

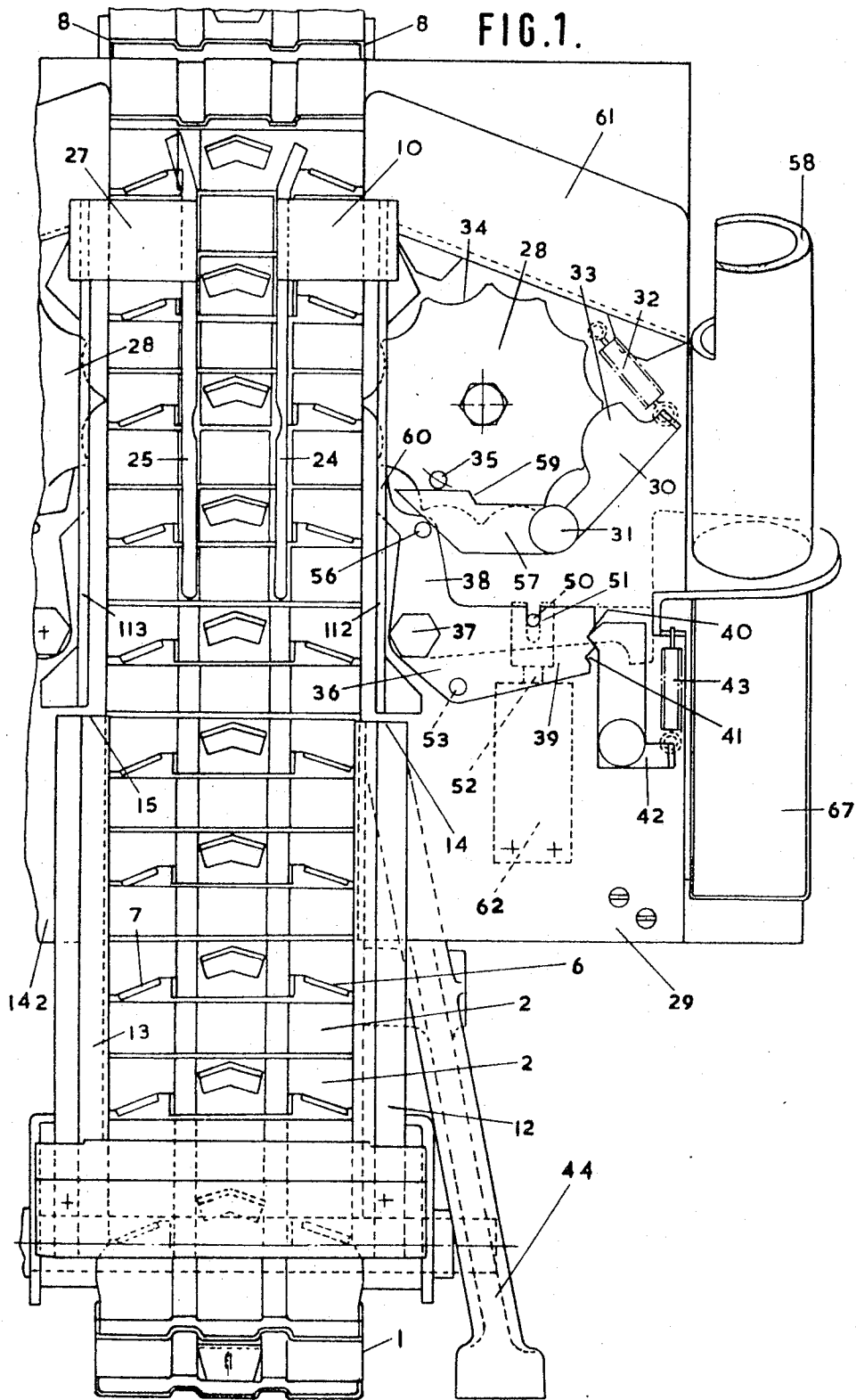
Aug. 26, 1969

H. J. DOLMAN
APPARATUS FOR EXTRACTING AND FEEDING COINS
STORED IN A BULK SUPPLY

3,463,171

