United States Patent [19]

Fischer

[11] **3,740,049**

[45] **June 19, 1973**

[54] **COUNTER SYSTEM FOR ORBITAL PACKER**

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[73] Assignee: **Paper Converting Machine Company, Inc.**, Green Bay, Wis.

[22] Filed: **Aug. 17, 1970**

[21] Appl. No.: **64,332**

[52] **U.S. Cl.** ..... **270/41**, 93/93 K, 270/6, 270/45, 271/74

[51] **Int. Cl.** **B41l 43/04**

[58] **Field of Search** ..... 270/69, 5, 6, 58, 270/41, 42, 45; 93/93 K; 271/74

[56] **References Cited**

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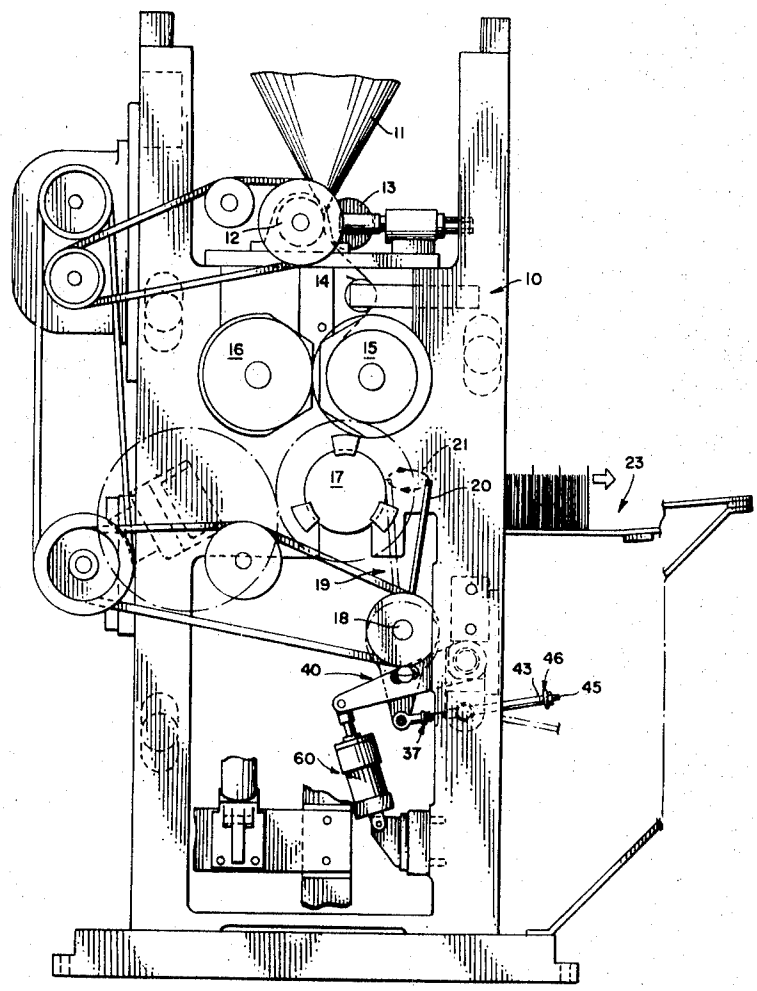
[57] **ABSTRACT**

During normal operation, the orbiting fingers of a machine for packing individual web segments takes folded web segments, such as napkins, from a rotating vacuum cylinder and removes them from the surface of the cylinder and stacks them horizontally. A mechanism counting the napkins generates an electronic signal at a predetermined count, and the signal energizes a solenoid which actuates an air cylinder to rotate the packer fingers without changing their orbit to a position in which the fingers engage the web segment at an earlier part of the orbit when the web segment is slightly higher on the cylinder. The fingers then take a single napkin off of the vacuum cylinder at the higher position and transfer it to the stack in that position so that this napkin extends above the upper surface of the stack and becomes a count napkin.

