April 26, 1960 A. E. CRANSTON, JR 2,933,866

METHOD AND APPARATUS FOR PACKAGING CYLINDRICAL ARTICLES

Filed Aug. 27, 1957 4 Sheets-Sheet 1

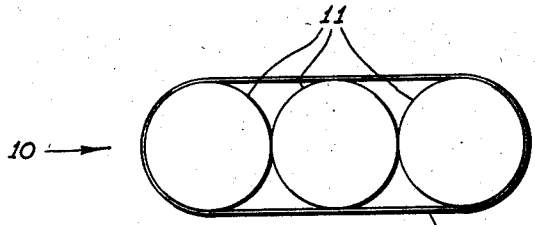


FIG. 1

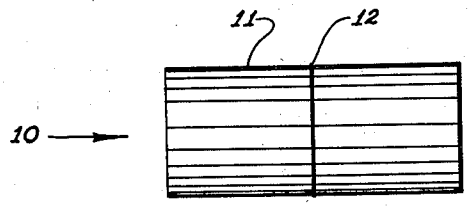


FIG. 2

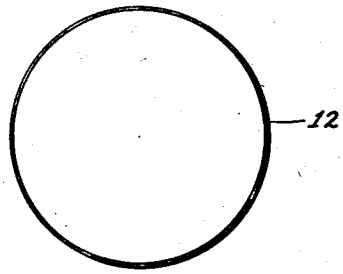


FIG. 3

INVENTOR.
Albert E. Cranston, Jr.
BY
Cook and Schermerhorn
Attys

April 26, 1960 A. E. CRANSTON, JR 2,933,866

METHOD AND APPARATUS FOR PACKAGING CYLINDRICAL ARTICLES

Filed Aug. 27, 1957 4 Sheets-Sheet 2

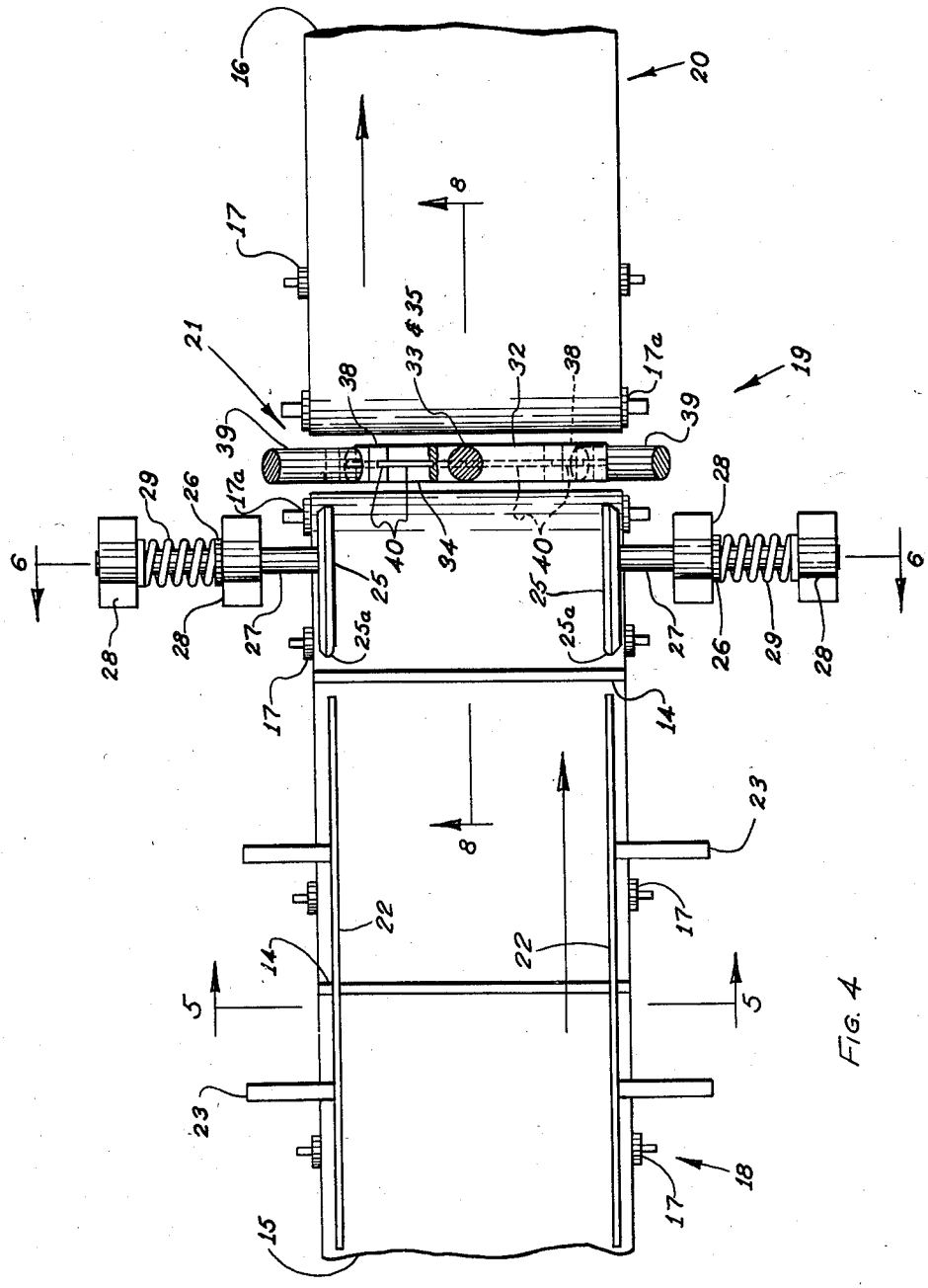


FIG. 4

INVENTOR.
Albert E. Cranston, Jr.
BY
Cook and Schermerhorn
Attys

April 26, 1960 A. E. CRANSTON, JR 2,933,866

METHOD AND APPARATUS FOR PACKAGING CYLINDRICAL ARTICLES

Filed Aug. 27, 1957 4 Sheets-Sheet 3

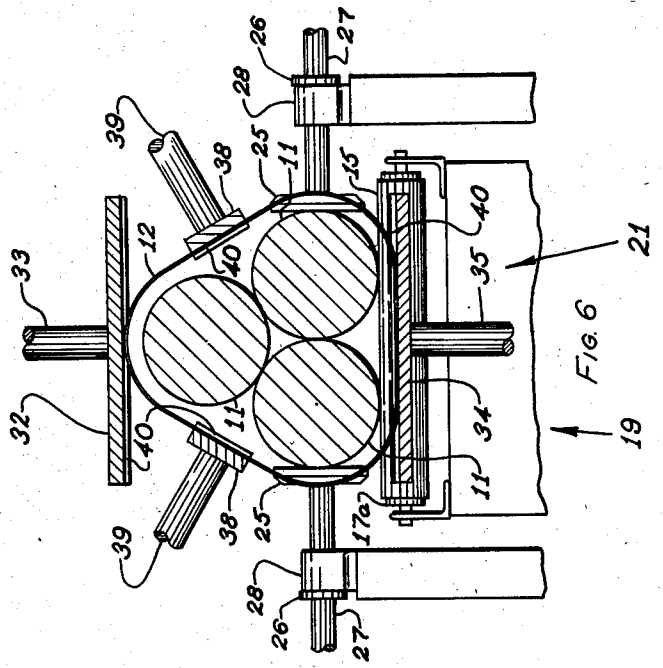


FIG. 6

