In coin wrapping apparatus having a plurality of rollers arranged along a path of travel of a wrapper strip around a neat stack of coins to be wrapped thereby, at least the last of the rollers is caused to rotate at a slightly higher speed than the other rollers, whereby the wrapper strip is wrapped tightly and without wrinkles around the circumference of the stack of coins as it is fed around the same between the substantially contacting surface of the rollers and the stack of coins.

4 Claims, 2 Drawing Figures
PREVENTION OF_WRAPPER SLACK IN COIN_WRAPPER APPARATUS

BACKGROUND OF THE INVENTION

This invention relates generally to apparatus for wrapping each predetermined number of coins of the same denomination in a neat stack, and in particular to means for preventing a strip of wrapper such as cellophane or the like from slackening as it is guided around the circumference of the stack of coins by a plurality of rollers rotating in substantial contact therewith.

Ordinarily, in the coin wrapping apparatus of this type, at least one of the rollers is stationary while the other rollers are made displaceable to urge each new stack of bare coins against the stationary roller and hence to securely hold the stack of coins thereamong. The front tip of the wrapper strip is caught between the first of the rollers and the stack of coins, and as all of the rollers are rotated in the same direction and at the same speed, the wrapper strip is fed around the circumference of the stack of coins by being successively caught between the succeeding rollers and the stack of coins. In this manner the stack of coins is packaged by a predetermined length of the wrapper strip which generally is wrapped several turns around its circumference.

During this wrapping operation, however, the wrapper strip inevitably slackens as its front tip is fed from one of the rollers to the next along the circumference of the stack of coins. While the wrapper strip usually becomes tense again as its front tip is successively caught and pulled by the next roller, this does not necessarily result in the event the wrapper strip slackens too much during travel of its front tip from one of the rollers to the next or in the event the front tip fails to be caught properly by the next roller. The slackened wrapper strip can give rise to wrinkles or improper wrapping of the stack of coins.

SUMMARY OF THE INVENTION

In view of the noted difficulties of the prior art, it is an object of this invention to provide improved means for preventing a wrapper strip from slackening as it is guided around the circumference of a stack of coins by a plurality of rotating rollers.

Another object of the invention is to provide the means of the above described character which can easily be accommodated in coin wrapping apparatus of prior design without any substantial modification of its construction.

With these objects in view and the other objects hereinafter made apparent, this invention provides, in coin wrapping apparatus of the type having a plurality of rollers arranged along a path of travel of a wrapper strip around the circumference of a stack of coins and adapted for rotation in substantial contact with the stack of coins to wrap the same with the wrapper strip, that improvement which comprises gearing means adapted to cause at least the last of the rollers to rotate at a higher speed than the other rollers, whereby the wrapper strip is prevented from slackening as it is fed around the circumference of the stack of coins by the rollers.

The features which are believed to be novel and characteristic of this invention are set forth with particularity in the appended claims. The invention itself, however, both as to its construction and mode of operation, together with the other objects and advantages thereof, will become more apparent and understandable as the description proceeds hereinafter, with reference taken to the accompanying drawings which illustrate, by way of example only, a preferred embodiment of the invention and in which like reference characters designate like parts.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings:

FIG. 1 is an exploded perspective view showing some essential components of coin wrapping apparatus to which the present invention is directed; and

FIG. 2 is a top plan view showing some of the components of FIG. 1 together with the means for preventing the slackening of a wrapper strip in accordance with the novel concepts of the invention.

DETAILED DESCRIPTION

Some important components of coin wrapping apparatus to which the present invention is directed will first be described, with reference to FIG. 1. A coin feed mechanism generally designated by the numeral 1 comprises a rotary disk 3 for centrifugally sending successive coins out onto a passageway 2 and an endless belt 5 for feeding the coins along the passageway 2 and into a cylindrical coin receptacle 4 while eliminating from the passageway any of the coins having other than the specified diameter and counting only the coins of desired denomination.

A coin guide mechanism generally designated by the numeral 6 includes a shutter 9 operatively mounted under the bottom opening of the coin receptacle 4 to support the coins stacked therein and operated by a cam 8 rigidly mounted on a camshaft 7. As a predetermined number of the coins are stacked within the coin receptacle 4 on the shutter 9, a vertically movable guide 10a, which generally defines a wrapping station, becomes operative to direct the stack of coins to a wrapping mechanism 10.

The wrapping mechanism 10 comprises a pair of displaceable rollers 11 and 12 and a stationary roller 13. One of the displaceable rollers 11, is rotatably supported by an arm 19 which can be pivoted around a pin 18 through a link 16 pivotally pinned to a lever 15 which is itself pivoted on a pin 14. The other displaceable roller 12 is rotatably supported by an arm 20 pivotally around the pin 14.