5 Claims, 6 Drawing Figures



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SHEET 1 OF 3

FIG. 1

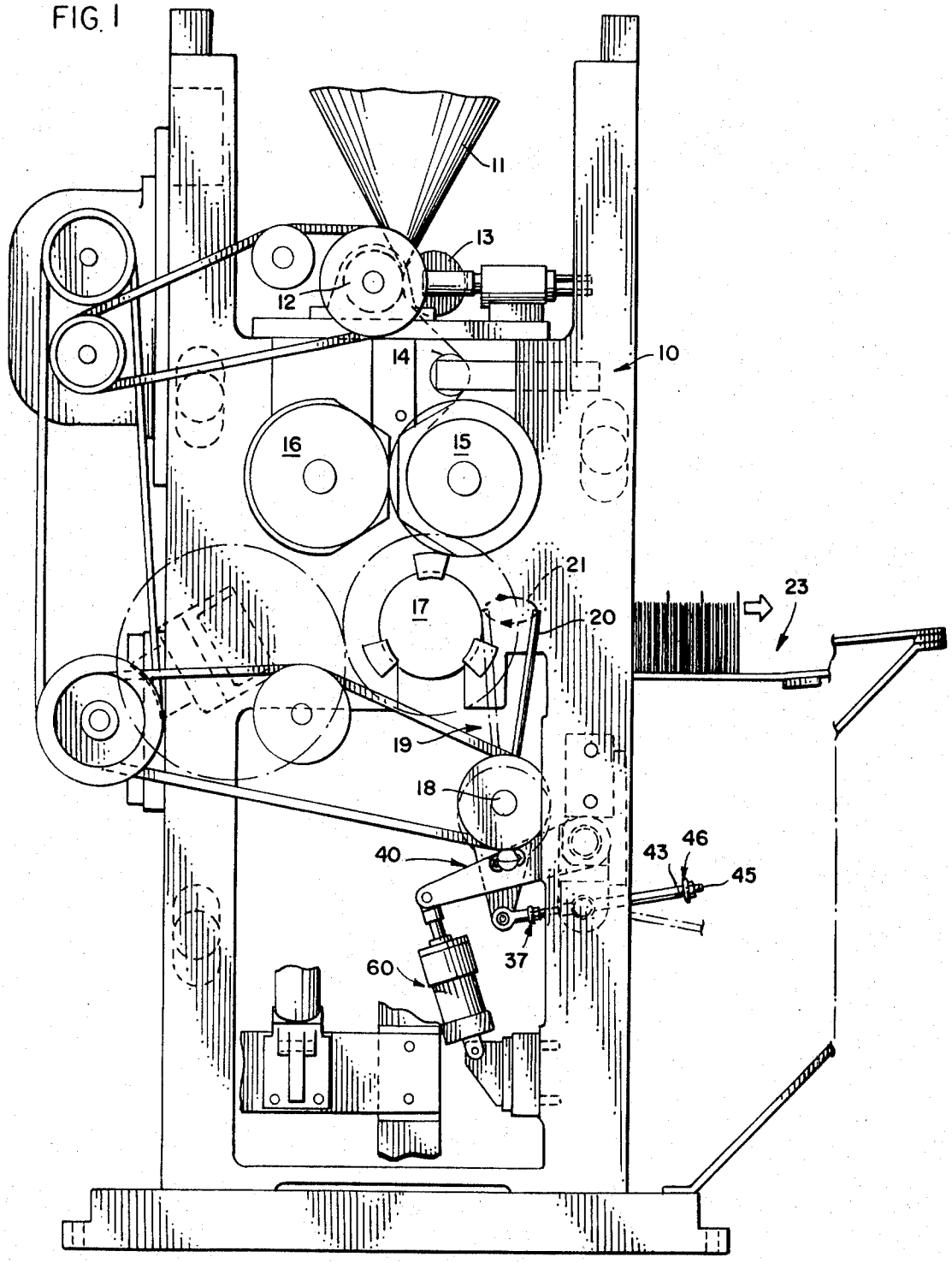

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FIG. 2

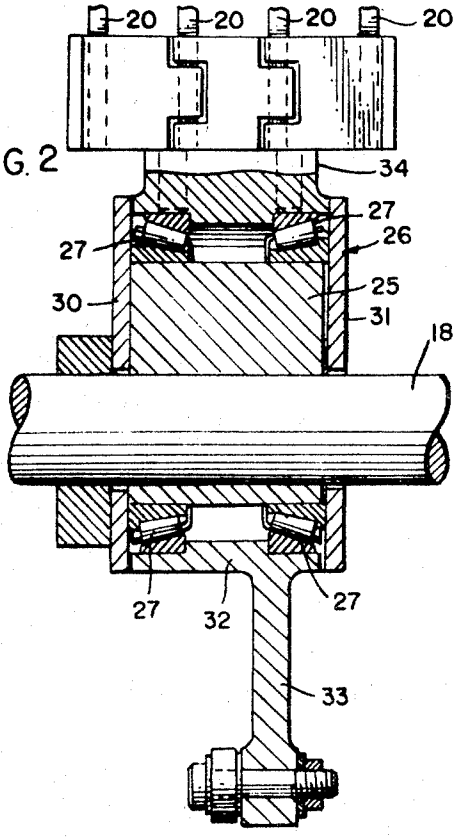

FIG. 3

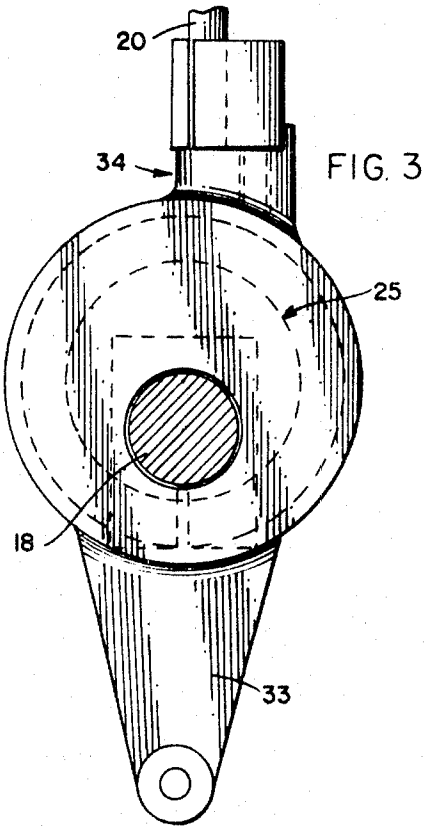

FIG. 4A

FIG. 4B

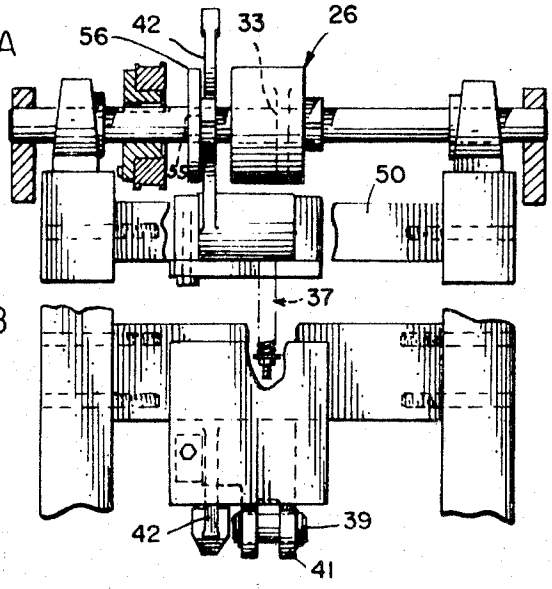

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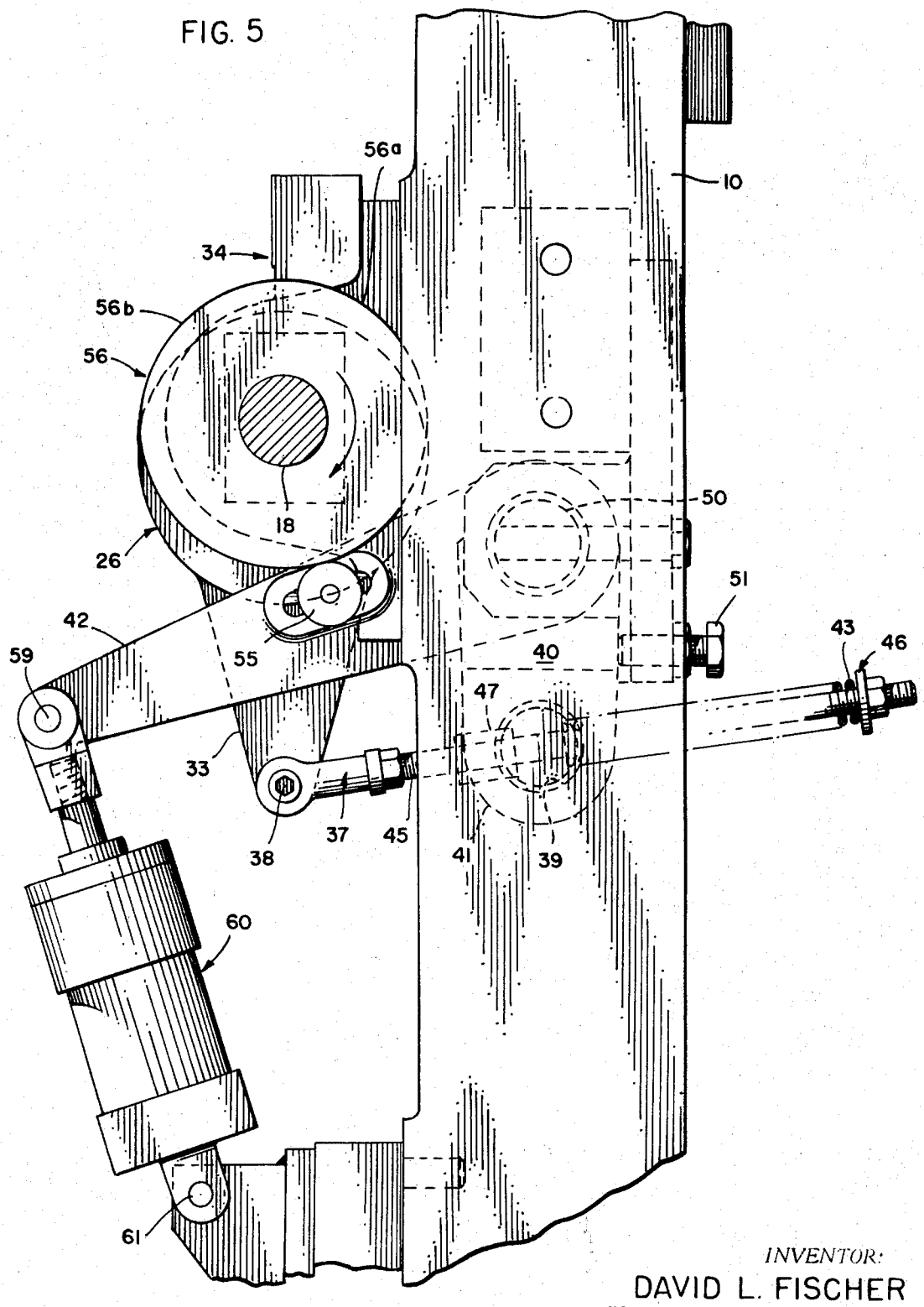
FIG. 5



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COUNTER SYSTEM FOR ORBITAL PACKER

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to systems for stacking individual web segments, such as napkins or the like. More particularly, the present invention pertains to an orbital packer for napkins which, at a predetermined count, displaces one single napkin to a higher position extending above the stack and serving as a count napkin.