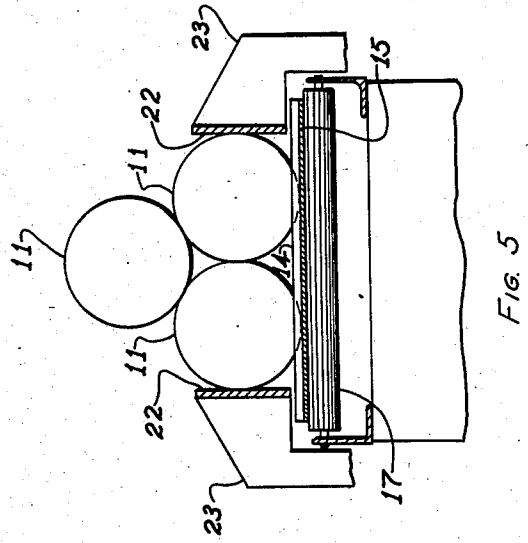


FIG. 5

INVENTOR.
Albert E. Cranston, Jr.
BY
Cook and Schermerhorn
Attys

April 26, 1960 A. E. CRANSTON, JR 2,933,866

METHOD AND APPARATUS FOR PACKAGING CYLINDRICAL ARTICLES

Filed Aug. 27, 1957 4 Sheets-Sheet 4

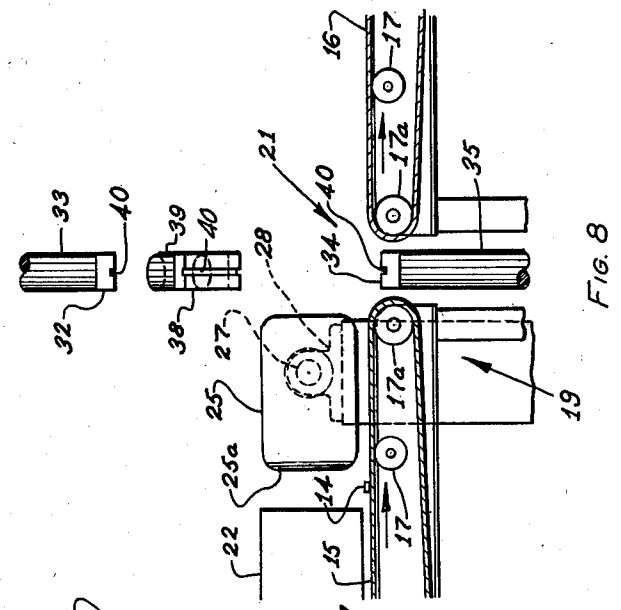


FIG. 8

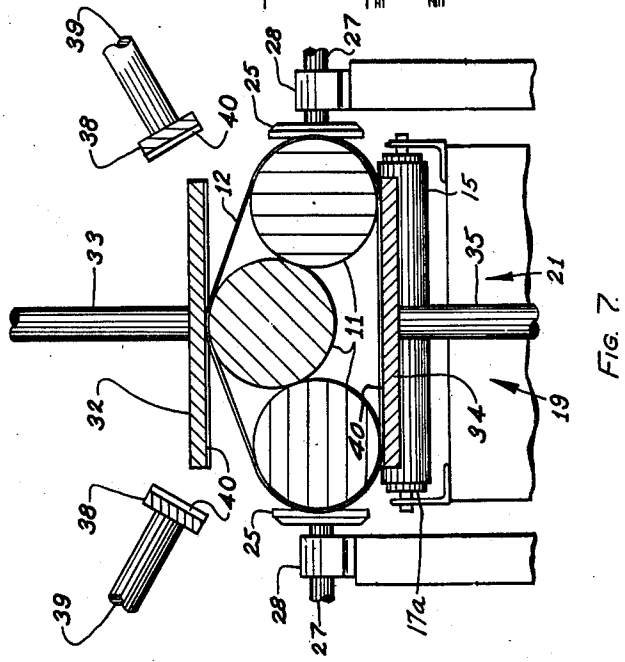


FIG. 7

INVENTOR.
Albert E. Cranston, Jr.
BY
Cook and Schermerhorn
Attys

United States Patent Office 2,933,866 Patented Apr. 26, 1960



2,933,866

# METHOD AND APPARATUS FOR PACKAGING CYLINDRICAL ARTICLES

Albert E. Cranston, Jr., Oak Grove, Oreg.

Application August 27, 1957, Serial No. 680,533

10 Claims. (Cl. 53—3)

The present invention relates to a method and apparatus for packaging cylindrical articles and to the resulting packaged product.

The present method and apparatus are particularly advantageous for the packaging of cylindrical articles, and specific application thereof is in connection with the packaging of a fuel product in the form of short artificial logs made from compressed sawdust having a natural or added binder. Such logs have the general physical characteristics of wood and are most conveniently handled and merchandised in flat package units containing three logs. It is to be understood, however, that the method and apparatus are not to be limited to the packaging of this product alone as such are useful in the packaging of other cylindrical articles which are capable of being tightly bound together in a common plane in a friction-held, non-slipping relationship, as will be more fully understood hereinafter.

