

[54] **COIN WRAPPING APPARATUS**
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[51] Int. Cl.²..... **G07D 9/06**

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53/64, 77, 211, 212

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[57] ABSTRACT

A detecting mechanism in a coin wrapping machine carries out the operations of causing a wrapping mechanism to continue operating when feeding of wrapping paper from a feeding mechanism to the wrapping mechanism is detected, suspending in a standby state the operation of the wrapping mechanism when wrapping paper is not detected at a predetermined time, and stopping the wrapping mechanism when feeding of the paper is not detected even after the elapse of a predetermined time from the time of suspension of the operation of the wrapping mechanism.

2 Claims, 9 Drawing Figures

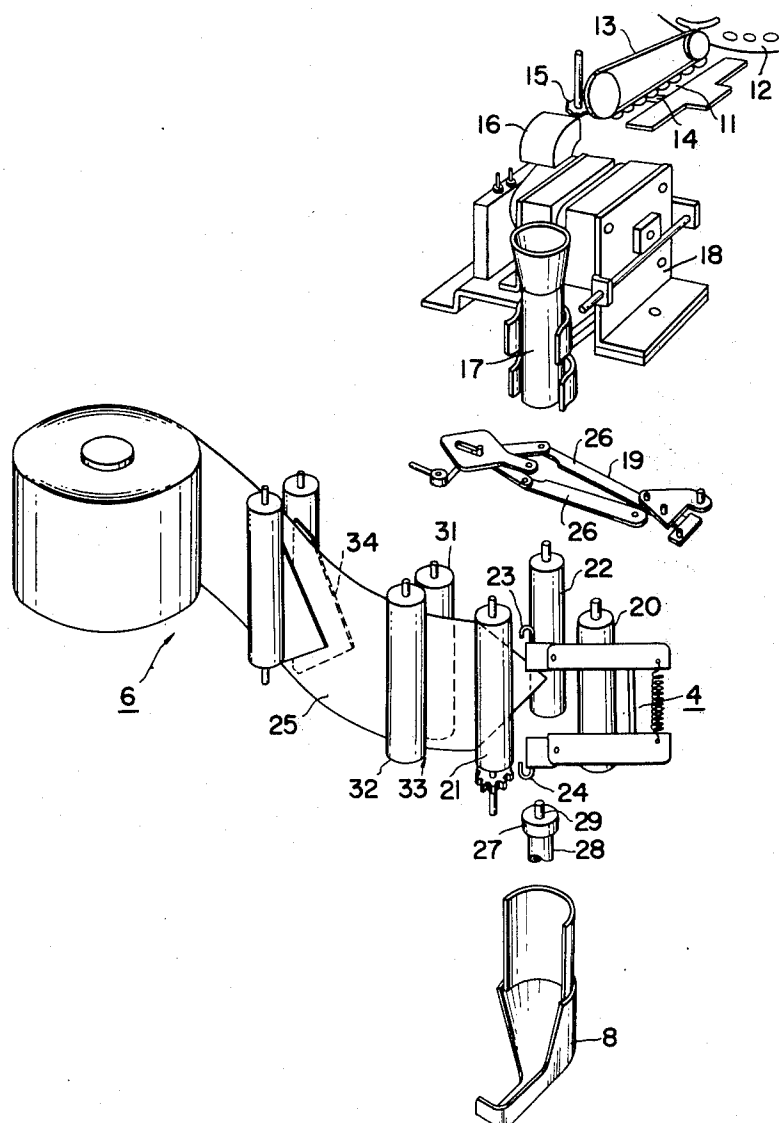


FIG. 1

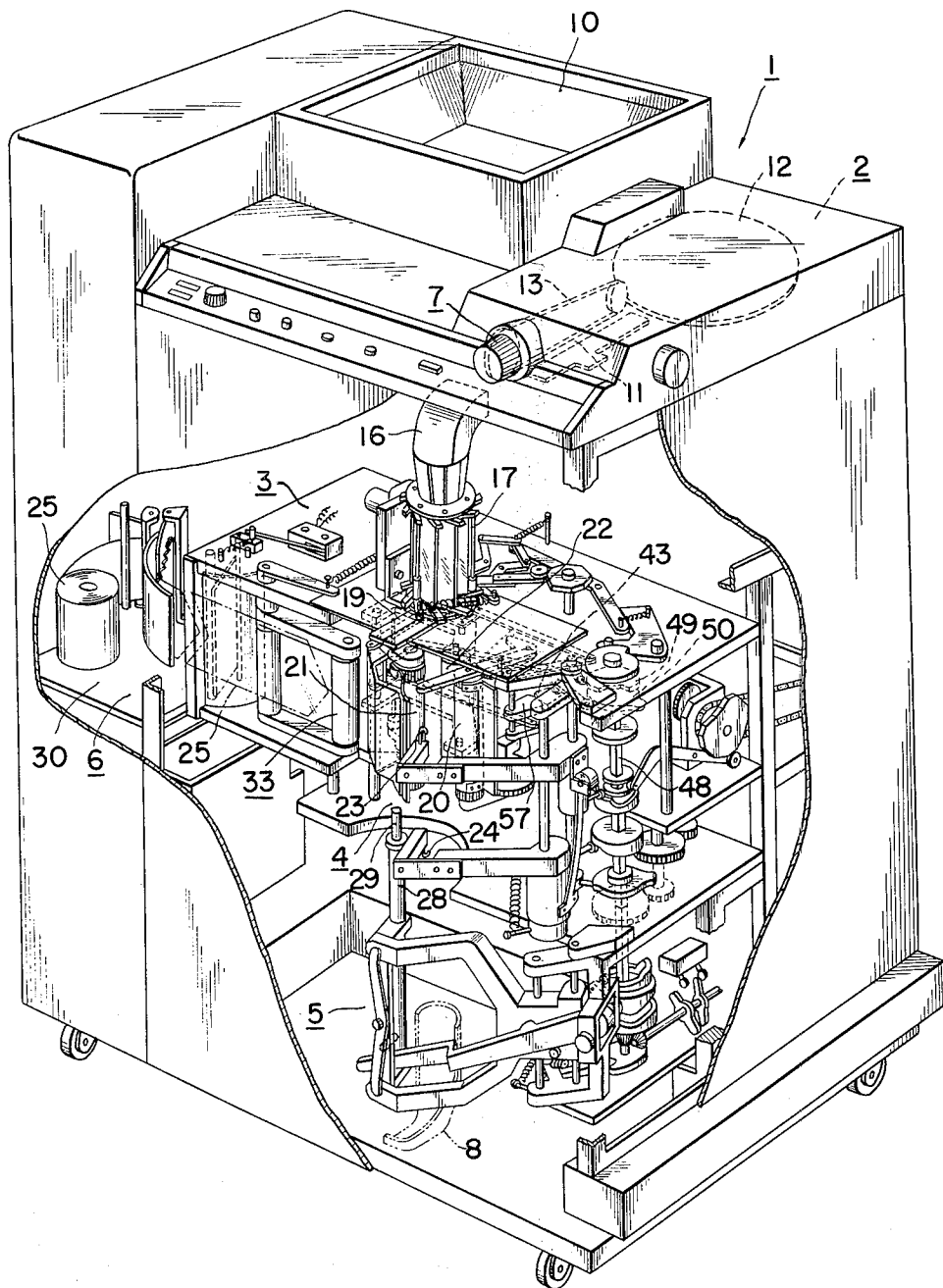


FIG. 2

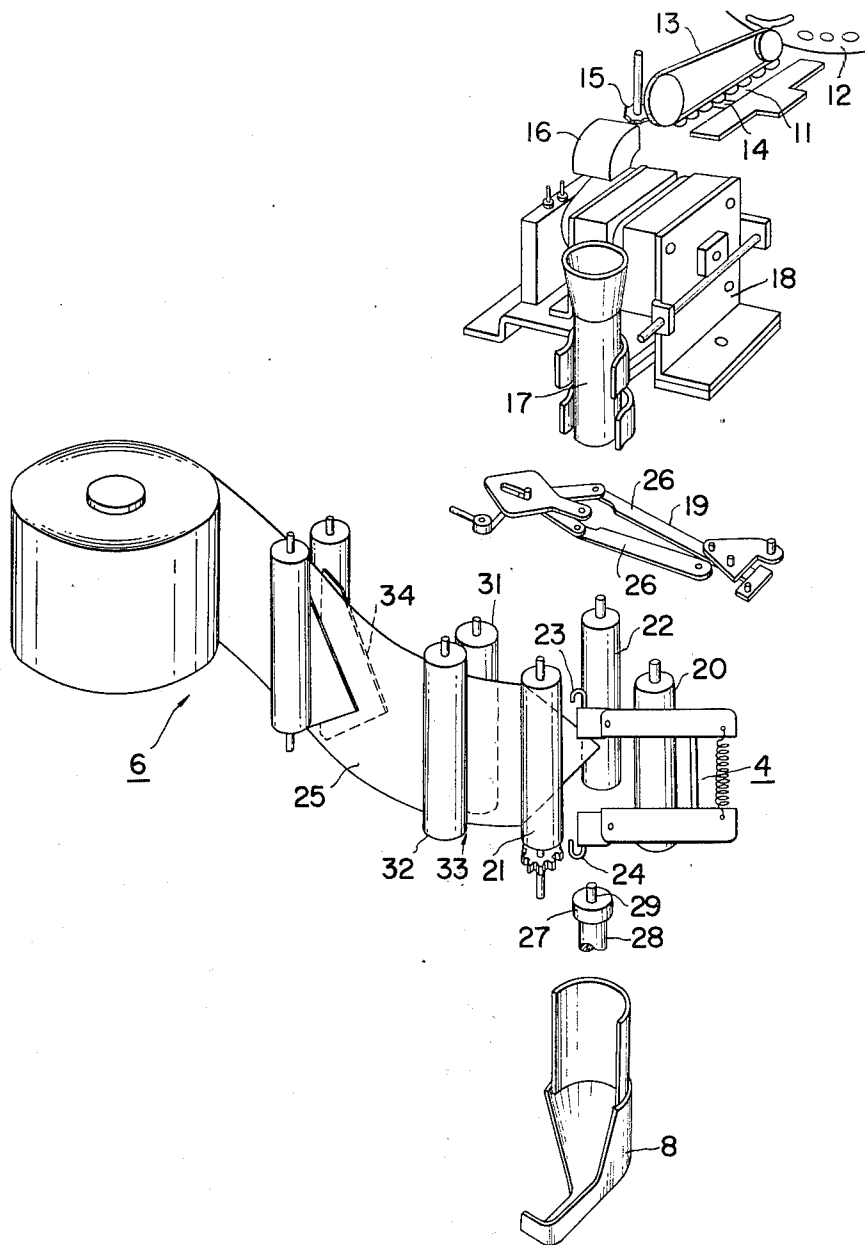


FIG. 3

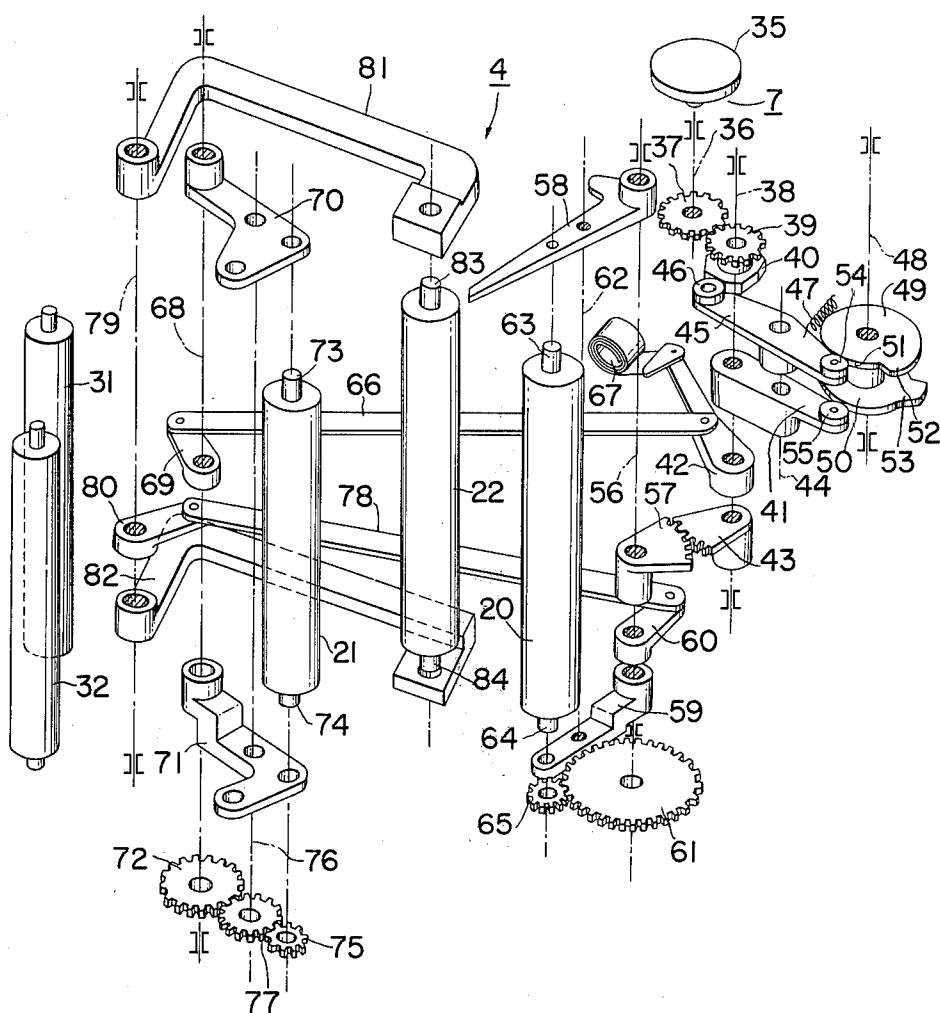


FIG. 4

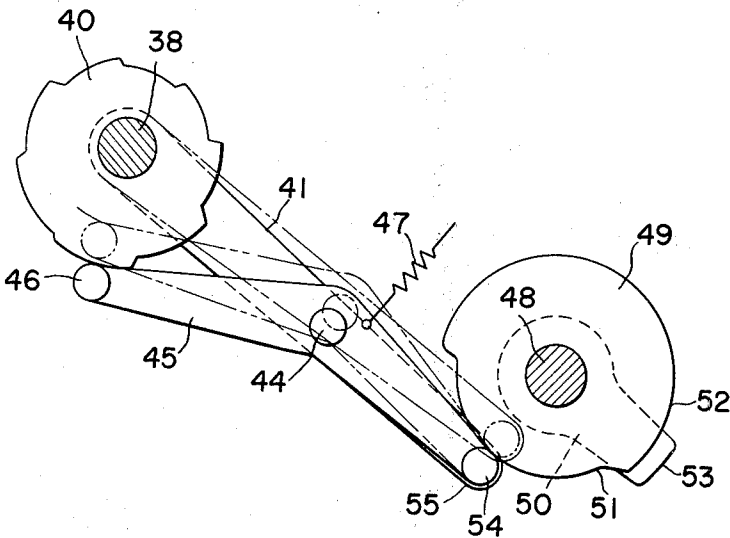


FIG. 5

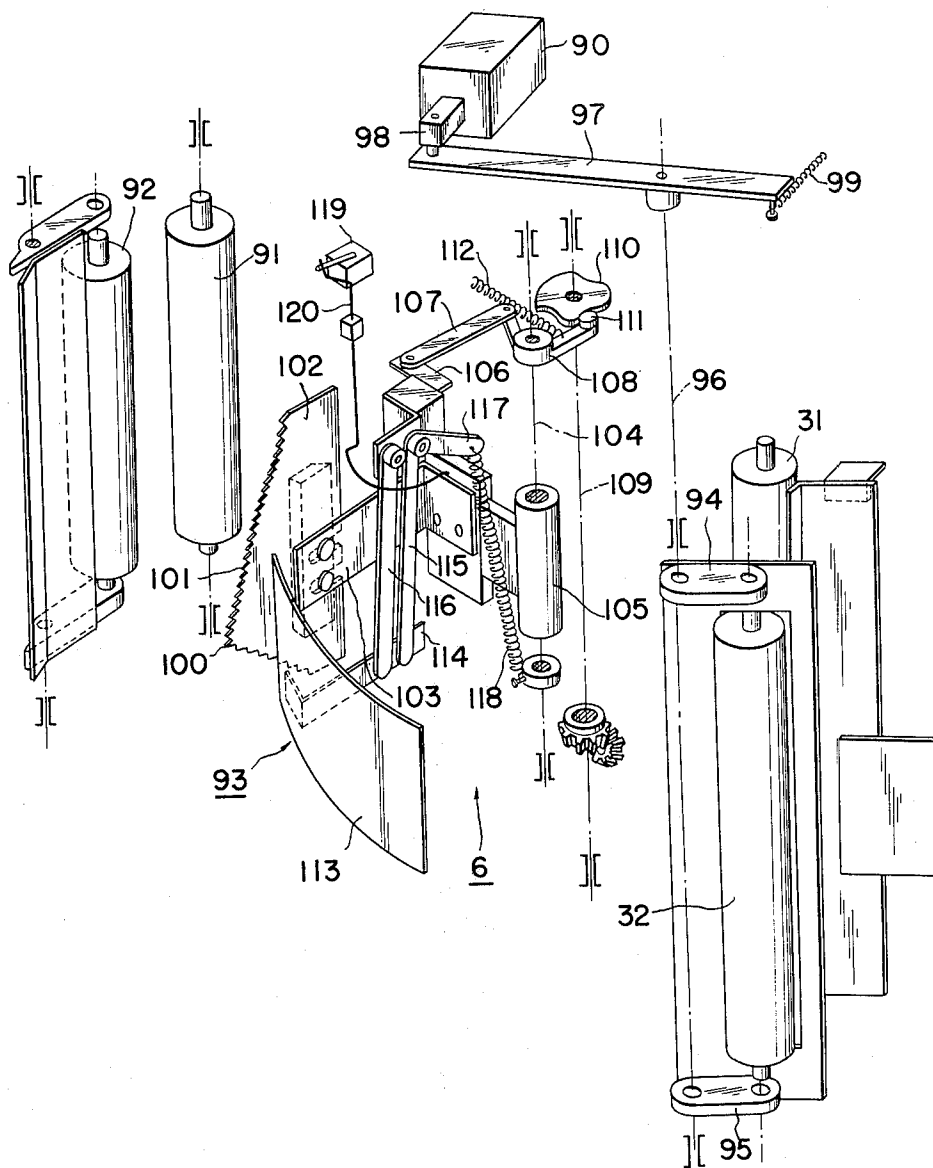


FIG. 6

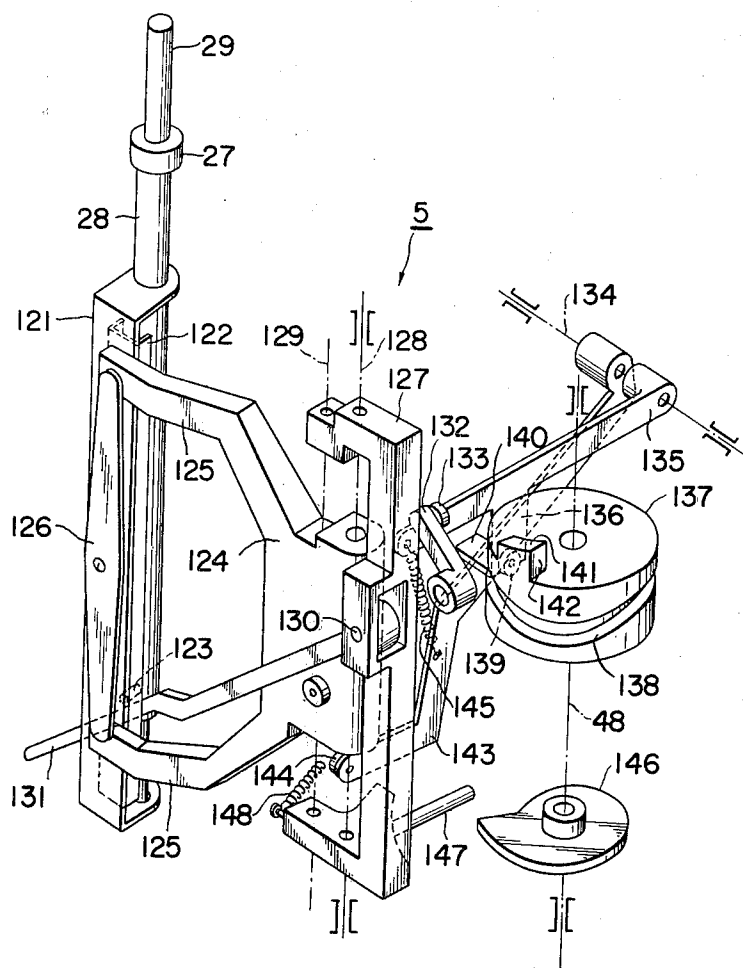


FIG. 7

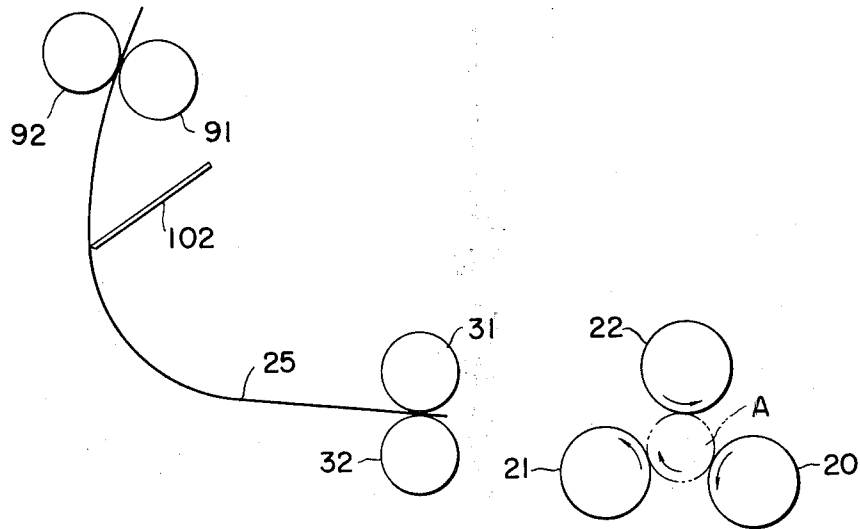


FIG. 8

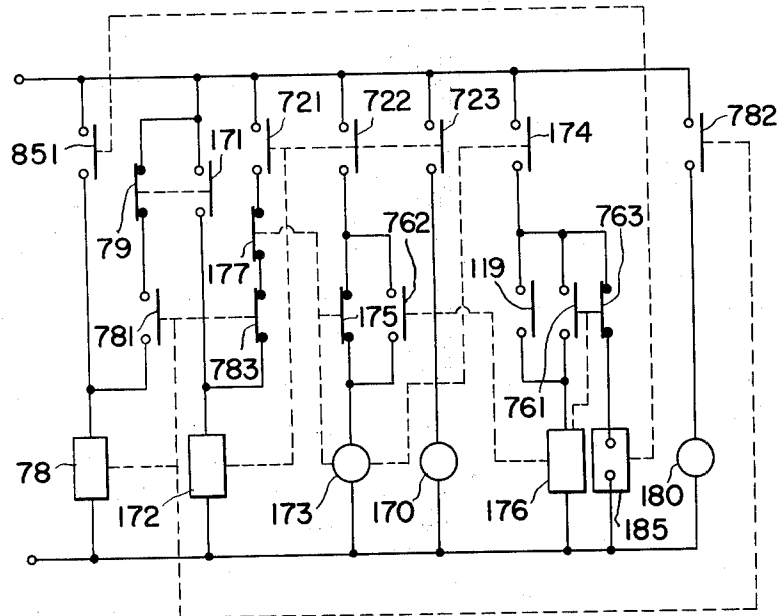
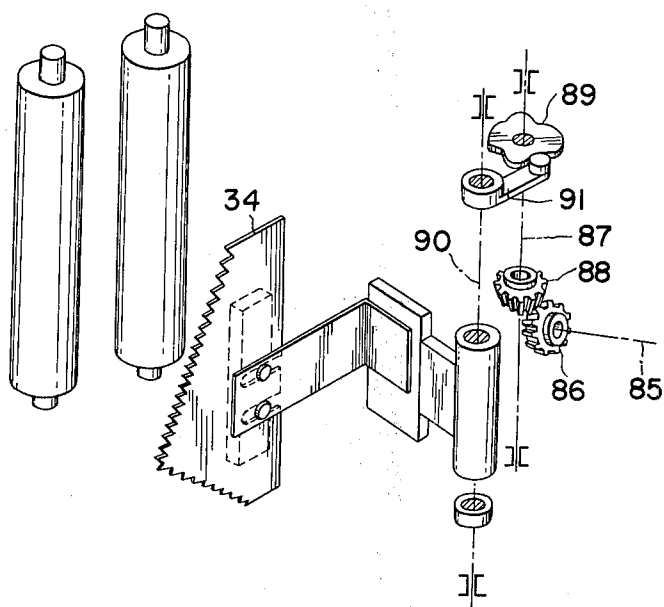


FIG. 9



COIN WRAPPING APPARATUS

BACKGROUND OF THE INVENTION