Filed Oct. 3, 1967

5 Sheets-Sheet 1



Aug. 26, 1969

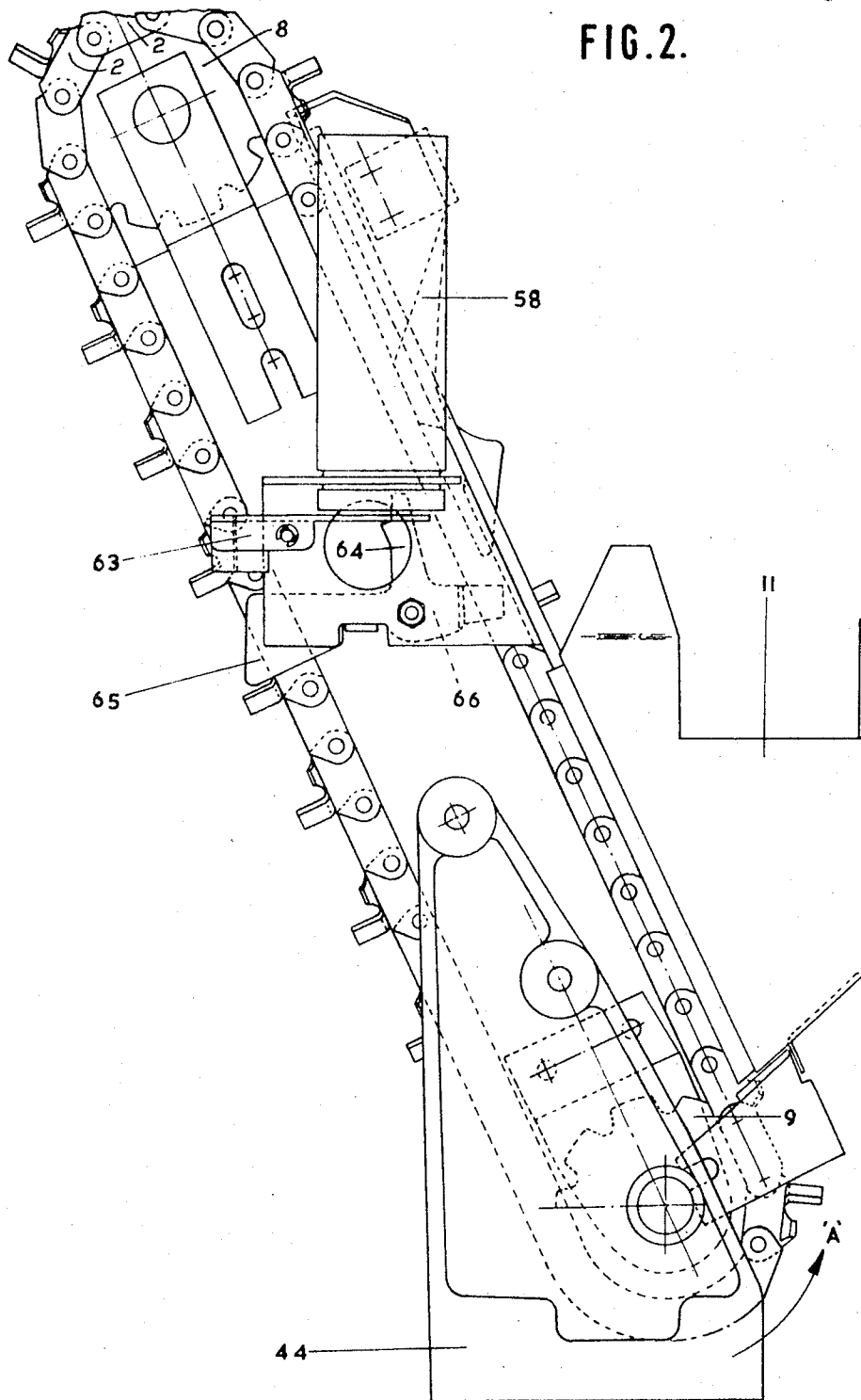
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FIG. 2.