Folded napkins, of the type which are commercially available in retail markets, are formed from a continuous web which is fed into a folding path where the web is first longitudinally folded, then severed into individual segments which are subsequently transversely folded and then packed in a magazine. It is customary to have one napkin at a predetermined number raised above the others by one-fourth to one-half in.. These napkins, referred to as count napkins, separate the stack into bundles of known amounts for packaging.

2. Description of Existing Systems

In earlier machines the folded napkins were taken from the folding path by a reciprocating packer mechanism operating at relatively slow speeds. It was not a significant problem to take a count napkin and raise it above the others because of the relatively slow operating speed. However, because of a desire to go to higher and higher speeds, commercial packers have used mechanisms in which the individual web segments are taken from a grooved vacuum roll by means of fingers which travel in an elliptical or circular orbit to displace each segment from the periphery of the drum and place it in a magazine. One such system is disclosed in the Bradley U.S. Pat. No. 3,256,012 which issued June 14, 1966 and is owned by the assignee of this invention.

SUMMARY

In the present system, orbiting fingers are arranged to take folded napkins from a grooved vacuum or cylinder or roll and deliver them individually to a magazine where a stack is formed horizontally. The packer assembly including the packer fingers is mounted on a driven shaft by means of an eccentric inner member clamped to the shaft and an outer member rotatably mounted on the inner member. The outer member is held generally upright by means of a first spring-loaded link while permitting orbital motion of the outer member which supports the packer fingers. Under normal operating conditions, the packer fingers move in an elliptical orbit to displace the web segments from the surface of the roll and transport them into the magazine.