This invention relates generally to coin handling and processing apparatus, particularly coin packaging apparatus known as coin wrapping machines. More specifically, the invention relates to a novel and advanced coin wrapping apparatus of the type wherein a plurality of wrapping rolls, clamping and imparting rotation to a stack of coins, cause a piece of wrapping paper to be wrapped around the stack, and the two lateral edge parts of the wrapping paper thus wrapped and projecting outward beyond the ends of the coin stack are fold crimped by a fold crimping hook needle.

In a coin wrapping apparatus of this type known heretofore, the timing of the operations of the wrapping mechanism and of the wrapping paper feed mechanism is accomplished by a cam line, that is, a plurality of cams arranged in a line on a cam shaft. For this reason, the wrapping mechanism operates irrespectively of whether or not wrapping paper is being fed, with the result that, when wrapping paper is not being fed, the coin stack collapses between the wrapping rolls, and the coins separate, infiltrating into and jamming the wrapping mechanism, scattering into the apparatus, or being discharged in their unwrapped state.

SUMMARY OF THE INVENTION

It is an object of this invention to provide a coin wrapping apparatus wherein means are provided for detecting feeding of the wrapping paper, causing, in the event that the paper feeding is delayed, the wrapping rolls to stand by in their state of clamping and rotating a stack of coins which has arrived therebetween until a piece of wrapping paper is fed, and starting the wrapping operation of the wrapping mechanism in response to the feeding of the wrapping paper, to accomplish positive and accurate coin wrapping.

