March 17, 1964 C. S. BOWER 3,125,102

COIN SINGLING APPARATUS

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Fig. 5.

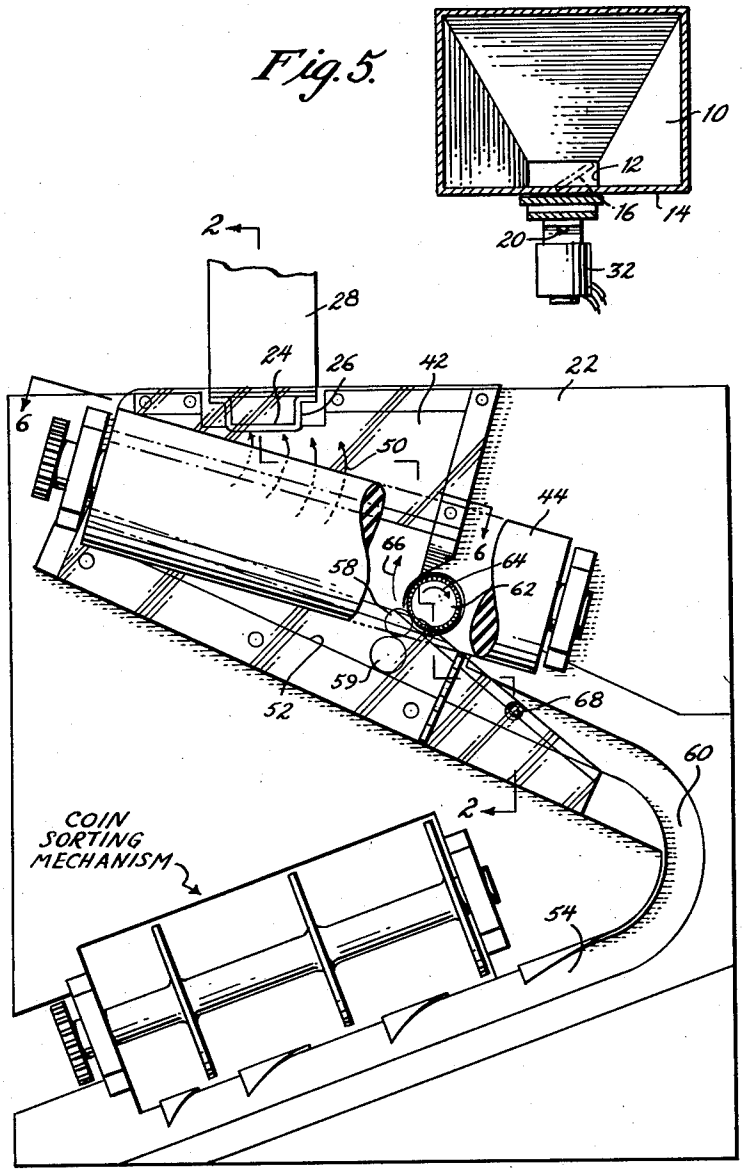


Fig. 1.

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Fig. 3.