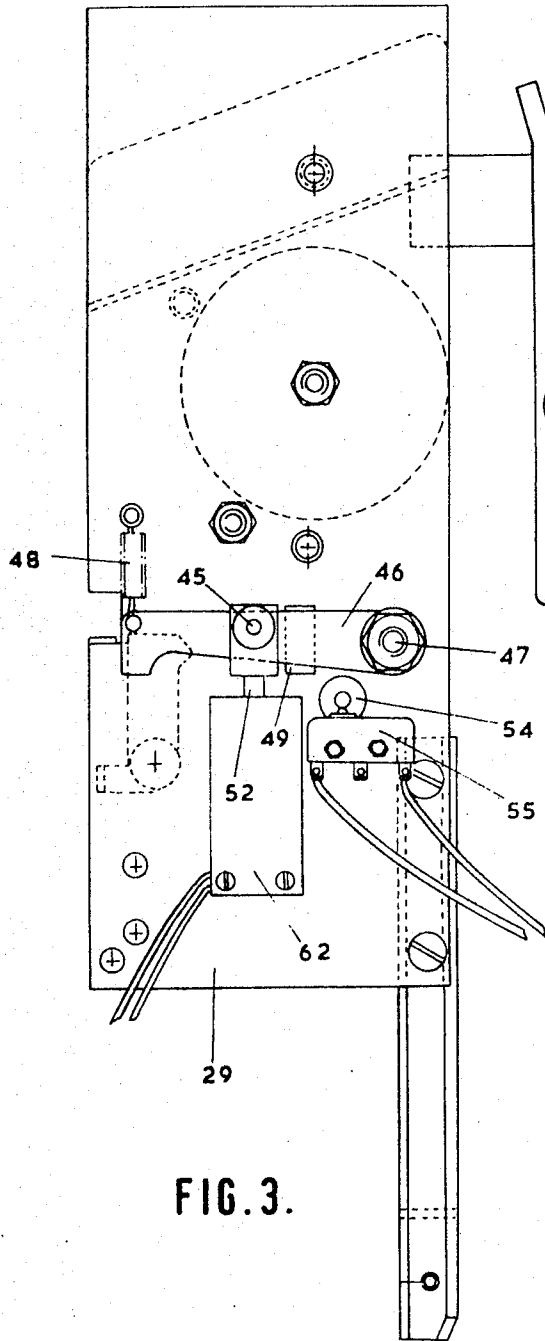
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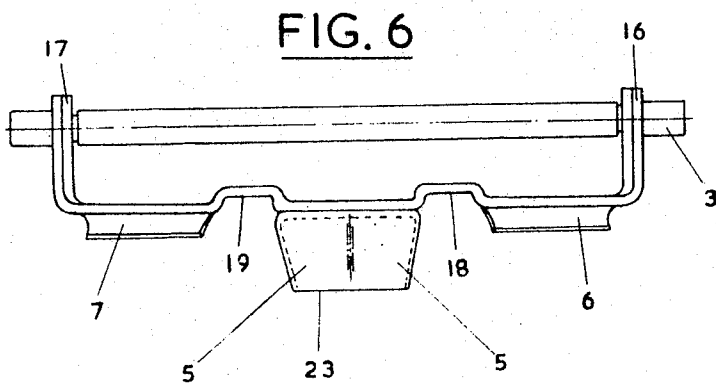
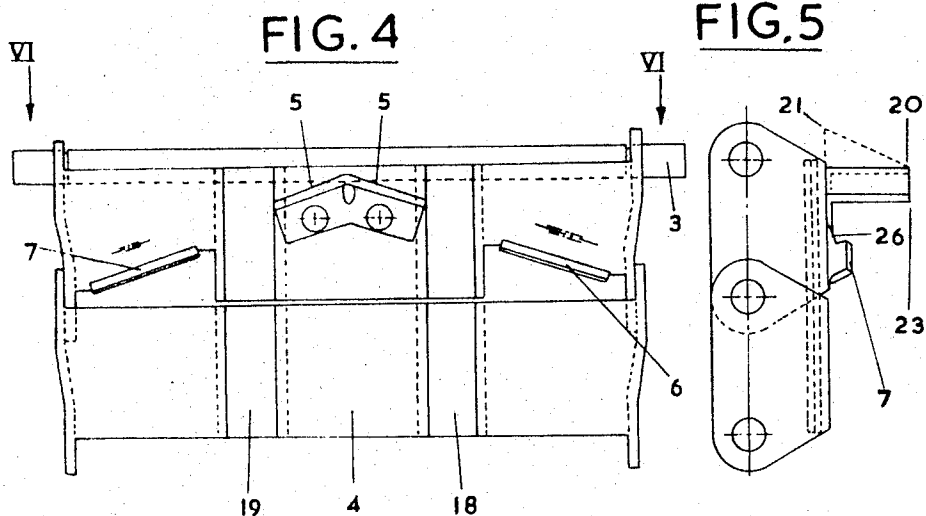
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5 Sheets-Sheet 4