A principal object of the present invention is to provide an improved flat package unit of cylindrical articles and an improved method and apparatus for producing said package unit.

Another object is to provide an improved method of applying a binding to a plurality of cylindrical articles and, more specifically, to bind a plurality of cylindrical articles in parallel relation in a common plane wherein friction between adjacent articles holds said articles securely and rigidly in such relation.

The package unit of the invention is formed from a plurality of the cylindrical articles bound together in a common plane by an endless band or hoop and held in said common plane by a frictional grip between adjoining articles and between the outside articles and the binding member. In the method of forming the package described the cylindrical articles are placed in pyramidal relation and then moved into the pre-formed band. Then the articles are pressed into a common plane, the band having a predetermined length dimension such that it will be tightly tensioned around the articles when the articles are disposed in said common plane. Friction between the adjacent articles and between the outside articles and the band maintains the articles in a common plane to form a flat package.

The apparatus for carrying out the method described has conveying means for moving the articles from a loading station to a packaging station and means at the packaging station for receiving an endless band transversely of the conveying means. Means are also provided at the packaging station for pre-forming a stiff circular band into a substantially triangular shape so that the articles in pyramidal relation can be moved endwise thereinto. Presser head means are employed for pressing the articles into a common plane to tension the band.

Conventional binding and strapping machines cannot apply a band around a small rigid package under tension because the band joining mechanism deflects the band away from the package and introduces slack which must be taken up by resilience provided by the package or by a



sufficient length of band. The present package unit cannot be bound tightly enough by conventional machines to hold the articles rigidly in position because there is insufficient resilience in the articles and the relatively short length of band to hold the band adequately tight after removal from the joining mechanism. The present method, by using pre-formed hoops, permits the final tension to be adjusted as desired and obviates the usual problem of uniting the band ends under tension.

The invention will be better understood and additional objects and advantages will become apparent from the following description taken in connection with the accompanying drawings which illustrate a preferred form of the invention. It is to be understood, however, that the invention may take other forms, and that all such modifications and variations within the scope of the appended claims which will occur to persons skilled in the art are included in the invention.

In the drawings:

Figure 1 is a side elevational view of a packaged product of the present invention;

Figure 2 is an end view of said product;

Figure 3 is an elevational view of a hoop or band for binding the articles together;

Figure 4 is a plan view of a machine for carrying out the method;

Figure 5 is a cross sectional view taken on the line 5—5 of Figure 4 and showing in addition a pyramid of articles to be banded;

Figure 6 is a cross sectional view taken on the line 6—6 of Figure 4 showing the pyramid of articles disposed in the packaging station of the machine;

Figure 7 is a view similar to Figure 6 but showing the articles partially pressed toward a common plane position; and

Figure 8 is a sectional view on the line 8—8 of Figure 4.

Referring now to the drawings, Figures 1 and 2 illustrate the package unit of the present invention. This package is designated generally by the numeral **10** and comprises a plurality of cylindrical articles **11** bound together in axially parallel side-by-side relation in a common plane by an encompassing endless band or hoop **12**. As was described hereinbefore, the article to be packaged is a compressed sawdust fuel product, although the package could as well be formed with other cylindrical, or approximately cylindrical articles, as will be readily understood as the dsecription proceeds.

The band or hoop **12** for binding these articles together is shown in Figure 3 and is formed from a material having the requisite strength such as wire, flat metal band, certain types of twine or tough paper, plastic or other flexible but preferably stiff material. The band may assume various widths but the inside circumferential length thereof is of a predetermined dimension in relation to the number and diameter of the articles being packaged whereby when the articles are disposed in a common plane the band will be tightly tensioned around the articles.

With the type of article described, i.e., an article having a rough surface, the tight banding thereof in a common plane will cause the articles to remain in such common plane position due to the frictional grip which exists between adjacent articles and between the outer articles and the band. More specifically, in a package of the type illustrated, comprising three articles, a tight band **12** will cause the center article to have a frictional gear-like grip on the other two articles whereby the center article is clamped tightly in place. Therefore, if the center cylinder will not slide out of place, in order for it to move, the end cylinders would have to rotate in opposite directions and such rotation does not occur in normal handling by reason of the frictional grip of the band. In

the package thus formed, a plurality of individual articles are thereby held in compact and rigid relation for easy handling and convenient piling and storing.