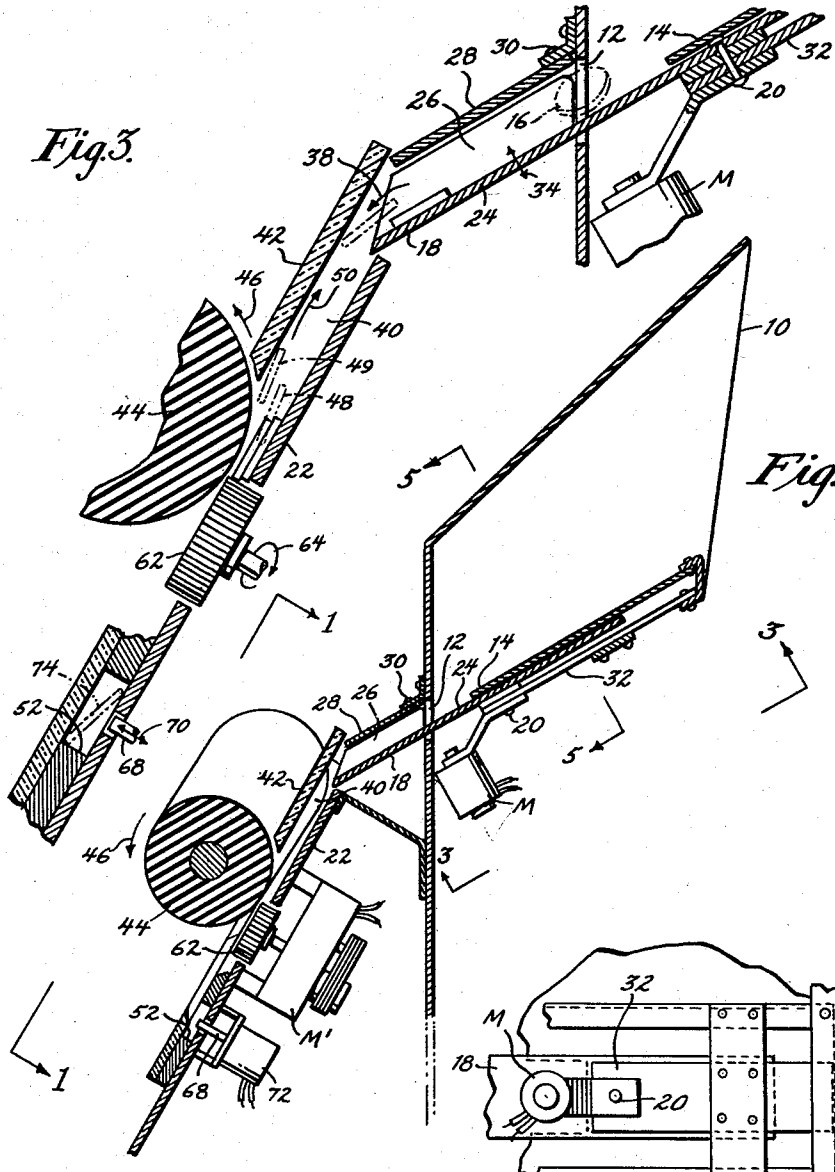


Fig. 2.

Fig. 4.

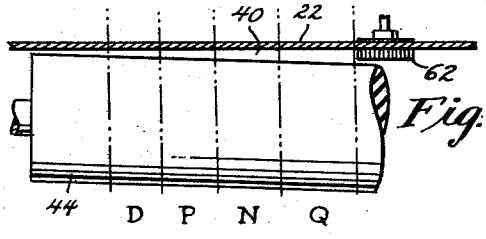


Fig. 6.

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COIN SINGLING APPARATUS

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7 Claims. (Cl. 133—3)

This invention relates to a toll collecting machine of the type used on toll bridges and highways and elsewhere.

One object of the invention is to produce an improved machine of the type set forth.

A single coin toll collecting machine includes coin recognizing mechanism and a "stop" signal and a "go" signal, one of which is energized by said coin recognizing mechanism according as to whether the coin deposited is, or is not of the proper denomination. A multi-coin toll collecting machine, that is, a machine for accepting a number of coins of the same, or of different denominations, also includes a coin sorting mechanism and a coin singling mechanism for feeding the coins, in single file, to the coin sorting mechanism.

My experience over many years of activity in this field has shown that most of the trouble encountered in the operation of a multi-coin toll collecting machine was due to jamming of the coins before they have reached the coin sorting mechanism. This is due to the fact that the assortment of coins, which a motorist throws into the machine haphazardly, tend to collect in groups and tend to assume various positions, or to move on edge where they should not, and vice versa. As can be appreciated, the vagaries of the coins are for practical purposes, without limit and, as far as I am aware, coin singling mechanisms heretofore available are not as reliable as one would wish them to be. Indeed a, small percentage of error which is condoned in some other machine, cannot be tolerated in a toll collecting machine where any failure which delays a motorist passing through the toll zone for only a few seconds, will create a traffic jam a mile long.

It is therefore the object of this invention to produce an improved coin singling mechanism which will reduce, or wholly eliminate, coin jamming, thereby insuring proper operation of the machine as a whole.

The full nature of the invention will be understood from the following specification and the accompanying drawings in which:

FIG. 1 is a fragmentary elevational view of a toll collecting machine embodying the invention.

FIG. 2 is a sectional view looking in the direction of line 2—2 on FIG. 1.

FIG. 3 is an enlargement of FIG. 2, certain parts being omitted better to show details of construction.

FIG. 4 is a bottom plan view looking in the direction of line 4—4 on FIG. 2.

FIG. 5 is an enlarged sectional view looking in the direction of line 5—5 on FIG. 2.

FIG. 6 is a reduced, diagrammatic view, partly in section and partly in plan, looking in the direction of line 6—6 on FIG. 1.

Since this invention is only concerned with the coin singling mechanism, the coin recognizing and counting mechanisms and the signalling devices which indicate whether or not the correct toll was paid are not shown. However, because the coin sorting mechanism receives the coins from the coin singling mechanism, the coin sorting mechanism is shown in a general way and only as a point of reference, but is not described. It is thought sufficient for the purpose of this disclosure to show a hopper, such as hopper 10, into which an assortment of coins can be thrown and which has a throat 12 for delivering the coins to a coin singling mechanism. The coin singling mechanism delivers the coins to the sorting mechanism which is generally shown in FIG. 1 and which delivers the

coins to the coin recognizing and counting mechanisms, etc., not shown.

