METHOD OF PACKAGING LOCK WASHERS

Fig. 1.

Fig. 2.

LOCK WASHERS TO BE PACKAGED
METHOD OF PACKAGING LOCK WASHERS

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This invention, like that of the pending application Serial No. 298,871, filed July 14, 1952, now abandoned, of which this is a continuation-in-part, relates to the art of packaging lock washers of the type which are split radially and have axially offset ends, and has as its purpose and object to provide a method of packaging such washers into a small compact and easily handled package resembling a roll of coins with all of the washers in nesting relationship with one another so that the length of the resulting "roll" affords an accurate indication of the number of washers in the package.

As will be readily apparent unless the washers are arranged in such nested relationship it is impossible to utilize the length of the roll, or more correctly, the height of the stack as an indication of the number of washers contained in the package. To so arrange the washers presents a problem if the packaging is to be done on a commercially economical basis, and it is, therefore, another object of this invention to provide a practical method by which the washers may be quickly and easily stacked with all of the washers in nested relationship with one another and when so stacked encased within a tubular wrapper.

With the above and other objects in view, which will appear as the description proceeds, this invention resides in the novel method hereinafter described and more particularly defined by the appended claims being understood that such changes in the precise embodiments of the hereindisclosed invention may be made as come within the scope of the claims.

In the accompanying drawings:

Figure 1 is an elevational view of a package of lock washers produced in accordance with this invention, part of its wrapper being broken away to illustrate the disposition of the washers therein;

Figure 2 is a view diagrammatically illustrating one manner in which the washers may be arranged in a row or stack by impaling them haphazardly upon a spindle; Figure 3 is a perspective view of the spindle showing a number of lock washers haphazardly impaled thereon;

Figure 4 is a view of the same spindle and stack of washers impaled thereon but with the washers arranged in nested relationship;

Figure 5 is a view similar to Figure 4 but illustrating the removal of all but a predetermined quantity of washers from the stack;

Figure 6 is a perspective view illustrating one way in which a wrapping may be applied to the nested stack of washers;

Figure 7 is a perspective view illustrating the crimping or tucking in of one end of the wrapper beneath the bottom of the stack of washers;

Figure 8 is a perspective view illustrating a slightly modified method of achieving proper orientation of the lock washers;

Figure 9 is a perspective view showing how the package of washers properly oriented with one another in the manner shown in Figure 8, may be "sized" to contain a predetermined number of washers;

Figure 10 is a perspective view illustrating another method of properly orienting the washers and packaging them into rolls;

Figure 11 is a cross sectional view through Figure 10 on the plane of the line 11—11; and

Figures 12, 13 and 14, are perspective views illustrating still another modified embodiment of this invention, which however, requires a slight change in the shape of the lock washers, as shown in Figure 15.

Referring now particularly to the accompanying drawings and especially to Figures 1 to 7 inclusive, the numeral 10 designates the finished package of washers which, as shown in Figure 1, consists of a stack of lock washers 11 of the type which is radially split and has axially offset ends 12. All of the washers in the stack are in nested relationship with one another, that is, the axially offset ends of each washer are in contact with the ends of its adjacent washers. The stack of washers is thus solid and consequently its height or length is an accurate measure of the number of washers in the stack.

A tubular wrapping 13 of paper or other suitable flexible, oblong material encloses the stack of washers and has its ends 14 tucked or folded in to retain the washers against displacement in the wrapper. The wrappers 13 may be preformed tubes of predetermined length, as for instance, to hold fifty or one hundred washers, depending upon their size, or they may be formed into a tube during the packaging operation.

Since the wrapper 13 is of paper or other suitable flexible, oblong material, opening of the package is a simple matter and can be quickly done by merely striking the roll against a sharp edge.

The method by which the package is formed, in order to be commercially feasible, obviously must be capable of performance by automatic machines, but can be fully illustrated and explained without reference to any particular machine.

In that embodiment of the invention shown in Figures 1 to 7 inclusive, the first step in the method is to arrange the washers haphazardly in a row, that is, in coaxial alignment. While this could be done in several different ways it is convenient to merely impale the washers haphazardly upon a spindle 15, as by moving the spindle endwise through a mass of washers contained in a bin as shown in Figure 2, but care should be taken that a sufficient number of washers are impaled.