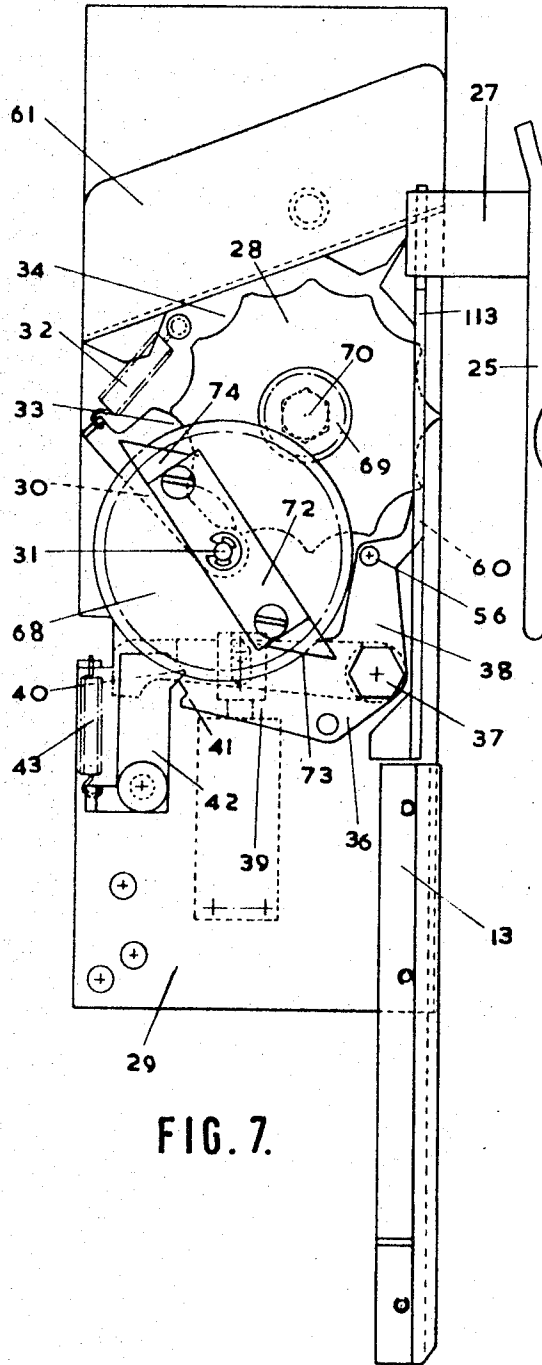
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5 Sheets-Sheet 5



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**APPARATUS FOR EXTRACTING AND FEEDING
COINS STORED IN A BULK SUPPLY**

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44,780/66

Int. Cl. G07d 9/00

U.S. Cl. 133—1

14 Claims

ABSTRACT OF THE DISCLOSURE

In a system of separating and feeding coins stored in bulk supply hopper, a conveyor agitates the coins in the hopper, extracts the coins individually from the hopper and feeds them in series. The conveyor includes individual carriers each of which comprise a pair of sloping panels which cause the extracted coins to roll laterally to positions on opposite sides of the carrier. The coins are individually supported by a fixed guide and a supporting ledge formed on the conveyor.

This invention relates to methods and apparatus for extracting coins from a bulk supply and feeding them individually for further use, for example for use in change giving mechanism.

The present invention consists in a method of separating and feeding coins stored in a bulk supply hopper comprising agitating the coins in the hopper, extracting coins individually from the hopper, directing extracted coins to individual coin conveying means and moving the conveying means to feed the coins in series.

The agitation and extraction may be effected by movement of the conveying means with respect to the coins in the hopper.

The directing of the extracted coins may be effected by gravity.

The present invention also consists in a conveyor for individually extracting coins stored in bulk in a hopper and carrying them in face to face condition therewith, said conveyor comprising a series of projections and associated carriers adapted to pass upwardly through the hopper, each projection acting to agitate coins in the hopper, extract a coin therefrom and direct it to its carrier.

The conveyor may comprise an endless chain trained around rollers and having an operative run passing through the hopper while the links of said chain may comprise slats, some at least of which carry the projections and associated carriers.

The conveyor may be duplex, that is to say the slats that include a projection and carrier may have two projections at the centre line, one for directing coins laterally to a carrier at one side of the conveyor and the other for directing coins to a lateral carrier at the other side of the conveyor.

Means may be provided to return to the hopper a coin that is not correctly directed to a carrier.

Preferably the conveyor is sloped at an angle of about 25° to the vertical.

Preferably each projection extends normal to the surface of its slat and comprises a panel sloping downwardly at a small angle towards its associated carrier so that a coin extracted by the panel rolls laterally on to said carrier where its movement is arrested by a fixed guide.

Each carrier may comprise a ledge protruding from its slat but at a lower level than its associated panel, whereby

a coin that rolls on to said ledge is maintained against lateral movement by engagement between the lateral edge of said associated panel and the fixed guide.

The ledge may be parallel with its associated panel.

The ledges may protrude from the slat a distance equal to the thickness of a worn coin of the denomination concerned.

Each slat adjacent a ledge may be bent outwardly so that a coin below said ledge that tends to lie against it will overbalance and be returned to the hopper.

