transmitted which actuates motor **34**. Through the reduction gear assembly, not shown, power is transmitted to motor gear **33** which turns idler gear **32** which in turn turns drive gear **31** of the conveyor belt. The conveyor belt continuously travels about bottom roller **22** and top roller **23** in the direction of the arrow shown in FIG. **1**. Since hopper bottom **15** is inclined towards the conveyor, the coins will slide towards the conveyor to fall into hopper chute **16** where because of the slope of the chute they are oriented on their edge and forced to bear against the conveyor belt. As the belt rotates, some of the coins will be grabbed by cleat buckets or flanges **41** and conveyed upwardly towards top roller **23**. Due to the coin area bearing against the lower portion of the conveyor belt, every cleat has an ample op-

portunity to grab a coin. Bottom roller **22** is grooved, not shown, to prevent tines **38** and **39** from contacting the roller, which preferably has a hard aluminum coating, and causing abrasion. Due to the diagonal spacing and orientation of the cleats, only one coin at a time is delivered to the top of the conveyor belt. Due to the inclination of the conveyor belt, the coins lean against it and do not fall off.

The travel rate of the belt is important in that it must be slow enough to prevent coins from jamming in the next operation and yet it must be fast enough to insure quick operation. In the present embodiment described, the belt requires 19 seconds for one complete cycle which corresponds to a rate of travel of 1.37 inches per second. Upon downward movement of the coins, the coins fall into a collection box for sorting and stacking, not shown, nor a part of this invention. Since the cleats are diagonally stacked, the coins will fall one by one and hence readily permit an accurate ensuing sorting or stacking operation. When a desired amount of coins has been delivered to the dispensing portion of the paper note-coin changer apparatus, the signal will be transmitted to motor **34** to stop rotation of the conveyor belt.

When it is desired that coin hopper **11** be emptied of the coins, the hopper dump lever **61** may be manually actuated as by pulling rod **62** to the left in FIG. **1**. The top of hopper dump lever **61** is pivotally attached at **61A** to the paper note-coin changer apparatus and at **64** to one end of the hopper dump arm **63**. The other end of dump arm **63** is pivotally attached at point **65** to chute leg **66**. Hopper chute **16** is hinged to hopper bottom **15** at point **67**. Also, comb **18** is attached to the hopper chute. Thus, when hopper dump lever **61** is moved to the right, it pivots about point **62** causing hopper dump arm **63** to move to the right as shown in phantom in FIG. **1** and thereby cause hopper chute **16** to pivot about hinge **65** and permitting the coins to drop. Preferably, hopper dump lever **61** upon movement to the left trips an electrical switch causing conveyor member **13** to rotate as well as causing the delivered coins to also drop out of apparatus **10** through a mechanism not shown. This fact insures that all of the coins on the conveyor belt are removed. After the hopper and belt have been cleared of coins, dump lever **61** may be returned to its normal position and a new load of coins emptied into hopper **11**. The primary purpose for the unloading linkage is of course to permit servicing or maintenance of the receptacle **11** portion of the paper note-coin changer apparatus.

It can thus be seen that the disclosed structure carries out the objects of the invention set forth above. While according to the patent statutes the best mode has been set forth such as with recept to U.S. currency, it will be apparent to those skilled in the art that many modifications can be made without departing from the spirit of the invention herein disclosed and described; the scope of the invention being limited solely by the scope of the attached claims.

What is claimed is:

1. A receptacle for conveying multiple sized coins, comprising:

a hopper;

a conveyor means mounted in juxtaposition to said hopper and about at least one roller for transporting the coins,

chute means at the bottom of said hopper adjacent to said conveyor for directing the coins against said conveyor means,

said conveyor means having cleats for holding the coins during transportation,

said cleats having an outwardly extending bottom flange for holding coins,

said cleats having a tab attached thereto and depending therefrom,

said cleats having tines extending from the upper portion thereof, and said tines engaging said conveyor means so that said cleats are attached to said conveyor means and causing the locus of said cleats about said roller to be tangent to said roller.

2. A receptacle for conveying multiple sized coins as in claim **1**, wherein coin strippers are mounted between said cleats adjacent to said conveyor means to remove coins held between said coin holding cleats having said flanges.

3. A receptacle for conveying multiple sized coins as in claim **2**, wherein said coin strippers have an acute projection extending between said cleats to remove said coins.

4. A receptacle for conveying multiple sized coins as in claim **1**, wherein a lever assembly applies tension to said conveying means.

5. A receptacle for conveying multiple sized coins as in claim **1**, wherein a comb is located at the bottom of said hopper chute.

6. A receptacle for conveying multiple sized coins, comprising:

a hopper,

a conveyor means mounted in juxtaposition to said hopper for transporting the coin,

said conveyor means mounted about a roller located at the upper portion of said hopper,

said conveyor means having cleats attached thereto through the upper portion of said cleats such that the locus of said cleats about said roller are tangents, said cleats containing a tab depending therefrom,

said cleats having an outwardly extending bottom flange for holding coins,

said cleat flange having a varying lateral projection to hold coins of varying size, and

chute means at the bottom of said hopper adjacent to said conveyor for directing the coins in said conveyor means, and

said cleats diagonally spaced on said conveyor means so that multiple sized coins are continuously transported on a single basis.

7. A receptacle for conveying multiple sized coins as in claim **1**, wherein said flange has a varying lateral projection to hold coins of varying thickness.

8. A receptacle for conveying multiple sized coins as in claim **7**, wherein said projection is greateer at a laterally outward position.

9. A receptacle for conveying multiple sized coins as in claim **1**, wherein said chute means is pivotally attached to move away from said conveyor means upon actuation of a hopper dump lever.

10. A receptacle for conveying multiple sized coins, according to claim **6**, wherein coin strippers are mounted between said cleats adjacent to said conveyor belt to remove coins located between said coin holding cleats.

11. A receptacle for conveying multiple sized coins, according to claim 6, wherein a lever assembly applies tension to said conveyor means.

12. A receptacle for conveying multiple sized coins, according to claim 11, wherein a comb is located at the bottom of said hopper chute.

13. A receptacle for conveying multiple sized coins, according to claim 6, wherein said varying flange projection is greater at a laterally outward position.

14. A receptacle for conveying multiple sized coins, according to claim 6, wherein said chute means is pivotally attached to move away from said conveyor means upon actuation of a hopper dump lever.

15. A receptacle for conveying multiple sized coins, according to claim 11, wherein said coin strippers have an acute projection extending between said cleats to remove said coins.

16. A receptacle for conveying multiple size coins comprising, a hopper, a conveyor means mounted in juxtaposition to said hopper for transporting the coins, chute means at the bottom of said hopper adjacent to said conveyer for directing the coins against said conveyor means, said conveyor means having cleats for holding the coins during transportation, said cleats attached to said conveyer means and having an outwardly extending bottom flange for holding coins, said cleats having a tab attached thereto and depending therefrom, said cleat flange having a varying lateral projection to hold coins of varying thickness, and said projection being greater at a laterally outward position.

17. A receptacle for conveying multiple size coins according to claim 16, wherein coin strippers are mounted between said cleats adjacent to said conveyor means to remove coins located between said coin holding cleats.

18. A receptacle for conveying multiple size coins according to claim 17, wherein said coin strippers have an acute projection extending between said cleats to remove said coins.

19. A receptacle for conveying multiple size coins according to claim 16, wherein said chute means is pivotally attached to move away from said conveyer means upon actuation of a hopper dump lever.

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