The spindle 15 is preferably of the special construction shown and has a pair of diametrically opposite radially projecting abutments 16 and a cylindrical flange 17 adjacent to the abutments but at the side thereof remote from that portion of the spindle upon which the washers are to be impaled.

If the manner of impaling the washers upon the spindle illustrated in Figure 2 is employed, the spindle is merely grasped in the hand and pushed into the bin of lock washers as shown until more than the required number of washers have been arranged thereon. This results in the condition illustrated in Figure 3 which shows a sufficient number of washers impaled on the spindle but arranged haphazardly.

The next step in the method is to arrange the washers into nesting relationship with the axially offset ends of each washer contacting the ends of its adjacent washers. This is done by effecting relative rotation between the washers and is conveniently accomplished by rotating or spinning the spindle in the direction to bring one of its abutments 16 against the adjacent end 12 of the lock washer resting on the abutments 16, and continuing the rotation or spinning of the spindle in that same direction until all of the washers have been rotated with respect...
to one another the required amount to bring all of them into nesting relationship. Ordinarily the inertia of the washers alone, providing, of course, that the spindle is held upright or sufficiently so that the weight of the stack of washers is borne by the abutments 16, is sufficient to assure the required relative rotation between the spindle and the washers between the adjacent washers but if not the washers can be easily restrained from turning with the spindle until the desired nesting relationship is achieved.

After the washers stack on the spindle has been brought into nesting relationship as shown in Figure 4, all but the predetermined number of washers to be contained in the package or roll are removed from the spindle in any suitable manner, for instance as shown in Figure 5. Thereafter the tubular wrapper 13 is applied.

The wrapper, as indicated hereinafter, may be performed, that is, it may be a completed tube and as such may be slipped or telescoped over the stack of nested washers as shown in Figure 6. However, it is also possible to wind the wrapper about the stack of nested washers to form the tube as it is applied. In any event, it is important to observe that the abutments 16 on the spindle which support the stack of nested washers do not project beyond the peripheries of the washers. Consequently, it is possible for the tubular wrapper to be extended or projected beneath the lowermost washer so that the bottom end of the tubular wrapper may be tacked in as shown in Figure 7 around the bottom of the stack to enable the entire wrapped stack to be slipped off the spindle without danger of deranging the washers within the wrapper or displacing the same therefrom.

The opposite or upper end of the wrapper may be tacked in either while the stack is still on the spindle or while it is being removed therefrom; and as will be clear the package is completed by firmly tucking in or folding down the ends of the wrapper.

The cylindrical flange 17 on the spindle provides convenient means by which the spindle may be rotated or rather by which torque may be applied to the spindle to rotate the same.

In the embodiment of the invention illustrated in Figures 8 and 9, no spindle is needed, and instead, the washers are haphazardly dropped into a preformed tube 19 which has been slipped onto a cylindrical boss 20 projecting upwardly from a base 21. If desired, a funnel-like collar 22 may be applied to the top of the tube to facilitate feeding the washers into the tube.

The top of the boss has a short axial pilot pin 23 to fit inside the lowermost washers, and a radial boss or shoulder 24 to engage one of the offset ends 12 of the bottommost washer and thereby hold this washer against turning while those above it are rotated. Rotation is imparted to the washers by simply turning the tube, it being understood that sufficient frictional engagement obtains between the tube and the washers to assure the needed torque application. When all of the washers have been brought into nesting relationship by this rotation of the tube, the filled tube is lifted off the base, one end thereof is closed and then these washers in excess of the predetermined number to be contained in the package are removed from the opposite end of the stack, as for instance in the manner shown in Figure 9. Finally, the remaining open end of the package is closed.

Another way of practicing the invention is illustrated in Figures 10 and 11. In this case the orientation of the washers with one another is effected before they are stacked or axially aligned, so that when they are inserted into the tubular wrapper 25 they nest with one another.

The main step in this method consists in causing the individual washers to move through a positioning gate 26 of such shape that to pass through the gate the washers must all occupy a predetermined position. This gate 26 constitutes the only outlet from a hopper 27 and leads to a short trough 28, the bottom of which conforms to the bottom of the gate.