The slats may be channelled upwardly at a position between the panels and their associated ledges so that a fixed stripper located adjacent the channel will act to return to the hopper any coin located at said position.

The projecting panels may taper towards their outer edges so that a coin riding edge-on within the channel will not jam against the stripper and will be returned to the hopper.

The fixed guide may be discontinued near the end of the operative run of the conveyor to permit coins carried by the ledges to roll off the conveyor for further use.

The height normal to the slat of a projection is such that the centre of gravity of a coin whose edge engages both a slat and the projection lies between said two engaging positions.

FIG. 1 is front elevation of the mechanism viewed normal to the operative run of the conveyor 1. The hopper 11 is omitted in this figure to avoid confusing the drawing.

FIG. 2 is a view taken from the left hand side of FIG. 1, but showing the angle of slope of the conveyor.

FIG. 3 is a rear view of the plate 29.

FIG. 4 is a front view of a larger scale of two consecutive slats of the conveyor 1.

FIG. 5 is a side view of FIG. 4.

FIG. 6 is a view on the line VI—VI of FIG. 4.

FIG. 7 illustrates a modified form of counting mechanism.

The conveyor illustrated is a duplex one, that is to say it has two projections at its centre line, one for directing coins laterally to the right and one for directing coins laterally to the left as viewed in FIG. 1.

The conveyor, generally numbered 1, comprises a chain whose links 2 are bent at right angles at each end, said ends being drilled to receive pins 3 (FIGS. 4 and 6) to join the links together as a continuous chain.

The links 2 between the ends comprise slats 4 and on alternate slats are mounted projecting panels 5. Near the two ends of said alternate slats 4 portion thereof is bent up to provide ledges 6, 7.

The conveyor 1 is trained around pairs of sprockets 8, 9 (best seen in FIG. 2), the sprockets 9 being driven in the direction of the arrow A so as to drive the operative run of the conveyor upwardly through a hopper 11 that provides a bulk supply of coins.

44 is the right hand portion of a stand for supporting the conveyor 1 and its attached plate 29 with its mechanism. The stand 44 is such as to maintain the conveyor and plate at an angle of about 25° to the vertical.

Fixed guides 12, 13 are mounted at the sides of the operative run of the conveyor to arrest coins that roll on to the ledges 6, 7. The guides 12, 13 extend upwardly to positions 14, 15 respectively and from those positions a second pair of fixed guides 112, 113 are mounted, spaced apart somewhat wider than the guides 12, 13.

The construction of the slats 4 will now be described with reference to FIGS. 4 to 6.

In general each slat comprises a rectangular plate bent at right angles at each end to provide drilled links 16,

17 (FIG. 6) of the chain and each slat 4 is channelled upwardly at 18, 19, the position of said channels being between the panels 5 and ledges 6, 7 respectively.

As will be seen, on each alternate slat there is mounted, normal to said slat, a projection in the form of a panel 5, and since the conveyor illustrated is a duplex one, two such panels are shown, the right hand panel sloping laterally downwardly to the ledge 6 and the left hand panel sloping laterally downwardly to the ledge 7.

The angle at which the panels 5 are set is important since, as the coins roll on to their ledges 6, or 7, their weight must be such as to overcome friction between the surface of the coin and the surface of the slats, bearing in mind that the slats are at an angle of about 25° to the vertical. It has been found that an angle of about 18° to 20° to the horizontal is most suitable for the setting of the panels.

The panels 5 taper towards their outer ends, i.e. at the edge 23 (see FIGS. 5 and 6) they are narrower than at the position where they are bolted to the slats. This is to prevent coins riding edge-on in the channels 18 or 19 jamming against a stripper 24 or 25, hereinafter described.

The height of the panels 5 normal to the slats 4 is of importance because if it is incorrect, there is a tendency for coins in the hopper 11 forming into a roll edge-on to the conveyor. It has been found that the horizontal distance from the highest point of the edge 23 of a panel to the slat above, should be greater than half the diameter of a coin. In other words the distance from point 20 in FIG. 5 to the point 21 is greater than half the diameter of a coin, the line 20-21 being at an angle of 25°. This effectively prevents the formation of a roll of coins.

The ledges 6, 7 hereinafter referred to, are provided by bending up strips of each slat at right angles thereto and it will be seen that the ledges are at a lower level on the slat to their associated panels 5. They are also parallel to said panels. The ledges are so bent that they protrude a distance equal to the thickness of a worn coin of the denomination concerned. This ensures that two coins cannot be supported on a ledge.