The spring-biased link which holds the packer fingers in their generally upright position is connected to an L-shaped link. A counter generates an electrical signal at a predetermined count, representing the count napkin, to actuate a solenoid valve which energizes an air cylinder to rotate the L-shaped link to a position wherein a cam follower on the L-shaped link is moved into operative relation with a cam on the driven shaft. At the "fall" in the cam, the L-shaped link rotates to move the spring-biased link which, in turn, tips the packer assembly to move the elliptical orbit of the packer fingers slightly away from the vacuum roll — i.e., slightly out of the grooves in the vacuum roll. This causes the fingers to strike or pick off the napkin in an earlier portion of the orbit — that is, at a higher position on the vacuum roll. Thus, the picked napkin is deposited in the magazine in a higher position than previously-packed napkins, and this napkin becomes the count napkin.

The cam resets the packer fingers to the original elliptical orbit before they reach their maximum delivery position to avoid hitting the previously discharged napkins in a magazine harder at the count than during normal delivery. Further, the rotation of the cam delivers the outer member to its original dwell profile and when the air cylinder is reversed, the outer member is already in its normal delivery position.

Thus, the present invention enables an orbital packer to continue to operate at its normal high speed while delivering a count napkin at a predetermined count at the same normal high speed of the system. Other features and advantages of the present invention will be apparent to persons skilled in the art from the following detailed description of a preferred embodiment wherein identical reference numerals will refer to like elements in the various views.

THE DRAWING

FIG. **1** is a schematic view, in side elevation, of a system incorporating the present invention;

FIG. **2** is a detailed showing, partially in cross section of the packer assembly;

FIG. **3** is a close-up side view of a portion of the packer assembly;

FIG. **4A** is a plan view, with certain parts partially broken away, showing the orbiting and tripping mechanism, and turned 90° from the orientation of FIG. **1**;

FIG. **4B** is a partially broken away elevation view of the structure of FIG. **4A** taken from the bottom of the page thereof; and

FIG. **5** is a more detailed side elevational view of a portion of the mechanism for tilting the packer assembly.

DETAILED DESCRIPTION

Turning then to FIG. **1**, there is seen a napkin folder equipped with an orbital packer including a frame generally designated by reference numeral **10** to which is fed a continuous web **11** of the material comprising the napkins. The web **11** is fed over a folding board (hidden by the web **11**) for forming a continuous longitudinal fold in the web **11**. The folded web is fed between a rigidly supported roll **12** and a pull roll **13** which is resiliently biased against the rigidly supported roll **12** for drawing the web into the system and for creasing the longitudinal fold. The rolls **12** and **13** as well as the rolls subsequently discussed are suitably journaled in the frame **10** unless otherwise indicated. The folded web is then fed about an idler roll **14** into partial wrapping engagement with a carrier roll **15** adjacent which is located a cut off roll **16**.

Although in the illustrated embodiment only one system is shown for providing a complete folding, cutting and stacking of napkins, it will be appreciated that normally a number of separate systems are provided side-by-side on the same frame so that all of the cutter rolls, carrier rolls, folding rolls, etc. are mounted on the same frame and driven in common.

As is well known in the art, the carrier roll **15** preferably is provided with two anvils located at diagonally opposite portions of its periphery for backing the web **11** as it is severed by knives carried by the cut off roll

16. The severed segments are held against the surface of the carrier roll 15 by a suitable vacuum and then brought into contact with the surface of a folding roll 17. All of the rolls discussed thus far are driven in synchronism. The folding roll 17 applies a vacuum to the transverse mid-section of each of the severed web segments on the periphery of the carrier roll 15; and the vacuum in the roll 15 is then released so that as the folding roll 17 removes the individual segments, they become folded transversely.

Also driven in synchronism with the folding roll 17 and suitably journaled on the frame 10 is a driven shaft 18 on which there is mounted a packer assembly generally designated by reference numeral 19. The packer assembly includes a plurality of upstanding fingers 20 (see FIG. 2) which are driven in the indicated orbit by the dotted line 21 of FIG. 1 for delivering the napkins on the folding roll 17 to a magazine generally designated by reference numeral 23. To this end, the periphery of the folding roll 17 is conventionally provided with a plurality of grooves in which the fingers 20 reside during the left-hand portion of the elliptical orbit 21.