The end of the chute is closed, but has a round discharge port 30 in the bottom thereof which passes axially through a collar 29. This collar has a counterebore in its lower end into which the tube 25 is inserted. Hence the washers drop into the tube as they are brought into alignment with the port 30, retaining their proper orientation as they enter the tube so as to assure the desired nesting relationship. To successively bring the washers to this point the hopper and chute are reciprocated lengthwise of the chute, but if desired, the chute may be extended to form the bottom of the hopper, in which event, the hopper need not be reciprocated.

The form of the invention illustrated in Figures 12 to 15 inclusive involves impaling the washers upon a spindle 33, but the spindle is not round. Instead, it has a sharp ridge 34 along the length thereof, and in use the spindle is held horizontally with its ridge 34 at the top.

The washers are applied to the spindle in any suitable way and then the loaded spindle is vibrated laterally. This causes the washers to rotate on the spindle until a notch 35 in the inner edge of each washer seats itself on the ridge 34, as shown in Figure 13, and since the notch of every washer is in the same plane with respect to its axially offset ends, it follows that when the notches of all of the washers are seated on the ridge 34, the entire row of washers on the spindle will be properly oriented. Thereafter, the washers are compacted into a solid nested stack of predetermined height, stripped off the spindle and inserted into a tube or other wrapper.

The notch 35 may be formed in any suitable way, but preferably it is made by an appropriately shaped die at the time the wrapper is formed.

From the foregoing description taken in connection with the accompanying drawings, it will be readily apparent that this invention greatly simplifies the merchandising of split lock washers of the type described herein, since it presents the washers in the most compact form in which they can be packaged, and also obviates the need for counting or weighing the washers in making a sale since each individual package or roll of washers will be known to contain a predetermined number.

What is claimed is:

1. A method of packaging lock washers of the type which are split radially and have axially offset ends, which comprises: haphazardly impaling the lock washers upon a spindle; effecting relative rotation between the lock washers impaled upon the spindle until all of the washers are in nesting relationship with the Circular boss and the inclined end of the adjacent washer; continuing

2. A method of packaging lock washers of the type which are split radially and have axially offset ends, which comprises: haphazardly impaling the lock washers upon a spindle; effecting relative rotation between the lock washers impaled upon the spindle until all of the washers are in nesting relationship with the circular boss and the inclined end of the adjacent washer; continuing

3. A method of packaging spring-type lock washers which are split radially and have axially offset ends, which comprises: haphazardly impaling the lock washers upon a spindle having a radially projecting abutment adapted to engage one end of the adjacent washer and to provide a torque transmitting connection between said washer and the spindle; rotating the spindle to bring its abutment against said end of the adjacent washer, and continuing
such rotation of the spindle to effect relative rotation between the washers on the spindle and thereby bring all of the washers into nesting relationship with one another with the axially offset ends of each washer engaging the axially offset ends of its adjacent washers; removing all but a predetermined number of nested washers from the spindle; wrapping the remaining stack of nested washers in a tubular wrapping; and stripping the wrapped stack of washers off the spindle.

4. A method of packaging spring-type lock washers of the type which are split radially and have axially offset ends, which comprises: haphazardly impaling a quantity of the lock washers upon a spindle having a radial abutment upon the lowermost lock washer bears, and with which the adjacent end of the lowermost lockwasher may be brought into torque transmitting engagement; rotating the spindle in the direction to bring its radial abutment against said end of the lock washer resting thereon and continuing rotation of the spindle to thereby effect relative rotation between adjacent washers until all of the ends of the adjacent washers have been brought into nesting relationship with one another with the axially offset ends of each washer bearing against the axially offset ends of its adjacent washers; removing all but a predetermined number of nested washers from the spindle; wrapping the remaining stack of nested washers in a tubular wrapping; and stripping the wrapped stack of washers off the spindle.

5. A method of packaging spring-type lock washers having a radial split and axially offset ends, which comprises: arranging the washers in axial alignment; effecting relative rotation between the washers to bring all of them into nesting engagement with one another with the ends of each washer contacting the ends of its adjacent washers, and while the stack of washers is thus held in nested relationship applying a tubular wrapping thereto.

6. A method of packaging lock washers of the type having axially offset ends, which comprises: haphazardly arranging a plurality of such washers in axial alignment; effecting relative rotation between said washers while maintaining their coaxial relationship to thereby bring all of the washers into nesting relationship with one another with the ends of each washer contacting the ends of its adjacent washers; telescoping a tubular wrapper over the stack of nested washers; and tucking in the ends of the tubular wrapper.

