

Dec. 30, 1969

J. B. TANNER

3,486,424

WEB FORMER WITH WEAR INSERT

Filed June 23, 1967

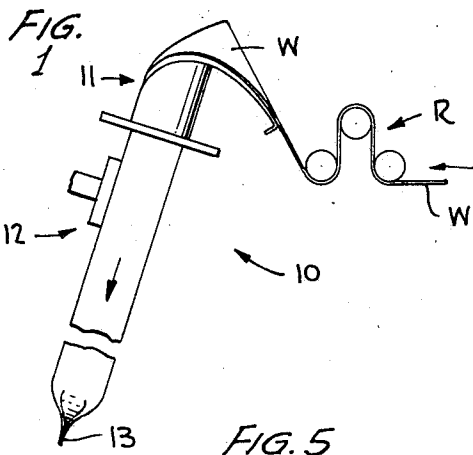


FIG. 5

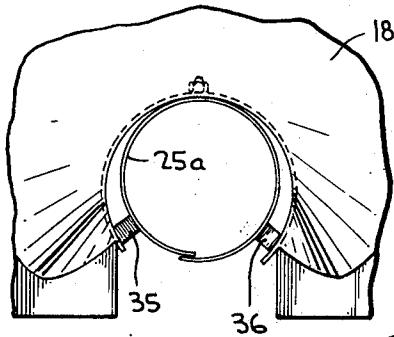
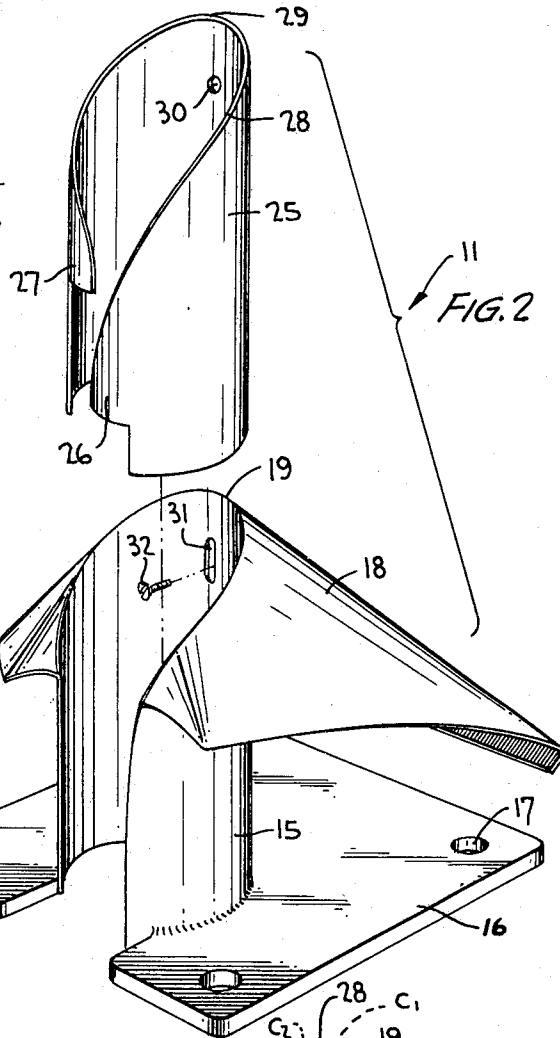
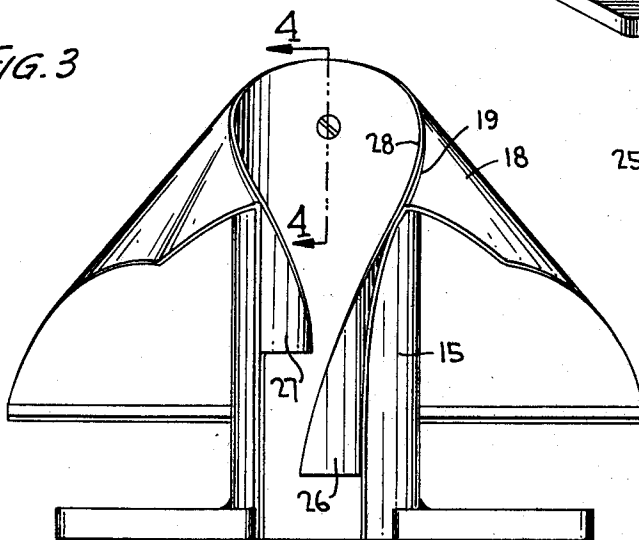
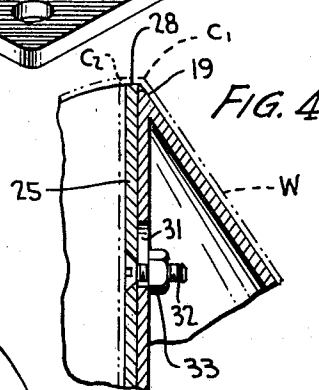