Another object of the invention is to provide a coin wrapping apparatus of the above set forth character in which there are further provided means whereby the wrapping mechanism is stopped when the wrapping paper is not supplied thereto within a predetermined time from the instant the wrapping rolls assume their stand-by state, and the wrapping mechanism is checked from continuing its operational cycle to the final stage, to prevent paperless wrapping operation.

The nature, utility, and further features of the invention will be apparent from the following detailed description with respect to a preferred embodiment of the invention when read in conjunction with the accompanying drawings briefly described below, throughout which like parts are designated by like reference numerals.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a general perspective view, with parts cut away, showing in its entirety a coin wrapping machine according to this invention as viewed from a point above, in front of, and to the right of the machine;

FIG. 2 is a perspective view, with parts shown in a levitated state, of mechanisms for classifying, stacking, and wrapping coins, a mechanism for feeding wrapping paper, and a discharge chute for wrapped coin stacks in the apparatus shown in FIG. 1;

FIG. 3 is an exploded perspective view showing the essential parts of the wrapping mechanism, the wrapping paper feeding mechanism, mechanisms for driving these mechanisms, and related parts in the same apparatus;

FIG. 4 is a relatively enlarged plan view showing a portion of a mechanism illustrated in FIG. 3;

FIG. 5 is an exploded perspective view showing the essential parts of the mechanisms for feeding and cutting the wrapping paper;

FIG. 6 is a perspective view showing parts of a mechanism for guiding and introducing coin stacks into their wrapping position;

FIG. 7 is a diagrammatic plan view indicating the manner in which wrapping paper is fed, cut, and guided to the wrapping mechanism;

FIG. 8 is a circuit diagram showing the essential organization of one example of an electrical system for controlling the mechanisms in the same apparatus; and

FIG. 9 is a perspective view showing the essential parts of the wrapping paper cutting mechanism shown also in FIG. 5.

DETAILED DESCRIPTION

First, the general organization of one example of a coin wrapping machine in which this invention has been applied will be described. The essential operational sections of this coin wrapping machine 1 are: a coin supplying device 2 for supplying coins to be wrapped; a coin stacking device 3 for arranging coins supplied from the supply device 2 into a stack of a predetermined number of coins; a coin wrapping device 4 for winding wrapping paper around the coins thus stacked to wrap the same; a coin stack transferring mechanism 5 for introducing the above mentioned coin stack from the coin stacking device 3 into the coin wrapping device 4; a wrapping paper feeding device 6 for feeding wrapping paper into the coin wrapping device 4; and a control device 7 for controlling the operation of the coin wrapping device 4.