The method and apparatus for forming the package **10** will now be described. A preferred form of apparatus for carrying out the method is illstrated in Figures 4–8 and comprises a pair of longitudinally aligned belt conveyors **15** and **16** which operate on suitable rollers **17** to carry the articles to be packaged from a loading station **18** to a packaging station **19** and thence to an unloading station **20**. The conveyor **15** leads into the packaging station and the conveyor **16** leads out of said station, and the adjacent ends of these two conveyors are spaced apart slightly by end rollers **17***a* to form a transverse gap or break **21** for receiving the bands or hoops **12** one at a time. Conveyor belt **15** is equipped with cleats or lugs **14** to impart positive feed movement.

Disposed along the sides of the conveyor **15** throughout a portion of the length thereof are stationary guide plates **22** carried on arms **23** suitably secured rigidly to the machine frame structure. The trailing ends of the guide plates **22** terminate short of the gap **21** a distance slightly in excess of half the length of articles **11**. Disposed between the plates **22** and the gap in continuation of the plates **22** are resilent guide plates **25** connected to rods **27**. Rods **27** are slidable in bearings **28** and are urged toward each other by springs **29** which are compressed between the outer bearings **28** and suitable abutments **26**, such as washers, secured on rods **27**. In the rest position of the plates **25**, shown in Figure 4, the plates **25** have the same lateral spacing as stationary plates **22**.

The leading ends of guide plates **25** are rounded at **25***a* to permit the articles to slide freely therebetween without impediment by the vertical edges. The transverse spacing between the plates **22** and **25** depends upon the diameter of the articles being packaged as this spacing must be slightly greater than the combined width of two of the articles so that three articles in pyramidal relation can slide freely therebetween on the conveyor **15**, as shown in Figure 5.

Disposed centrally over the gap **21** is a presser head or bar **32** carried on a vertical piston rod **33**, and mounted centrally below the gap **21** is a transverse presser bar **34** mounted on a vertical piston rod **35**. Each bar **32** and **34** has vertical movement by the action of fluid pressure cylinders, not shown. Also disposed over the gap **21** is a pair of band-holding heads **38** mounted on inclined piston rods **39**, as best shown in Figure 6. The rods **39**, similar to the rods **33** and **35**, are movable toward and away from the conveyor and also project from fluid pressure cylinders, not shown. Each bar and head **32**, **34** and **38** is equipped with a band-holding groove **40**.

In carrying out the method, using three articles to a package, a group of three articles is loaded in pyramidal relation on the conveyor **15** between guide plates **22** at the loading station **18** as shown in Figure 5 while the conveyor is stationary. The upper presser bar **32**, as well as the lower bar **34**, are at this time in a retracted position away from the conveyor and heads **38** are projected, as shown in Figure 6. A circular band or hoop **12** is then deformed into a rounded triangular shape and inserted in grooves **40** which support and hold it in vertical position in the gap **21**.

Then the conveyor belts **15** and **16** are started to move the pyramid group of articles **11** lengthwise into the band **12**. The belts are stopped when the articles reach banding position and heads **38** are retracted to their Figure 7 position. In banding position the articles **11** have cleared stationary side plates **22** and are confined by resilient side plates **25**.

Then the presser bar **32** moves downwardly and the bar **34** moves upwardly to the supporting belt level. The downward movement of bar **32** spreads the outer cylinders apart and moves the center cylinder therebetween, as shown in Figure 7, the plates **25** spreading transversely against the action of springs **29** as the articles are pressed into a common plane position as shown in Figure 1. The upper bar **32** and lower bar **34** then retract to their Figure 6 positions and the conveyors **15** and **16** move the package through the machine to the unloading station **20**.

When the articles assume the approximate positions shown in Figure 7, all slack has been removed from the band **12** and further downward movement of the center article operates to tension the band. A single band of adequate strength is sufficient to hold a group of three cylindrical articles rigidly in a stable flat package.