The structure for causing the fingers 20 to move in their elliptical delivery path is illustrated in more detail in FIGS. 2 and 3. To the driven shaft 18 there is eccentrically clamped an inner member 25 which rotates with the driven shaft 18. An outer member generally designated by reference numeral 26 is rotatably mounted on the eccentric member 25 by means of tapered roller bearings 27. The outer member 26 includes first and second side plates 30 and 31 together with a central yoke 32. The yoke 32 includes a downwardly depending flange 33 and an upper bracket 34 on which the packer fingers 20 are mounted.

Referring now to FIG. 3, as the shaft 18 is driven, the eccentric inner member 25 rotates with it, but the outer member 26 is held in a generally upright position (while being permitted to orbit) by means of structure presently to describe so that the fingers 20 are driven in their generally elliptical orbit 21.

Turning now to FIG. 5, the outer member 26 of the packer assembly is held in its generally upright position by means of a link 37 pivotally connected as at 38 to the lower portion of the flange 33. The link 37 includes a spring 43 which is in compression urging the link 37 toward the right. The spring 43 is received on a rod 45 which extends through an inner bearing member 39 which is journaled within a generally L-shaped link designated 40 and including (in FIG. 5) a downwardly depending section 41 and a leftwardly-projecting section 42. The spring is held in compression between the bearing 39 and an end washer 46 mounted on the rod 45. The link 37 is limited in motion toward the right in FIG. 5 (i.e., in causing the outer member 26 to rotate counterclockwise) by a collar 47 which engages the bearing 39. Thus, there is a certain amount of yield permitting the packer assembly to rotate clockwise in the case of a jam to avoid breakage. As the packer fingers are driven in their elliptical orbit, the link 37 oscillates up and down about its pivotal bearing 39; and the spring 43 urges the link 37 to maintain the generally upright position of the packer assembly.

The L-shaped link 40 is rotatably mounted at its heel to a shaft 50 which is secured to the frame 10, and a bolt 51 threadably received within the frame 10 limits the counterclockwise motion of the link 40. The link 40 may be seen in FIG. 4A and 4B.

A cam follower 55 is rotatably mounted on the section 42 of the link 40. The cam follower 55 is adapted to selectively engage a cam 56 which is mounted to and rotates with the driven shaft 18. The cam 56 rotates clockwise as shown in FIG. 5; and in profile it is provided with a 180° dwell surface, followed by a 90° "fall" (see reference numeral 56*a*). The fall 56*a* is a modified sine form, and it is followed by a 90° "rise" 56*b*, also of modified sine form. The radial distance between the rise and fall being sufficient to move the follower 55 a distance of 0.125 in.

The distal end of the section 42 of the link 40 is pivotally connected at 59 to the rod end of an air cylinder unit generally designated 60, the cylinder end of which is pivotally connected at 61 to the frame 10. As seen in FIG. 5, the air cylinder unit 60 is shown in its contracted state; and when actuated, the rod will be extended to cause the portion 42 of the link 40 to move upward and thereby rotate the link 40 in a clockwise direction about the fixed shaft 50 when permitted to do so, as will be presently explained.

A conventional electrical counter (not shown) is provided with the system for generating a signal which controls a solenoid valve which, in turn, forces air into the cylinder end of the air cylinder 60 and exhausts the rod end thereby causing the rod to extend relative to the frame 10. The resultant force causes the link 40 to rotate in a direction as just explained until the cam follower 55 contacts the dwell surface of the cam 56. The distance the link moves to cause the cam follower 55 to engage the cam 56 at dwell is very small — of the order of 3–5 mils.

The fall 56*a* of the cam 56 is placed so that the follower 55 contacts the cam 56 during a dwell cycle. Thus, when the air cylinder 60 is expanded, the tipping of of the packer assembly is controlled by the cam 56.

When, during the delivery of a count napkin, the fall 56*a* of the cam 56 passes the cam follower 55, the link 40 rotates clockwise a distance of 0.125 in. at the follower 55. This causes the link 37 to be translated to the left thereby tipping the packer assembly about the driven shaft 18 slightly. The timing is such that the tipping or tilting of the packer assembly causes the packer fingers to strike or pick off the napkin when traveling on the folding roll 17 sooner than would occur if the packer fingers were traveling in their normal orbit. When this napkin is thus delivered to the magazine, it will be placed slightly higher than preceding and subsequent napkins and form the count napkin.