The above mentioned coin supplying device 2 comprises, essentially: a hopper 10 for receiving coins dropped therein; parts forming a passageway 11 for coin classification and counting; a revolving disk 12 for successively sending coins from the hopper 10 by centrifugal force into the passageway 11; a locomotive belt 13 for moving coins introduced into the passageway 11 along this passageway, a classification device 14 for classifying the coins thus moved and discharging coins of small diameter; and a counting mechanism including a counting sprocket wheel 15 (only component shown) rotated by the moving coins meshing successively therewith and driving a counter (not shown), which detects the passage of a predetermined number of coins, whereupon the counting sprocket wheel 15 is locked and thereafter stops further supply of coins until the succeeding operational cycle.

The coin stacking device 3 comprises a coin alignment cylinder 17 communicatively aligned with a guide member 16 provided at the outlet end of the passageway 11, a vibrating device 18 for imparting vibration to the alignment cylinder 17 thereby to shake the coins into a neat stack, and a shutter mechanism 19 for opening and shutting the lower open end of the alignment cylinder 17.

The principal parts of the coin wrapping device 4 are a plurality of wrapping rolls 20, 21, and 22, which are

movable in directions for mutually approaching and mutually separating from each other, and a pair of fold crimping hook needles 23 and 24. A coin stack aligned in the above described manner in the coin stacking device 3 is transferred by the stack transferring mechanism 5 described below past the shutter mechanism 19 in opened state and into a space surrounded by the wrapping rolls 20, 21, and 22 and is then clamped by these rolls. As these rolls thereupon impart rotation to the coin stack, they cause a piece of wrapping paper 25 to wrapped around the coin stack.

One principal part of the coin stack transferring mechanism 5 is a vertical guide tube 28 supported in a manner permitting its vertical movement and having at its upper end a support part 27 disposed below the above mentioned shutter mechanism 19 and operating to lower and introduce the above mentioned coin stack, which drops under its own weight upon being released by the opening action of shutter plates 26, 26 of the shutter mechanism 19, into the space between the wrapping rolls 20, 21, and 22. Another principal part of this transferring mechanism 5 is a holding rod 29 passed slidably through the guide tube 28, thereby being vertically movable, and operating to hold the coin stack between the wrapping rolls 20, 21, and 22. This coin stack transferring mechanism 5 is adapted to move out of the way below and to one side of the wrapping device 4 at the time of discharge of a wrapped stack from this wrapping device.

The wrapping paper feeding device 6 has a holding mechanism 30 for holding and storing ribbon-form wrapping paper 25 as a roll, a feed roll mechanism 33 comprising a driving roll 31 and an idler pinch roll 32 for clamping and paying out the wrapping paper 25 from the holding mechanism, and a cutter 34 for cutting the wrapping paper 25 into pieces of appropriate length for wrapping each coin stack.

Each piece of wrapping paper thus cut is interposed between the wrapping rolls 20, 21, and 22 and a coin stack and thereby wrapped around the cylindrical surface of the coin stack as described hereinbelow. Each coin stack upon completion of wrapping is discharged by way a wrapped coin discharge chute 8.

Next, details of the wrapping mechanism related to this invention will be described.

In FIG. 3, for convenience in description, holes for receiving and being fixed to shafts or spindles are shown with hatching on their inner surfaces, and holes for loosely and rotatably fitting on shafts are shown without hatching. Furthermore, shaft holes represented symbolically as bearings indicate that the corresponding shafts or spindles are rotatably supported by the machine frame.

This FIG. 3 shows a specific example of construction of mechanism for causing some or all of the wrapping rolls 20, 21, and 22 to move toward each coin stack in accordance with the setting for the kind of coins (denomination) in the stack. A denomination setting knob 35 is coupled to a vertical shaft 36 either directly or indirectly by way of parts such as a rotary switch, a motor, and a cam. This shaft 36 fixedly supports a gear 37 meshed with an idler gear 39, which is rotatably fitted on a vertical shaft 38. The gear 39 is fixedly and coaxially connected to a cam 40 for setting the distance of movement of the three wrapping rolls 20, 21, and 22. This cam 40 has a peripheral cam surface which, as shown by one example in FIG. 4, is of a figure wherein

the distance of the periphery from the centerline of the shaft 38 varies stepwise in accordance with the different outer diameters of the coins to be handled by the machine.

The vertical shaft 38 fixedly supports arms 41 and 42 at their proximal ends and a sector gear 43. A vertical shaft 44 is rotatably fitted in the arm 41 at substantially the middle part thereof and, extending through the middle part of a lever 45, rotatably supports this lever. This lever 45 has at one end thereof a roller 46, which is continually pressed in contact with the peripheral cam surface of the aforementioned cam 40 by the force of a spring 47.

A vertical shaft 48 adapted to rotate through one revolution with one cycle of the wrapping process fixedly supports cams 49 and 50. As shown in FIG. 4, cam 49 has formed thereon a cam surface 51 for establishing the position for minimum distance between the wrapping rolls 20, 21, and 22 and a cam surface 52 for establishing the position for introduction of a coin stack (intermediate position). Cam 50 has formed thereon a cam surface 53 for establishing the position of maximum separation. The other end of the abovementioned lever 45 rotatably supports a cam-follower roller 54 pressed into contact with the cam 49. A cam-follower roller 55 rotatably supported on the distal end of the above mentioned arm 41 is disposed to face the other cam 50 and is adapted to contact only the cam surface 53 for establishing the maximum separation position.

The above mentioned sector gear 43 is meshed with a sector gear 57 fixed to a vertical shaft 56. This shaft 56 fixedly supports arms 58, 59, and 60 at their proximal ends, and a gear 61 for transmitting rotational power from a motor (not shown) for driving the wrapping rolls to the wrapping roll 20 is rotatably fitted on the lower end of this shaft 56.

The arms 58 and 59 are coupled by a tie rod 62 fixed to intermediate points respectively of these arms and, at points further out from their proximal ends, rotatably support the upper and lower shafts 63 and 64, respectively, of the wrapping roll 20. To the lower shaft 64, there is fixed a gear 65 meshed with the above mentioned gear 61. Accordingly, rotational power is transmitted from the gear 61, through the gear 65 and the shaft 64, to the wrapping roll 20.

At the distal end of the aforementioned arm 42 on the shaft 38, there is pin connected one end of a link member 66, and a constant-force spring 67 is coupled to the extreme outer end of the arm 42. The other end of the link member 66 is pin connected to the distal end of an arm 69 fixed at its proximal end to a vertical shaft 68.

The shaft 68 also fixedly supports arms 70 and 71 for supporting the wrapping roll 21 at spaced apart points above and below the arm 69 and, in addition, fixedly supports a gear for transmitting power from a wrapping roll driving motor (not shown) to the roll 21. The wrapping roll 21 is rotatably supported by upper and lower journals 73 and 74 on the distal ends of the arms 70 and 71. A gear 75 is fixed to the lower journal 74 and is meshed with a gear 77 on a vertical shaft 76 passing through the arms 70 and 71, the gear 77 also meshing with the above mentioned gear 72.