7. A method of packaging lock washers of the type having a radial split and axially offset ends, which comprises: haphazardly impaling more than a predetermined number of washers upon a spindle and against an abutment on the spindle; spinning the spindle while the stack of washers impaled thereon is supported by the abutment on the spindle to thereby effect relative rotation between the lock washers until all of them are in nesting relationship with one another; removing all but said predetermined number of washers from the spindle; telescoping a tubular wrapper over the stack of washers remaining on the spindle; tucking in the ends of the tubular wrapper; and removing the wrapped stack of washers from the spindle.

8. A method of packaging lock washers of the type which are split radially and have axially offset ends, which comprises: forming a stack of lock washers by haphazardly arranging them in axial alignment; effecting relative rotation between the lock washers in the stack until all of the washers are in nesting relationship with the nested stack with the axially offset ends of each washer engage the axially offset ends of adjacent washers; and applying a wrapper about the stack of nested washers.

9. The method of packaging lock washers defined in claim 8 further characterized by the step of removing all but a predetermined number of lock washers comprising the nested stack before the wrapper is applied.

10. A method of packaging spring type lock washers which are split radially and have axially offset ends, which comprises: providing a spindle which has a radially projecting abutment thereon adapted to engage one end of a washer on the spindle to provide a torque transmitting connection between said washer and the spindle; removing the spindle through a supply of lock washers to thereby haphazardly impale a quantity of washers on the spindle; rotating the spindle to bring its abutment against one end of the adjacent washer, and continuing such rotation of the spindle to effect relative rotation of the washers on the spindle until all of the washers on the spindle have been brought into nesting relationship with one another with the axially offset ends of each washer engaging the axially offset ends of adjacent washers; applying a tubular wrapping about the nested stack of washers; and stripping the wrapped stack of washers off the spindle.

11. A method of packaging lock washers of the type which are split radially and have axially offset ends, which comprises: arranging the washers in a stack with all of the washers in axial alignment and in nesting relationship with their neighbors and the axially offset ends of each washer engaging the axially offset ends of adjacent washers; and applying a wrapper about the stack of nested washers.

12. The method of packaging lock washers defined in claim 11 further characterized by the step of removing all but a predetermined number of lock washers comprising the nested stack before the wrapper is applied.

13. A method of packaging lock washers of the type which are split radially and have axially offset ends, which comprises: inserting the washers in a tubular wrapper of a size to snugly receive them, with the wrapper in an upright position, to thereby form a stack of washers in the wrapper; rotating the wrapper while holding the lowermost washer against turning to thereby effect relative rotation of the washers until all of them are in nesting relationship with their neighbors and the axially offset ends of each washer engage the axially offset ends of adjacent washers; and closing the ends of the wrapper.

14. The method of claim 13 further characterized by the step of removing all but a predetermined number of lock washers comprising the nested stack before the wrapper is applied.

15. A method of packaging lock washers of the type which are split radially and have axially offset ends, which comprises: moving the washers edgewise along a horizontal path, causing the washers to assume a predetermined position as they move past a point in said path so that the axially offset ends of the washers moving along the path beyond said point all face in the same direction with respect to the path of movement; successively dropping the thus oriented washers into a wrapper tube; and closing the ends of the tube after a predetermined number of washers have dropped into it.

16. A method of packaging lock washers of the type which are split radially and have axially offset ends, which comprises: forming the washers with a notch at one point in their inner circumference so that a stack of washers having their notches aligned with one another will be nested and have their offset ends engaging the offset ends of adjacent washers; placing a group of washers on a spindle which has a ridge extending longitudinally along one side thereof, while the spindle with the washers thereon is in a substantially horizontal position, vibrating it laterally to thereby cause the individual washers to rotate about the spindle until the notches of all the washers are engaged with the ridge and the washers are in position to be nested; compacting the washers on the spindle into a nested stack; and without disturbing the washers from their nested condition, stripping them off the spindle and packaging them.

17. The method of claim 16 further characterized by the step of removing all but a predetermined number of lock washers comprising the nested stack before the wrapper is applied.

No references cited.