The improved coin singling device of my invention includes four, separate, mechanisms which are disposed along the path of movement of the coins and which are calculated to deal with all conceivable vagaries of a haphazardly deposited and haphazardly moving assortment of coins. For example, a coin traveling down the inclined bottom 14 of the hopper, may approach throat 12, not flat on its side, as it should, but on its edge, or somewhat slanted, whereby the coin becomes permanently or temporarily wedged in the throat, as illustrated by coin 16 in FIG. 3, thus causing the machine to record an insufficient toll, when, in fact, the correct toll was paid. In order to prevent jamming, or delay at the throat of the hopper, I provide a chute 18, the upper end of which is connected, as at 20, to the bottom wall 14 of the hopper immediately in advance of throat 12, and the lower end of which freely overhangs the upper end of wall 22 which will hereinafter be referred to. Chute 18 includes a bottom wall 24 and side walls 26, and the open top thereof is closed by a fixed cover 28 which is suitably secured to the hopper as at 30 and serves to keep the coins from bouncing out. The bottom wall 24 of chute 18 carries an electric vibrator 32, which is of the type used for scalp and facial massages in barber and beauty shops and which, when energized, vibrates chute 18 in the direction of arrow 34 in FIG. 3. Since the structure of the vibrator forms no part of the present invention and is available on the market, its structure and manner of operation are not shown or described. It is sufficient to say that chute 18 is continuously vibrated as long as the toll collecting machine is in use. The vibration of chute 18 insures that all coins will travel down on their sides as at 36.

The coins leaving vibrating chute 18 fall in the direction of arrow 38 into a space 40 defined by previously mentioned wall 22, by wall 42 and by roll 44. Space 40 is tapered, as shown in FIG. 6, by inclining the periphery of roll 44 with reference to wall 22. The tapering of space 40 is so calibrated as to provide zones D, P, N and Q, which are only wide enough to permit the passage of dimes, pennies, nickels, and quarters, respectively, in single file, or one at a time. The length of each of said zones is such as to permit more than one coin of a kind to pass through simultaneously. Roll 44 is rotated in the direction of arrow 46 by any prime mover, not shown, whereby if any two coins, regardless of denomination, approach any portion of space 40, side by side, such for example as coins 48 and 49, the coin adjacent roll 44 will be engaged by the periphery of the rotating roll and will be tossed upwardly in the direction of arrows 50. While one or more coins are being tossed up by roll 44, the remaining coin, assuming that it is in registration with the appropriate zone, will fall onto a slanting track 52 on which the coins will roll, on edge, and single file, toward the receiving end 54 of a coin sorting mechanism which segregates the coins according to their denomination, prior to their delivery to the coin recognizing and counting mechanisms which are not shown.

Even though roll 44 effectively singles the coins, that is, causes them to roll down on track 52 on edge and single file, it sometimes happens that two coins, such as coins 58 and 59, will move down the track with one coin on top of the other as shown in FIG. 1. The lower end of space 40 in which the coins are tossed up by roll 44 leads to the upper end of chute 60, the depth of which, vertically measured, is only slightly in excess of the diameter of the largest coin which the machine is intended to accept, and therefore, two coins of any denomination which may approach the chute with one riding on top of the other, such as coins 58 and 59, as in FIG. 1, may tend to jam. In

order to prevent this contingency, I provide a serrated disk or gear 62 which is mounted near the receiving end of chute 60, as shown in FIGS. 1 and 6, and which is rotated in the direction of arrow 64, by an electric prime mover M'. Since the structure and operation of the prime mover form no part of this invention, they are not shown or described. It is thought sufficient for the purpose of this disclosure to say that disk 62 is continuously rotated, in clockwise direction, as viewed in FIG. 1, as to engage, and toss, upper coin 58 in the direction of arrow 66, or back into space 40 between walls 22 and 44. This permits the lower coin 59 to continue to move down through chute 60 while coin 58 finds its way back to its appropriate zone and passes below gear 62 and into chute 60.

The coins must move, single file, down chute 60 and to the receiving end 54 of the coin sorting device and therefore the width of chute 60 must be only slightly larger than the thickness of the largest coin which the machine can accept and the height of the chute must be only slightly larger than the diameter of said coin. Under these conditions, a coin moving down chute 60 can assume an angular position in which the coin is wedged in the chute or is, at least, retarded. To guard against such a contingency, I provide a plunger 68 which is reciprocated in the direction of arrow 70 by any suitable prime mover 72. Since the structure of prime mover 72 forms no part of this invention, it is not shown. It will be noted that the reciprocation of plunger 68 will move a coin which has assumed the angular position shown at 74 in FIG. 3 back to a vertical position and thus prevents jamming. In the drawings, plunger 68 is shown immediately below gear 62, but it is within the scope of this invention to locate plunger 68 at any point along chute 60 as long as it is in advance of the receiving end 54 of the coin sorting mechanism.