As shown in FIG. 2, the aforesaid lever 15 is urged by a helical tension spring 15a toward a cam 21 fixedly mounted on the camshaft 7 in such a manner that the cam 21 engages a pin 17 on the lever 15 to cause the arms 19 and 20 to turn on their respective pins 18 and 14. Thus, the pair of displaceable rollers 11 and 12 are interrelatedly moved toward and away from the fixed roller 13. A stack of coins 22 on the guide 10a are held securely among the rollers 11, 12 and 13 as the rollers 11 and 12 are moved toward the roller 13. All these rollers are rotated in the same direction on their own axes by gears 23a, 23b and 23c, respectively, mounted coaxially therewith. It is to be noted that the gears 23a and 23b coaxial with the displaceable rollers 11 and 12, respectively are of the same diameter and of the same pitch while the gear 23c coaxial with the fixed roller 13 is of smaller diameter and has a fewer number of teeth than the gears 23a and 23c.
As seen in FIG. 2, a wrapper guide 25 is mounted close to the stationary roller 13, whereas wrapper guides 26 and 27 are so mounted as to move together with the displaceable rollers 11 and 12 respectively. These wrapper guides 25, 26 and 27 function cooperatively to guide the front tip of a strip of wrapper 28 around the stack of coins 22 so as to completely encircle the same.

A wrapper feed mechanism, generally designated by the numeral 29, includes a shaft or rod 30 on which the wrapper strip 28 is held in a roll. A drive roller 32 cooperates with an idler roller 31 to feed the wrapper strip 28 toward the aforesaid rollers 11, 12 and 13. A guide plate 33, FIG. 2, extends between the drive roller 31 and the stationary roller 13 to guide the wrapper strip 28 toward the latter and is pivoted on a rod 33a. A cutter 34 mounted in opposition to the guide plate 33 has a number of teeth on its substantially V-shaped edge to cut the wrapper strip 28 at each predetermined length.

Although not shown in the drawings, it is assumed that hooks are provided at the upper and lower ends of the stack of coins 22 being held by the rollers 11, 12 and 13 so that both edges of the wrapper strip which has been wrapped around the circumference of the stack of coins 22 are automatically folded over onto the upper- and lowermost coins of the stack. The stack of coins thus completely packaged is then carried downward from the rollers 11, 12 and 13.

Thereupon, the drive roller 32, rotating in synchronism with the camshaft 7, becomes operative to feed the front tip of the wrapper strip from its first standby position intermediate between the cutter 34 and the displaceable roller 11 to a second standby position between the rollers 11 and 13, thereby making the wrapper strip ready for the next wrapping operation.

The drive mechanism of this coin wrapping apparatus is such that a gear 37 fixedly mounted on a drive shaft 36 having a gear 35 rotated by a motor, not shown, is meshed with a gear 38 fixedly mounted on the camshaft 7. This camshaft is associated with the guide 10a in such a manner that when the latter has been elevated to its predetermined position under the shutter 9, the cam 8 of the camshaft 7 operates to open the shutter 9 so that the stack of coins is caused to rest on the guide 10a.

Thereafter, the guide 10a is lowered together with the motion of the camshaft 7 to carry the stack of coins 22 down to the wrapping mechanism 10. At this instant, the cam 21 disengages the pin 17 of the lever 15 to permit the same to be turned by the helical tension spring 15a. Since, at this time the arms 19 and 20 are also turned on their respective pins 18 and 14, the displaceable rollers 11 and 12 are both moved toward the stationary roller 13 to retain the stack of coins 22 in position.

A gear 39 in mesh with the gear 37 on the drive shaft 36 is meshed with a gear 40 which in turn is meshed with a gear 41 mounted on the pin 18 to be meshed with the gears 23c and 23d of the rollers 11 and 13, respectively, so that these two rollers are rotated by the train of gears 37, 39, 40 and 41. The aforementioned gear 35 on the drive shaft 36 is meshed with a gear 42 mounted on the pin 14, and this gear 42 is meshed through the gear 23b with a gear 43, so that the roller 12 is rotated by the train of gears 35, 42 and 43.

Since the gear 23c on the stationary roller 13 is of smaller diameter and has a fewer number of teeth than the gears 23a and 23b on the displaceable rollers 11 and 12 as previously mentioned, the fixed roller 13 is rotated at a faster speed than the displaceable rollers 11 and 12.

In the coin wrapping apparatus constructed substantially as hereinbefore described, each predetermined number of coins which have been arranged into a neat stack by the coin feed mechanism 1 are carried by the guide 10a to the wrapping mechanism 10. Thereupon, the cam 21 of the camshaft 7 actuates the lever 15 to cause the displaceable rollers 11 and 12 to move toward the stationary roller 13. Since the front tip of the wrapper strip 28 has already been fed to the displaceable roller 11 by the pair of rollers 31 and 32 of the wrapper feed mechanism 29, the front tip of the wrapper strip is caught between the stack of coins 22 and the displaceable roller 11 as the displaceable rollers 11 and 12 are moved toward the stationary roller 13. The displaceable roller 11 is then rotated at a higher speed than the drive roller 32 in accordance with the prior art, so that the wrapper strip 28 is severed at a predetermined length by the cutter 34 due to its own tension.