The cam 56 is designed additionally such that before the fingers reach their maximum position to the right, the cam 56 has rotated with the driven shaft 18 to the rise cam profile 56*b* which forces the link 40 back to its original position thus resetting the packer fingers to their elliptical orbit and preventing hitting the previously deposited napkins in the magazine harder at count than during normal delivery. After delivery of the count napkin, the cam 56 will have rotated to a position equivalent to its original dwell profile so that when the air cylinder is contracted, there is only a slight additional counterclockwise rotation of the link 40. The electric counter may be of the type which is commercially available under the tradename Dynapar, manufactured by Louis Allis Co. of Milwaukee, Wis., or it could be a conventional mechanical counter which

closes a switch to generate an electrical signal, for example the Cyclo-Monitor Model CMR manufactured by Precision Products and Controls of Tulsa, Okla. The counter is used to generate the signal which energizes the air solenoid to actuate the air cylinder **60** only during a single count.

With the construction illustrated and disclosed herein, orbital packers have been driven at their normal high speed while delivering a count napkin in a system which is dynamically stable and compatible with an orbital packer in that the rotating parts may be counterbalanced and there are no reciprocating parts which engage the napkins in the folding path. Persons skilled in the art will be able to substitute equivalent elements for those which have been disclosed and to modify the illustrated structure while continuing to practice the inventive principle; and it is, therefore, intended that all such modifications and substitutions be covered as they are embraced within the spirit and scope of the appended claims.

I claim:

1. In an orbital packer including means for delivering individual folded web segments to a vacuum folding roll having peripheral grooves and a packer assembly including fingers received for orbital motion in said groove for delivering napkins from said roll to a magazine, the improvement comprising actuatable means for tipping said packer assembly when actuated to engage a napkin on said folding roll sooner than would be engaged in a normal delivery cycle, said actuatable means including a driven shaft, holder means supporting said fingers eccentrically rotatably mounted on said driven shaft, resilient means for yieldably holding said holder means in a first position while permitting orbiting of said fingers, and power means for selectively moving said resilient means when actuated to thereby tip said holder means to move said fingers momentarily out of their normal orbit to deliver a count napkin; and timing mechanism associated with said packer assembly for actuating said power means at predetermined intervals.

2. The system of claim **1** wherein said timing mechanism further includes means for returning said fingers to their normal orbit after removing a count napkin from said roll to prevent hitting previously deposited napkins harder.

3. The system of claim **1** wherein said holder means further includes an outer member including packer fingers received within said grooves on said folding roll whereby when said shaft is driven said packer fingers move in an elliptical orbit to deliver web segments from said folding roll, said outer member defining an extension; and wherein said power means further includes means for rotating said outer member about said shaft in timed relation with said folding roll whereby a napkin on said folding roll is engaged at an advanced position and delivered to said stack displaced from napkins delivered prior thereto.

4. In combination with a folding machine for delivering individual web segment on a rotating vacuum roll with peripheral grooves, a packer assembly comprising a shaft driven in timed relation with said vacuum roll; a plurality of fingers rotatably mounted on said shaft, the ends of said fingers received in said grooves of said roll and traveling in a predetermined orbit when said shaft is driven to engage individual web segments on the periphery of said roll and remove them from the roll and deliver them to a magazine; link means for resiliently holding said fingers in a first position to deliver segments to said magazine; and actuation means operating in timed relation with said driven shaft to tilt said fingers outwardly of said roll before a web segment reaches its normal delivery position whereby said segment is delivered to said magazine displaced from other segments therein.

5. The system of claim **4** wherein said actuation means further comprises a cam on said driven shaft including a fall and a rise; a first spring-biased link means having one end connected to said fingers for holding them generally in said first position while permitting orbiting of the fingers in normal deliveries; second link means mounted for selective rotation between a first and a second position, said first link means pivotally connected to said second link means and effecting normal deliveries of said web segments when in said first position; said second link means also including a cam follower adapted to engage said cam on said shaft when said second link means is in said second position to tilt said fingers outwardly of said orbit when said cam follower engages the fall of said cam, said cam being timed to deliver a web segment displaced from other stacked web segments, said rise on said cam then displacing said second link means to said first position; and wherein said power means includes forcing means for selectively urging said second link means to said second position in response to a predetermined count in the delivery of web segments.

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