A link member 78 is pin connected at one end thereof to the distal end of the above mentioned arm 60 and the shaft 56 and at the other end thereof to the distal end of an arm 80 fixed at its distal end to a verti-

cal shaft 79. This shaft 79 also supports a pair of approximately C-shaped arms 81 and 82 at their proximal ends at spaced apart positions on the shaft above and below the arm 80. The distal ends of the arms 81 and 82 rotatably support the upper and lower journals 83 and 84 of the wrapping roll 22.

The wrapping rolls 20, 21, and 22 have a mutual positional relationship such that they are respectively disposed at the corners of an equilateral triangle as viewed in plan view as in FIG. 7. These wrapping rolls are caused to move toward or away from the center of that triangle or the center of the coin stack by the movements of their respective supporting arms. In FIG. 7, reference character A designates a coin stack.

Next, the details of the wrapping paper feeding device 6 related to this invention will be described.

As indicated in FIGS. 3, 5, and 7, the driving roll 31 for advancing the wrapping paper 25 and the pinch roll 32 adapted to be movable toward and away from this driving roll 31 and pressed toward the driving roll 31 by an electromagnet device 90 thereby to clamp and drive the wrapping paper 25 constitute a mechanism for drawing the wrapping paper 25 and applying a tension thereto. The wrapping paper 25 in the form of a roll in the holding mechanism 30 is clamped between feeding rolls 91 and 92 provided on this holding mechanism 30 and fed into the position between the driving roll 31 and the pinch roll 32.

Next the above mentioned mechanism for drawing the wrapping paper and the actuating mechanism thereof will be described in detail. This drawing mechanism comprises the driving roll 31 functioning as a drawing means and the pinch roll 32 functioning as following and pulling means and is disposed between wrapping paper detecting means 93 described hereinafter and the wrapping mechanism 4.

The pinch roll 32 is rotatably supported at its upper and lower ends by the distal ends of a pair of arms 94 and 95, which are fixed at their proximal ends to a vertical shaft 96. A horizontally swingable lever 97 is fixed at an intermediate point thereof to one end of this shaft 96 and is pin connected at one end thereof to the plunger rod 98 of the above mentioned electromagnet or solenoid 90. A tension spring 99 is connected to the other end of the lever 97 in such a manner as to impart a torque thereto in the direction opposite to the torque due to pulling by the solenoid 90, that is, in the direction to swing and press the pinch roll 32 against the driving roll 31. solenoid solenoid 90 is energized when a switch is pressed by a cam on the cam shaft 48 and operates counter to the force of the spring 99 to move the pinch roll 32 away from the driving roll 31.

The wrapping paper thus fed toward the wrapping device 4 is cut into pieces of appropriate length for each coin stack by a wrapping paper cutting mechanism 100 provided with a cutting blade 102 having a convex V-shaped cutting edge 101 with saw teeth as shown in FIGS. 5 and 9. This cutting blade 102 is mounted in a manner permitting its horizontally advancing and retracting movement on a supporting member 103, which is fixed to a rotatable structure 105 supported on a vertical rotating shaft 104.

The rotatable structure 105 has a projecting part 106, to which is pin connected a link 107 at one end thereof. The other end of the link 107 is pin connected to the outer end of one arm of a bell crank lever 108 which is provided on the above mentioned shaft 104

and rotatably supports at the outer end of its other arm a follower roller 111 in following contact with a cam 110 fixed to a vertical rotating shaft 109 rotatable interrelatedly with the aforementioned shaft 36. A spring 112 is anchored under tension at one end thereof to the lever 108 thereby to maintain the roller 111 continually in contact with the cam 110.

The above mentioned wrapping paper detecting mechanism 93 has a detecting structure 113 disposed between the cutting blade 102 and the wrapping paper driving roll 31 to confront the traveling surface of the wrapping paper 25. The front surface of this detecting structure 113 is formed as a convex arcuate surface to be pressed by the wrapping paper 25. A member 114 fixed to the back surface of this detecting structure 113 is pivotally secured to links 115 and 116 pivotally suspended parallel to the aforementioned rotatable structure 105. A spring 118 is anchored under tension on the outer end of an arm part 117 projecting from one (115) of the links and imparts a force urging the detecting structure 113 toward the wrapping paper traveling side. Furthermore, the outer end of a rotatable actuating member 120 for closing a switch 119 is engaged by this link 115.

The coin stack transferring mechanism 5 has a vertical guide tube 28 having at its upper end a coin stack support part 27 of relatively large diameter as shown in FIG. 6 and as mentioned hereinbefore. This guide tube 28 slidably holds the holding rod 29 and is slidably held by a support frame member 121. This frame member 121 has a vertical guide groove 122 in which is slidably engaged an engagement projection 123 provided to project from the lower part of the guide tube 28. Furthermore, the support frame member 121 is mounted on support parts 125 of a vertically movable structure 124 and held by a mounting member 126.

The vertically movable structure 124 is swingably supported on a vertical shaft 128, which also rotatably supports a rotatable frame 127. A vertical shaft 129 passes slidably through this frame 127 and the vertically movable structure 124, whereby the structure 124 swings together with the frame 127.

The frame 127 rotatably supports a horizontal shaft 130, to which the proximal end of a lever 131 is fixed. The distal end of this lever 131 is engaged with the lower part of the above mentioned engagement projection 123 of the guide tube 28. A crank arm 132 is fixed at its proximal end to the shaft 130 and at its distal end rotatably supports a roller 133.

To a horizontal shaft 134, a lever 135 for vertical actuation is fixed at its proximal end and is engaged at the upper edge of its distal end with the distal end of the above mentioned arm 132. The lever 135 has a projecting part 136 rotatably supporting at its outer end a roller 139 engaged with a cam groove 138 formed in the peripheral surface of a cam 137 fixed to the aforementioned cam shaft 48. The cam groove 138 is so formed that its action is transmitted by way of the various mechanical parts described above to cause the guide tube 28 to rise rapidly and to descend gradually. At the end of the projecting part 136 of the lever 135, there is bent formed a flange 140.

On the upper surface of the cam 137, there is formed a projecting part 142 having a cam surface 141 comprising a substantially level part and an inclined part contiguously following the level part, this cam surface 141 being engaged by the above mentioned roller 133

of the crank arm 132. This cam surface 141 and the arm 132 constitute delayed action means for slowing the guiding speed of the guide tube 28 when the coin stack is moved from the guide tube 28 onto the holding rod 29.

A vertical movement follower lever 143 is rotatably fitted at its proximal end onto the above mentioned horizontal shaft 134 and at its distal end rotatably supports a roller 144, which engages the lower surface of the above mentioned vertically movable structure 124 and, at an intermediate part thereof engages the above-mentioned bent flange 140 of the lever 135 for vertical actuation. The levers 135 and 143 are coupled by a coil spring 145.

The above mentioned rotatable frame 127 is provided with a projection 147 engageable with a cam 146 fixedly supported on the cam shaft 48 and is urged by a spring 148 into engagement with the cam 146.

The example of the machine of the mechanical organization as described above operates in the following manner. First, the denomination setting knob 35 is turned to select the kind of coins to be wrapped, that is, the diameter of the coins, whereupon the rotational speed of the driving motor (not shown) of the wrapping rolls 20, 21, and 22 and the wrapping paper feeding rolls 31 and 32 is separately set.