By the rotation of the displaceable roller 11 and the stack of coins 22, the predetermined length of the wrapper strip 28 is then directed along the wrapper guides 26 and 27 until its front tip becomes caught between the next displaceable roller 12 and the stack of coins 22. Since the displaceable roller 12 is also in rotation together with the stack of coins 22, the wrapper strip 28 is further directed along the wrapper guides 26 and 27 and until its front tip becomes caught between the last roller 13 and the stack of coins 22. By the repetition of this procedure, the wrapper strip 28 is wrapped several turns around the stack of coins 22.

Because the stationary roller 13 is being rotated at a higher speed than the other rollers 11 and 12, the front tip of the wrapper strip 28, which has been loosely fed into the space between the stack of coins 22 and the wrapper guide 27, is quickly tensioned again as it is caught between the fixed roller 13 and the stack of coins 22. The slackening of the wrapper strip as indicated at A in FIG. 2, which has been often seen in the coin wrapping apparatus of prior design, is thus eliminated altogether, and the wrapper strip can be tightly wrapped around the stack of coins in any desired number of turns.

Thereafter, the upper and lower edges of the wrapper strip 28 are securely folded over against the upper- and lowermost coins to complete the wrapping operation. The pair of displaceable rollers 11 and 12 are now caused to retract by the cam 21 on the camshaft 7, and the wrapped stack of coins is carried downward from the rollers 11 and 13 in accordance with the prior art.

Although the improvement in the coin wrapping apparatus according to this invention has been shown and described above in terms of a preferred embodiment thereof, it is to be clearly understood that all matter described herein or shown in the accompanying drawings is by way of example only and is not intended to impose limitations on the invention. For instance, the stationary roller 13 in the foregoing embodiment can be rendered displaceable instead of either of the other rollers 11 and 12. It is only essential, according to the concepts of this invention, that the last of the several rollers disposed along the path of travel of the wrapper strip 28 around the circumference of the stack of coins 22 be caused to rotate at a higher speed than the other
It is also possible to cause the rotating speeds of these rollers to be progressively higher from the first to the last of the rollers as disposed along the aforesaid path of travel of the wrapper strip. In either case, however, the rotational speed of any of the rollers should be made only slightly higher than that of the preceding roller or rollers because, otherwise, the wrapper strip tends to be wrinkled as it becomes caught between the first roller 11 and the stack of coins 22.

We claim:

1. In a coin-wrapping apparatus including in combination, means for orienting assembled, similar coins at a wrapping station; a supply of strip material for forming wrapper segments for convolution about the oriented coins; means engagable with the strip material for conveying it lengthwise toward a wrapping station in a path of travel extending along the strip length; guide means disposed along the path of travel of said strip material for engaging the leading end of the strip material and directing it toward the wrapping station at which the coins are oriented; cutter means disposed intermediately of the path of travel of said strip material for forming coin-wrapping segments; and a wrapping mechanism for engaging the leading end of a coin-wrapping segment and wrapping it about the oriented coins at the wrapping station; the improvement in which said wrapping mechanism comprises a series of elongated rollers exposed along their entire length and journaled for rotation in flanking relation to the wrapping station and engagable along the entire length of the oriented coins with the leading end of the wrapper segment between the roller and the oriented coins, means mounting at least one of said rollers in a fixed position relative to the wrapping station, and means mounting the remaining rollers for simultaneous displacement laterally with respect to said wrapping station, lever means operatively connected to said displaceable rollers and integrating their simultaneous movement for positioning these rollers relative to the wrapping station and said fixed roller; power means for rotating the rollers at the wrapping station; control means for orienting the displaceable rollers relative to the wrapping station and oriented coins; guide means at the periphery of each of the respective rollers extending partially around and disposed in series about the wrapping station for progressively engaging the leading end of a wrapper segment and directing it to the series of rollers and oriented coins for convoluting the wrapper segment about the coins at the wrapping station, the guide means for said displaceable rollers being connected to and movable with the lever means integrating simultaneous movement of said displaceable rollers, said power means including force transmitting portions for rotating one displaceable roller located at a position with said guide means adapted to guide the leading tip end portion of the wrapping segment at a peripheral speed slightly lower than that of the succeeding roller for maintaining a wrapper segment in substantial tension and eliminating intermediate wrinkles in the wrapper segment as the leading tip end portion thereof successively engages the series of guide means.

2. The combination as claimed in claim 1 in which said force transmitting portions comprises trains of intermeshed gears operatively connected to a common drive gear, said trains of gears including drive gears operatively connected to the series of rollers and having diameter and gear-tooth ratios for affording peripheral speeds increased from the first to the last roller of the series of rollers.

3. The combination as claimed in claim 1 in which said cutter means is disposed in opposition to said first-mentioned guide means, the cutter means including a cutter edge portion directed toward the strip of wrapper material and interrupting the normal path of travel of said strip of wrapper material, the first roller of said series of rollers cooperating with the oriented coins at the wrapping station to tension the strip of wrapper material against the cutter edge portion for severing the supplied strip into wrapping segments.

4. The combination as claimed in claim 1 in which the respective guide means of the series of guide means include means mounting the guide means on respective lever means connected to the displaceable rollers for simultaneous movement with the respective displaceable rollers in their fixed and relative movement with respect to the wrapping station.

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