In addition to bending the ledges at right angles, the metal of the slat is also bent outwardly as will be seen at 26, particularly in FIGS. 5 and 6. The reason for this is as follows. If a coin is supported on each of two ledges in series, a third coin may be picked up on the upper edges of the lower coin. The picked up coin would overlap the ledge supporting the upper of the two coins and due to the angle of the conveyor and the fact that each ledge is bent outwardly, the picked up coin will overbalance and be returned to the hopper.

Reverting now to the general construction of the conveyor, a pair of strippers 24, 25 is mounted on bridge pieces 10 and 27 and these are positioned so that they extend along the channels 18, 19. The strippers 24, 25 taper towards their lower ends so that any coin located adjacent either of the channels 18, 19, i.e. are not correctly directed to a carrier or ledge, will be tipped off the conveyor and be returned to the hopper 11.

Operation of the conveyor 1 will now be described. The hopper 11 is filled with coins, e.g. 6d. pieces and the sprocket 9 is set in motion. The panels 5 as they pass upwardly through the mass of coins act to agitate the coins and so orient one or more so that they lie face to face with the surface of the conveyor. Such face to face coins are then extracted by the panels 5 and carried clear of the coins in the hopper, whereupon, due to the slope of said panels, said extracted coins roll laterally respectively to the ledges 6, 7 according to whether they are picked up by the right or left-hand panel 5.

Naturally one or more coins may be extracted directly by the ledges and if so a second coin rolling to a position on top of it cannot be retained by the ledge,

due to the thickness of the latter, and will fall back to the hopper.

Coins are sometimes picked up edge-on to the conveyor and these fall freely by vibration. If a coin arrives edge-on in a channel 18 or 19, it is dislodged by movement between a panel and a stripper 24, or 25.

It will be noted that a coin correctly supported on a ledge is located between the side edge of a panel 5 and a fixed guide 12 or 13, so that there is insufficient space between the coin and the panel edge or guide, as the case may be, for a coin to jam edge-on between those parts.

It will be observed from the drawings that the ledges 6, 7 and panels 5 are provided only on alternate links 2. This is a convenient arrangement when the coins concerned are sixpenny pieces, but with larger coins it may be desired to provide greater spacing between links that include ledges and panels, e.g. there may be two or more consecutive links without ledges and panels.

Toward the upper end of the operative stretch of the conveyor 1 there is mounted, at each side thereof a counting means comprising a scolloped wheel 28. This wheel is rotatable in a plate 29 step by step, due to its rotary motion being controlled by a pawl 30 pivoted at 31 to the plate and urged by a spring 32 to engage an abutment 33 formed thereon with a scollop of the wheel 28.

The wheel 28 on the right hand side of the conveyor which in operation rotates clockwise, includes twelve scollops 34 and extending at right angles from its surface towards the rear of one of the scollops is a short pin 35.

The guide 112 hereinafter referred to is secured to the plate 29 and this carries via the bridge 10 the stripper 24 hereinafter referred to.

There is also mounted on the plate 29 a two armed lever 36 that is pivoted at 37. One arm 38 of the lever 36 includes a deflector 60 that is bent up at an angle of about 30° from the plane of the lever 36 and acts, when said lever is triggered as hereinafter explained, to lie in the path of extracted coins on their ledges, to engage said coins and tip them back to the hopper 11, thus preventing coins passing to the counting means.

The second arm 39 of the lever 36 is provided at its end with two teeth 40, 41, while a pawl 42 that is urged by a spring 43, is adapted to engage the tooth 40 to hold the deflector 60 clear of the path of coins on the conveyor 1.

At 56 a pin extends from the front face of the arm 38 and said pin is adapted to be engaged by a weighted lever 57 that is freely pivoted at 31 and carries a cam 59, the arrangement being such that when the pin 35 of the wheel 28 engages the cam 59, it acts to pivot the lever 36 counter-clockwise and so through engagement with the pin 56 extend the deflector 60 into the path of coins on the ledges 6.

Above the guide 112 there is secured to the plate 29 a sloping chute 61 to receive coins counted by the wheel 28 and lead them to a tube 58. The guide 12 is slotted to permit the scolloped wheel 28 and the deflector 60 to project into the path of coins on the ledges 6.

To the rear of the plate 29 is secured a solenoid 62 whose armature 52 is pivotally connected at 45 to a lever 46 pivoted at 47, said lever being biased by a spring 48 to assume its upper position against a stop 49. The lever 46 at the pivot 45 includes a pin 50 that extends through a hole in the plate 29 and engages a slot 51 in the second arm 39 of the lever 36 whereby movement of the armature 52 in the downwards direction acts to pivot said lever 36 so that its tooth 40 engages the pawl 42.