Since, at the same time, the shaft 36 turns through a specific angle, this rotation is transmitted through the gears 37 and 38 to rotate the cam 40 through a corresponding angle. However, since the roller 55 of the arm 41 is contacting the cam surface 53 for establishing maximum position, the roller 54 of the lever 45 is pulled by the spring 47 and thereby contacts the surface 52 for establishing the position for introduction of a coin stack of the cam 49. On the other hand, since the roller 46 is in a state wherein it is not contacting the cam 40, the wrapping rolls 20, 21, and 22 are at specific positions irrespective of the diameter of the coins.

Next, as a result of the continued rotation of the shaft 48, the cams 49 and 50 rotate to specific angular positions, and the roller 55 of the arm 41 disengages from the surface 53 for maximum distance position of the cam 50. Then, when the roller 54 of the lever 45 contacts the surface 52 of cam 49, the lever 45 is pulled by the spring 47, and the roller 46 of the lever contacts the cam 40. Simultaneously with this action, the arm 41 turns through a specific angle about the shaft 38, this turning angle being determined by the amount of movement of the lever 45 contacting the peripheral cam surface of the cam 40.

Furthermore, the arm 42 and sector gear 43 fixed to the shaft 38 are also turned through a specific angle by the constant-load spring 67. Since this rotation of the arm 42 is transmitted through the link 66 and the arm 69 to rotate the shaft 68, the arms 70 and 71 rotate, and the wrapping roll 21 moves by one step toward the center of the space for receiving the coin stack. The rotation of the sector gear 43 is transmitted through the sector gear 57 meshed therewith to rotate the shaft 56, whereby the arms 58 and 59 fixed to this shaft 56 turn, and the wrapping roll 20 also moves by one step toward the center. In addition, the rotation of the arm 60 fixed to the shaft 56 is transmitted through the link 78 and the arm 80 to rotate the shaft 79, whereby arms 81 and 82 also turn, and the wrapping roll 22 also moves by one step toward the center.

Thus, all three wrapping rolls 20, 21, and 22 move by one step toward the center, the distance of this movement being determined by the preset angular position of the cam 40 contacted and followed by the roller 46 of the lever 45. More specifically, in the case of coins of small diameter, the three rolls move through a distance d_1 to the positions for coin introduction, that is, to a first-step shift position. In the case of coins of large diameter, the rolls move to the first-step shift position through a distance d_2 . The difference between these distances d_1 and d_2 is determined by the preset position of the cam 40.

When the three wrapping rolls 20, 21, and 23 move by one step in this manner to the coin introducing position determined with respect to each kind of coin, the guide tube 28 of the coin stack transferring mechanism 5 is actuated by a cam on the shaft 48 and rises to the lower end of the coin alignment cylinder 17 in alignment with the center of the space between the wrapping rolls 20, 21, and 22. The shutter plates 26 of the shutter mechanism 19 then open, and the coins which have been already counted by the counting mechanism and neatly stacked in the coin alignment cylinder 17 are borne by the guide tube 28 and thereby lowered to the central position between the three wrapping rolls for wrapping.

Then, together with the rotation of the cams 49 and 50, the roller 54 of the lever 45 contacts the surface 51 for setting the minimum separation position of the cam 49, and, as mentioned hereinbefore, the three rolls 20, 21, and 22 approach each other, moving through a distance l irrespective of the diameter of the coin stack and thereby clamping the stack. Since the distance of this movement is controlled by only the cam 49, it is always the constant value l independently of the outside diameter of the coins.

On one hand, the leading end of the wrapping paper 25 sent out previously by the rolls 91 and 92 as a result of the preceding wrapping operation is traveling at a position between the driving roll 31 and the pinch roll 32, and the cam shaft 48 rotates interrelatedly with the completion of counting of the coins for the succeeding stack. As a consequence, the three rolls 20, 21, and 22 clamp and rotate this stack, and, at the same time, as a result of supplying of power to the solenoid 90, the pinch roll 32 is actuated via the lever 97, shaft 96, and arms 94 and 95 to press against the driving roll 31, whereby the leading part of the wrapping paper 25 is abruptly drawn, and the paper 25 is pulled taut.

This tightening of the paper 25 causes the wrapping paper detecting structure 113 in contact therewith to be pushed against the force of the spring 118, whereby the links 115 and 116 rotate and operate the switch 119, thereby suspending the rotation of the cam shaft 48. As another result of the abrupt drawing of the paper 25, it is pressed against the cutting edge 101 of the cutting blade 102 and is thereby cut at its part thus pressed. The piece of wrapping paper thus severed is then wrapped around the coin stack being rotated by and between the wrapping rolls 20, 21, and 22.

When the wrapping paper 25 does not actuate the detecting structure 113 with predetermined timing in the operational process of the wrapping mechanism 4, the switch 119 remains in its opened state, and the cam shaft 48 of the wrapping mechanism 4 stops its driving action. Consequently, the rotation of the coin stack clamped by the wrapping rolls 20, 21, and 22 is contin-

ued with the stack in this state, and the wrapping mechanism 4 suspends its operation of the succeeding process step and maintains its standby state.

Then, when the wrapping paper 25 is supplied with a delay relative to the predetermined timing to actuate the detecting structure 113, the cam shaft 48 starts its driving operation, and the wrapping operation is continued.

When the wrapping mechanism 4 assumes its standby state, but the wrapping paper 25 is not supplied even after the elapse of a specific time, the motor also stops, and the wrapping rolls 20, 21, and 22, as well as the driving roll 31, also stop rotating.

The angle of the cutting blade 102 is adjusted by the rotation of the shaft 109 rotating intercoupledly with the shaft 36 to a value such that the cutting edge 101 of the blade will cut the wrapping paper into pieces of the optimum length for the outer diameter of the coins to be wrapped.

One example of an electrical circuit for controlling the apparatus according to this invention will now be described with reference to FIG. 8. When a predetermined number of coins have been counted for a stack thereof by the aforementioned counter (not shown), a switch 171 is closed, whereupon a relay 172 is activated, and its contact points 721, 722, and 723 are closed. The closure of the contact point 721 causes it to be self held, while the closure of the contact points 722 and 723 starts, respectively, a motor 173 for driving the aforementioned cam shaft 48 and a motor 170 for driving the driving roll 31 and the wrapping roll 20 and 21. As a result of the rotation of the cam shaft 48 by the motor 173, a cam closes a switch 174 and, at the same time, opens a switch 175.

When the wrapping paper detecting structure 113 detects the wrapping paper 25 and closes the above mentioned switch 119, a relay 176 is energized, and contact points 761 and 762 thereof are closed. The closure of the contact point 761 causes the relay 176 to be self held, while the closure of the contact point 762 causes the motor 173 to continue driving, whereby the wrapping operation is continued. When the wrapping operation is completed, a switch 177 is opened by a cam on the cam shaft 48, and the motors 170 and 173 are stopped.

Then, when the wrapping paper 25 is not fed at a specific preset time, the switch 119 continues to be kept opened, and, with the contact point 762 of the relay 176 remaining in the opened state, the switch 175 is in the opened state. Consequently, the motor 173 stops driving, whereby the cam shaft 48 stops and assumes the standby state for the succeeding wrapping process. The motor 170 continues driving, and the wrapping rolls 20, 21, and 22 assume their state of clamping and rotating the coin stack. The driving roll 31 also continues to rotate.