It will be seen from the foregoing that vibrating chute 18 prevents any jamming of the coins as they pass through the throat 12 of hopper; that the rotation of roll 44 insures that no two coins of a given denomination approach the zone of space 40 assigned to said denomination side by side; that gear 62 insures that no two coins will approach chute 60 with one coin riding on the other, and that plunger 68 will prevent jamming due to the tilting of a coin, as at 74, while traveling down chute 60 towards the receiving end 54 of the coin sorting mechanism. This is not speculation because machines equipped as above described, especially with reference to vibrating chute 18, rotating disks 62 and reciprocating plunger 68, have been extensively tested, under actual working conditions, and over long periods of time, and have performed most satisfactorily whereas machines equipped with roll 44 alone were not sufficiently reliable.

What I claim is:

1. A toll collecting machine including a hopper having a large mouth for receiving an assortment of coins of different sizes, and a discharge throat large enough to permit the passage there-through of the largest of said coins, the bottom of said hopper being inclined from said mouth to said throat, a rigid chute inclined downwardly from said throat with its upper end arranged to receive coins passing through said throat, a slanting track located below, and adapted to receive coins from, the lower end of said chute, a continuously rotating disc mounted in the path of movement of said coins along said track the periphery of, said disc being spaced, upwardly from said track, a distance in excess of the diameter of the largest coin moving on said track but less than the diameter of any two coins rolling on edge on said track with one of said coins on top of the other, whereby said disc engages and dislodges the upper of said coins.

2. The structure recited in claim 1 in which said disc is rotated in a direction to throw the upper coin engaged thereby in a direction opposite to the movement of said coins along said track.

3. A toll collecting machine including a hopper for receiving an assortment of coins of different sizes, an inclined rigid chute through which said coins travel after leaving said hopper, the height of said chute being slightly larger than the diameter of the largest of said coins, and the width of said chute being only slightly larger than the thickness of said largest coin, said chute having an opening in a side thereof, a plunger passing through said opening and disposed at an angle to the movement of the coins through said chute, and means for reciprocating said plunger to prevent tilting of a coin while it moves down said chute to prevent wedging of said coin in said chute.

4. A toll collecting machine including a hopper having bottom and side walls defining a large mouth for receiving an assortment of coins of different sizes and converging to define a restricted throat large enough to permit the largest of said coins to pass there-through, with the coin resting on its side, the bottom of said hopper slanting downwardly from said mouth to said throat, a first rigid chute inclined downwardly away from said throat for receiving coins passing through said throat with the coins resting on their sides, a slanted track below the lower end of said first chute, said track being transversely restricted to substantially the thickness of the largest of said coins whereby said coins can only slide down said track single file, a second rigid inclined chute with its upper end arranged to receive coins from said track, and a continuously rotating disc intermediate the lower end of the track and the upper end of said second chute for preventing movement of any two coins towards said second chute in edge-to-edge relation and with one of said coins riding on the other.

5. The structure recited in claim 4 in which the width of said second chute is only slightly larger than the thickness of the largest of said coins, there being an opening in a side of said chute, a plunger reciprocable in said opening in a direction at an angle to the direction of movement of said coins, and means for reciprocating said plunger to loosen any coin wedged in said second chute.

6. The structure recited in claim 4 and

a rotary roll,

means mounting said roll with its periphery disposed adjacent the path of movement of said coins along said track, and

means rotating said roll in a direction opposite to the movement of said coins along said track,

the periphery of said roll being spaced from said track to permit free passage of the thickest coin deposited in said hopper.

7. For use between a coin receiving hopper and a coin sorting machine,

a first chute,

means vibrating said chute in a direction transverse to the path of movement of said coins,

an inclined track on which said coins slide on their sides,

a rotary roll mounted with its periphery spaced from said track,

means rotating said roll in a direction opposite to the direction of movement of said coins on said track,

the space between said roll and said track being slightly larger than the width of the largest coin intended to pass through said space, whereby rotation of the roll will separate the adjacent coin of a pair of coins moving side by side down said track from the other of said coins,

a second chute below said roll,

a wheel projecting into the upper portion of said chute,

means constantly rotating said wheel in a direction opposite to the movement of the coins for engaging the upper of a pair of coins moving down said chute with one coin riding edge to edge on one another, there being an opening in the side of said second chute below said wheel,

a plunger movable in said opening transversely of the path of movement in said second chute and means

for continuously reciprocating said plunger to prevent tilting of a coin moving down said chute.

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