To the rear of the arm 39 near its pivot is mounted a pin 53 extending through a hole 54 in the plate 29, said pin being adapted to close a micro-switch 55 (see FIG. 3) when the said arm 39 is in the position indicated in FIG. 1. The closure of this switch acts through a relay to start the conveyor 1.

The tube 58 for receiving counted coins is also adapted to hold them there until required by a customer. The lower end of the tube 58 is normally closed by a counterbalanced lever 63, said lever being locked in its closed condition by an arm 64 of a three armed lever (see FIG. 2). The second arm 65 of the three armed lever comprises a counterweight adapted to maintain the lever in its locking condition, while the third arm 66 is adapted to engage the end of the lever 46 remote from its pivot.

The apparatus for counting coins operates in the following manner. The hopper 11 is filled with coins and the necessary electric connections are made to the operative parts of the mechanism.

Assuming now the parts are in the condition indicated in FIG. 1, in which condition the micro switch 55 is closed by the pin 53 so the conveyor 1 is in motion and acts through the panels 5 to agitate coins in the hopper 11, extract them therefrom and, due to the slope of said panels, direct them to consecutive ledges 6. The coins on the ledges are carried past the scolloped wheel 28 and as they are so carried they engage between the right hand side of the stripper 24, a ledge 6 and a scollop of the wheel and so each coin turns said wheel one step against the action of the pawl 30.

Each counted coin is then carried further up until it rolls off down the sloping chute 61 into the tube 58 where it rests on the counterbalanced lever 63.

This action continues for twelve coins, until the pin 35 engages the cam 59 to depress the lever 57 which through the pin 56, rocks the lever 36 so that the deflector 60 projects into the path of coins on the ledges 6, thereby returning any further coins which could be on said ledges 6 to the hopper 11.

Movement of the lever 36 through the pin 53 permits the micro switch 55 to open to halt the conveyor after a delay. This delay providing over-run of the conveyor 1 is desirable to ensure that coins already counted are carried to the chute 61.

When now the machine is operated, for example change is required for three two-shilling pieces, the insertion of the third coin acts through electric circuits (not shown) to energize the solenoid 62 and through its armature 52 to pivot the lever 36 clockwise (as seen in FIG. 1) to engage the tooth 40 with the pawl 42. Simultaneously the lever 46 is rocked to release the counterbalanced lever 63 which pivots downwardly due to the weight of the coins in the tube 58 and permits said coins to pass down a passageway 67 from which they pass to a bowl outside the machine where they may be removed by the purchaser.

The counterweighting of the lever 63 is such that immediately the coins have fallen from the tube 58, said lever returns to the position where it obturates the lower end of said tube, where it is again locked by the arm 64 of the three armed lever.

According to a modification, the conveyor 1 is made wider and the two sets of panels 5 at the centre are separated, thus a dividing partition extends down the centre line of the conveyor and continues into the hopper so as in the later case to divide the hopper into two separate hoppers. Coins of one denomination, say 6d. pieces, may then be supplied to one hopper and coins of another denomination, say 3d. pieces may be supplied to the other hopper. The arrangement of the panels and associated ledges on the conveyor are suitably modified to correspond with the denomination of coinage as are also the parts of the coin counting and other mechanism.

The method described for separating and feeding coins stored in a bulk supply and the apparatus described for carrying out that method may be applied to various kinds of machines. It has been described with respect to a simple change giving mechanism, but it may be used with a machine for vending articles in which change is required, for example a ticket issuing machine where, say, a 6d. piece is required in change for a ticket costing 2/-, the

machine being operated by a 2/6d. piece. Another use of such mechanism is in a machine that supplies monetary prizes, e.g. a Roulette machine.

In the case of a Roulette machine the insertion of a coin into the machine closes one switch in an electric circuit that controls the delivery of coins from the tube 58. A second switch in that circuit is closed by the ball so that if a coin has been inserted in a winning slot, the ball completes the circuit and releases the coins from the tube.

The method of counting the coins and the apparatus for carrying it out may also be applied to article vending machines that involve change and machines that provide monetary prizes.

The majority of the embodiment described concerns the conveyor 1 in conjunction with the counting mechanism on the plate 29, but it will be appreciated that the coins on the ledges 7 are intended to operate with a similar counting mechanism on a plate 142.

In FIG. 7 there is illustrated a modification of the counting mechanism. In this drawing parts similar to those shown in FIGS. 1 or 3 are given like numbers.

In this modification movement of the rotatable counting device 28 transmits movement to an associated rotatable member 68 and a projection on said member 68 strikes the deflector 60 to move it to its operative condition. By this arrangement, without enlarging the scolloped wheel 28, it may be used to count multiples of twelve coins.