Then, when the wrapping paper is fed with the mechanisms in this standby state, the switch 119 is closed, and the motor 173 starts driving as described hereinbefore, whereupon the wrapping paper 25 is wrapped around the peripheral surface of the coin stack, whereby the succeeding wrapping cycle is continuously carried out.

When the motor 173 stops and is in a standby state, and the wrapping paper 25 is not fed even after the elapse of a predetermined time, e.g., on the order of 10 seconds, from the time of start of the standby state, the

relay 176 is not activated, and the contact point 763 operating in intercoupled state with the contact point 761, which is in the closed state, whereby a delay relay 185 operates to close a contact point 851, and a relay 178 is activated. As a result of the operation of this relay 178, contact points 781 and 782 are closed, and a contact point 783 is opened.

The closure of the contact point 781 causes the relay 178 to be self held since a switch 179 intercoupled with the above mentioned switch 171 is in its closed state, and with the closure of the contact point 782, a lamp 180 for indicating that wrapping paper is not being supplied is lit. As a result of the opening of the contact point 783, the relay 172 becomes inoperative, its contact points 721, 722, and 723 being opened, and the motor 170 is also stopped. Consequently, the wrapping rolls 20, 21, and 22, the coin stack being clamped by these rolls, and the driving roll 31 stop.

The coin stack transferring mechanism 5 operates in the following manner. When the predetermined number of coins have been counted by the aforementioned coin counter and stacked in the alignment cylinder 17, the cam shaft 48 rotates in response to a counting signal generated interrelatedly with the counting of the counting sprocket 15, and as a result of the engagement between the cam 146 on this cam shaft and the projection 147, the swingable frame 127 swings horizontally about the support shaft 128 against the force of the spring 148. The vertically movable structure 124 thereupon swings horizontally, and the guide tube 28 provided on the support frame 121 of this structure 124 is positioned below the center of the space between the wrapping rolls 20, 21, and 22.

Furthermore, as a result of the rotation of the cam shaft 48, the lever 135 engaged in and with the cam groove 138 of the cam 137 swings rapidly upward, and the follower 143 coupled to the lever 135 via the spring 145 lifts the structure 124. At the same time, the upward swinging of this lever 135 causes the outer end of the rotating member 132 to be pushed upward, and the lever 131 fixed to the shaft 130 of this rotating member 132 also rotates. Consequently, the guide tube 28 is rapidly raised because of the engagement between the lever 131 and the projection 123. The support part 27 of the guide tube 28 then confronts the lower part of the shutter mechanism 19 at a point immediately therebelow.

At this time, the shutter mechanism 19 opens as a result of the cam shaft 48, and the coin stack aligned in the alignment cylinder 17 is loaded on the support part 27. Then, as the cam 137 rotates, the lever 135 is caused, by the shape of the cam groove 138, to begin descending with decelerating speed. Consequently, the follower lever 143 coupled therewith by the spring 145 also descends with decelerating speed, and the structure 124 descends. Accordingly, the holding lever 29, the rotating member 132, the lever 131, and the guide tube 28 also descend in a similar manner.

Then, during the descent of the guide tube 28, when its support part 27 arrives at a position near the upper end of the holding rod 29, the cam surface 141 of the cam 137 arrives at the position for engagement with the roller 139, and as a result of the engagement of the roller 139 and the cam surface 141, the rotating member 132 descends until it has come to almost a full stop. At this time, the holding rod 29 is in a position for holding the coin stack in the wrapping mechanism 4, and the

coin stack on the guide tube 28 is supported on the upper end of the holding rod 29. In this state, the coin stack is held between the wrapping rolls 20, 21, and 22.

Then the wrapping of the paper 25 around the coin stack as described hereinbefore is carried out, and the lateral edges of the paper extending beyond the upper and lower ends of the coin stack are fold crimped to complete the wrapping process cycle. The lever 135 is thereupon lowered somewhat by the rotation of the cam shaft 48, whereby the follower lever 143, the structure 124, the frame 121, and the holding rod 29 descend. Consequently, the holding rod 29 separates from the coin stack.

As a result of the rotation of the cam 146 on the cam shaft 48, the frame 127 is swung in return movement by the spring 148, and the guide tube 28 and the holding rod 29 are swung away from their position below the wrapping mechanism 4. The wrapping rolls 20, 21, and 22 thereupon release the coin stack from its clamped state, and the paper-wrapped coin stack drops into the discharge chute 8.

While, in the instant example of the invention, the mechanism for tensioning the wrapping paper 25 comprises a pair of rolls, it may, alternatively, comprise a pair of continuous belts. Furthermore, instead of an electromagnetic device (solenoid) for moving the wrapping rolls as described above, mechanical means may be used.

In accordance with this invention, there is provided a detecting mechanism whereby the state of supply of the wrapping paper toward the wrapping mechanism is detected, and in the case where this supply is delayed, the operation of the wrapping mechanism is suspended and this wrapping mechanism is held in a standby state until the paper is supplied. By this provision, continued operation of the wrapping mechanism without the supply of wrapping paper is prevented, whereby malfunctioning such as scattering of coins not wrapped by paper and infiltration of such coins into the wrapping mechanism is prevented, and positive and accurate coin wrapping is carried out.

Another feature of this invention is that when, in a coin wrapping process cycle, the wrapping paper is not supplied within a specific preset time, the wrapping mechanism is prevented from entering the succeeding process cycle and is held in a standby state, and when the wrapping paper is thereafter supplied, the wrapping mechanism again begins operating to wrap the paper around the coin stack and to fold crimp the edges to complete the wrapping cycle.

Furthermore, when the wrapping paper is not supplied in a specific preset time from the time of standby state of the mechanism, the wrapping mechanism stops, whereby undesirable occurrences such as continued clamping and rotating of the coin stack by the wrapping rollers, decrease in the performance of the wrapping mechanism, and deterioration of the durability of the mechanism are prevented. Furthermore, difficulties experienced heretofore in mechanisms wherein the wrapping mechanism is controlled by only cams, such as continuation of wrapping operation even without the supply of wrapping paper, scattering of the coins, and infiltration of the coins into the mechanism parts, are effectively prevented.

We claim:

1. In a coin wrapping apparatus of the type including a wrapping means comprising a plurality of wrapping rolls for wrapping a piece of wrapping paper around the peripheral surface of a stack of coins and a wrapping paper feeding means for feeding the wrapping paper to said wrapping mechanism, the improvement which comprises: a wrapping paper detecting means operatively positioned for detecting the feeding of wrapping paper by the wrapping paper feeding means; a first drive means operatively coupled to said wrapping rolls for reciprocally driving them so they are alternately in contact with and separated from the peripheral surface of the coin stack; a second drive means operatively coupled to said wrapping rolls for rotating them; and means operatively coupling said detecting means and first and second drive means for operating said first and second drive means when feeding of the wrapping paper is detected by said detecting means at a preset time during the wrapping operation, thereby to continue operation of the wrapping means, and, when an absence of the wrapping paper is detected at said preset time, for continuing rotation of said wrapping rolls but halting reciprocative motion of said rolls until the wrapping paper is normally fed.

2. A coin wrapping apparatus as claimed in claim 1 further comprising stop means operatively coupled to said second drive means for stopping said second drive means a predetermined period after said preset time when said detecting means detects the absence of wrapping paper at said preset time, whereby when the detecting means fails to detect the presence of wrapping paper during a predetermined period of time from said preset time, the rotation of said wrapping rolls also is stopped.

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