Having now described my invention and in what manner the same may be used, what I claim as new and desire to protect by Letters Patent is:

1. A method of packaging three cylindrical articles utilizing an endless circular band capable of banding said articles transversely in tight abutting relation when said articles are disposed in parallel side-by-side relation in a common plane, comprising the steps of pyramiding said articles in parallel relation, shaping said band into a triangular configuration, moving said articles lengthwise partially through said band, and then forcing said articles into a common plane to tighten said band transversely therearound.

2. The method of packaging cylindrical articles in a transverse endless band comprising assembling said articles in a compact pyramidal group, moving said group lengthwise into said band subject to sufficient yieldable lateral restraint to hold the group in assembled relation, and then applying pressure at right angles to the direction of said lateral restraint and parallel with the plane of the band sufficient to flatten the group into a common plane and tension said band.

3. Apparatus for packaging cylindrical articles comprising a pair of spaced conveyors defining a gap therebetween over which conveyed articles are moved, an upwardly movable presser bar in said gap, resilient side plates adjacent opposite sides of said gap, movable hoop deforming members on opposite sides of said gap above said conveyors, hoop engaging and supporting means on said presser bar and said members, and a downwardly movable presser plate above said presser bar.

4. Apparatus for packaging cylindrical articles comprising a pair of longitudinally spaced conveyors defining a gap therebetween over which conveyed articles are moved, a lower transverse presser bar movable upwardly in said gap, an upper transverse presser bar movable downwardly above said lower bar, means for supporting a hoop in a transverse vertical plane in said gap, and resilent side plates adjacent opposite sides of said conveyors.

5. Apparatus as defined in claim 3 in which said hoop supporting means comprises grooves in said presser bars.

6. The method of packaging a small number of cylindrical articles in excess of two comprising assembling said articles in parallel side-by-side relation with at least one of the articles offset from the plane of two other articles, supporting an endless band in open position to receive the articles, moving the articles lengthwise relative to the band so that the articles project through the band, and then forcing all of said articles into a common plane to tighten the band transversely therearound, said band having a predetermined circumference to bind said articles snugly in a common plane whereby said band will receive said articles freely when one of the articles is offset from the common plane.

7. The method of packaging three cylindrical articles comprising assembling said articles in parallel side-by-side relation in a pyramid, supporting an endless band in open position to receive the articles, moving the articles lengthwise relative to the band so that the articles project through the band, and then forcing the three articles into a common plane to tighten the band transversely therearound, said band having a predetermined circumference to bind said articles in a common plane

whereby the band will receive said articles freely in said pyramid assemblage.

8. The method of packaging a small number of cylindrical articles in excess of two comprising assembling said articles in parallel side-by-side relation with at least one of the articles offset from the plane of two adjacent articles, supporting an endless band in open position to receive the articles, moving the articles lengthwise relative to the band so that the articles project through the band, and then forcing said one article between said adjacent articles and into said plane thereof to tighten the band transversely around all the articles, said band having a predetermined circumference to bind said articles snugly in a common plane whereby said band will receive said articles freely when one of the articles is offset from the common plane.

9. Apparatus for packaging a group of cylindrical articles in an endless band comprising means for supporting a group of said articles in parallel side-by-side relation with at least one of the articles offset from the plane of two other articles, means for imposing yieldable lateral restraint on said group to prevent lateral spreading of the group, means for supporting an endless band in open position to receive said group, means for moving the



articles lengthwise relative to said band supporting means to project the articles through a band on said band supporting means, and means for forcing the offset article into said plane between said two other articles causing said two other articles to spread apart laterally against said lateral restraining means and tension said band around the group.

10. Apparatus for packaging a group of cylindrical articles in a hoop comprising a support for the articles, resilient side plates adjacent said support, retractable hoop supporting members adjacent an end of said support, means for moving said articles over said end of said support and lengthwise relative to said hoop supporting members, and a presser bar movable perpendicularly toward said support.

References Cited in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 2,707,553 | Yount | May 3, 1955 |
| 2,778,491 | Taylor | Jan. 22, 1957 |
| 2,781,621 | Wilson | Feb. 19, 1957 |
| 2,796,709 | Bolding | June 25, 1957 |
| 2,801,507 | Claus | Aug. 6, 1957 |