The operation is similar to that already described with reference to FIGS. 1 and 3 but the weighted lever 57 is omitted.

According to this modification a gear wheel 69 is mounted on the axle 70 of the scolloped wheel 28, and said gear wheel 69 mates with a second gear 68 mounted on the axle 31, while a striker bar 72 is rigidly mounted on the gear 68. The bar 72 carries projections 73, 74 at its ends.

The ratio of the gear 69 to the gear 68 is 3:1 so that counting of thirty-six coins by the wheel 28 will rotate the gear 68 once in the clockwise direction. The projections 73, 74 are adapted to engage the pin 56 on the deflector 60 to move the latter to its operative position where it engages coins on the conveyor 1 (not shown). By the arrangement illustrated the deflector will be moved each time eighteen coins have been counted.

By altering the ratio between the gears 68, 69 or modifying the bar 72, e.g. to provide four projections, various other multiples of twelve coins can be provided for.

I claim:

1. A conveyor for individually extracting coins stored in bulk in a hopper and carrying the coins in face to face relationship therewith, said conveyor comprising a series of carriers projecting normally of the conveyor for a distance equal to the thickness of a worn coin, a series of deflectors individually associated with said carriers for agitating the coins in the hopper, for extracting coins from the hopper and for directing coins extracted from the hopper to an associated carrier, each deflector comprising a panel projecting normally of the conveyor for a distance equal to a multiple of the thickness of a worn coin, said panel being of substantial extent in the direction which the coins are directed, and being disposed ahead of the carrier associated therewith so that a coin extracted by the panel is directed onto said associated carrier, and means for moving said carriers upwardly through the hopper.

2. A conveyor as claimed in claim 1 wherein each deflector comprises a panel sloping downwardly at a small angle towards the carrier associated therewith so that a coin extracted by the panel rolls laterally onto said carrier.

3. A conveyor as claimed in claim 1 wherein said conveyor comprises a plurality of slats forming an endless chain, at least one slat including first and second de-

flectors located at the center-line of the slat, said first deflector directing coins laterally to a carrier at one side of the conveyor and said second deflector directing coins laterally to a carrier at the other side of the conveyor.

4. A conveyor as claimed in claim 1 comprising a plurality of rollers and an endless chain trained around said rollers and comprising a series of links, said chain, in an operative run, passing through the hopper and said links comprising slats, at least one of said slats carrying a projection and associated carrier.

5. A conveyor as claimed in claim 4 wherein said at least one slat includes first and second projections located at the center line of the slat, said first projection directing coins laterally to a carrier at one side of the conveyor and said second projection directing coins laterally to a carrier at the other side of the conveyor.

6. A conveyor as claimed in claim 4 wherein each projection extends normal to the surface of the slat by which said projection is carried and comprises a panel sloping downwardly at a small angle towards the carrier associated therewith so that a coin extracted by the panel rolls laterally on to said carrier where the movement thereof is arrested by said fixed guide.

7. A conveyor as claimed in claim 6 in which each carrier comprises a ledge protruding from the slat by which said carrier is carried at a lower level than the panel associated therewith, whereby a coin that rolls on to said ledge is maintained against lateral movement by engagement between the lateral edge of said associated panel and the fixed guide.

8. A conveyor as claimed in claim 6 in which the height of a projection normal to an associated slat is such that the center of gravity of a coin whose edge engages both the slat and the projection lies between the two engaging positions.

9. A conveyor as claimed in claim 7 in which the ledge is parallel with the panel associated therewith.

10. A conveyor as claimed in claim 7 in which said ledge protrudes from the slat associated therewith a distance equal to the thickness of a worn coin of the denomination concerned.

11. A conveyor as claimed in claim 7 in which a portion of a slat adjacent a ledge is bent outwardly so that a coin below said ledge that tends to lie against that portion of the slat will overbalance and be returned to the hopper.

12. A conveyor as claimed in claim 7 wherein the said slat further comprises a channel located at a position between a panel and an associated ledge, and wherein there is further included fixed stripper means located adjacent said channel for returning any coin located at said position.

13. A conveyor as claimed in claim 12 wherein the panels taper towards their outer edges so that a coin riding edge-on within said channel will not jam against the stripper and will be returned to the hopper.

14. A conveyor as claimed in claim 12 in which said fixed guide terminates at a position near the end of the operative run of the conveyor whereby a coin carried to this position by a ledge will roll off the conveyor.

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WALTER SOBIN, Primary Examiner

U.S. Cl. X.R.

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