FIG. 3



INVENTOR,
JACK B. TANNER
BY *Watson, Cole,
Grindle & Watson*
ATTORNEYS

1

3,486,424

WEB FORMER WITH WEAR INSERT

Jack B. Tanner, Decatur, Ga., assignor to The Woodman Company, Inc., Decatur, Ga., a corporation of Georgia
Filed June 23, 1967, Ser. No. 648,269
Int. Cl. B31b 1/38

U.S. Cl. 93-82

9 Claims

ABSTRACT OF THE DISCLOSURE

A device for transforming a web into a tube utilizing a winged former with a wear insert position within the body thereof to receive substantially the full frictional wearing force from said web. The insert is adjustable along the longitudinal axis of the former and undersized inserts can be utilized to form tubes of smaller than normal size.

The present invention generally relates to form and fill packaging machines and, more particularly, to an improved tube former specifically adapted for such machines.

Packaging machines of the form and fill type now almost universally employ a former for transforming a web of sheet material into a continuous tube which includes an upright tubular body and a collar-like preformer portion extending at an acute angle to said body. As is well known, the web is drawn up over the preformer portion and then reversely directed down through the tubular body for the transforming operation. This type of former has certain advantages over other devices of this type in that the transformation into a tube can be made without forming wrinkles in the sheet material and without the necessity of employing internal guide mandrels thereby leaving the full opening of the top of the tube for positioning of the filling tube for an unrestricted product filling operation. However, since the sheet material is drawn with rather great force over the direction reversing line of transformation between the guide portion and the tubular body and since the sheet material inherently has at least some degree of abrasiveness, this junction between the guide portion and the tubular body is subjected to an appreciable amount of wear.

Prior to the present invention, after an extended period of use the former would have to be removed from the machine and replaced with a new former or repaired in this critical area of the junction where the actual transforming operation occurs. Because of the variation in the angle at which the sheet material passes over the line of transformation, the wear on the former is generally uneven, with the greatest wear being at the crown of the upper edge of the tubular body, which makes the repair procedure highly time consuming and tedious and, at best, results in a former that is serviceable for only a fraction of the time of a new former. In either case, substantial expense is involved in these prior procedures and thus it would be desirable to provide an improved former and procedure for meeting this problem.

Accordingly, it is one object of the present invention to provide a former of the type described having a removable wear insert which receives substantially the full frictional wearing force caused by the transforming operation.

2

It is another object of the present invention to provide a former having a winged preformer portion wherein a wear insert of the type described is provided to substantially prevent contact and resulting wear by the web of the critical guiding areas of the former and preformer portion so as to alleviate the problem of replacement and repair.

It is still another object of the present invention to provide the described type of tube former with a wear insert, which insert can be easily adjusted within the former so that the position of the guide lip of the insert can be set for maximum forming efficiency and so that the insert may be periodically repositioned within the former to present a new, and preferably reshaped, guide lip.

Briefly, the device of the invention comprises a wear insert of tubular shape which is fixedly positioned within the tubular body of a conventional former so as to receive the wear from the web in the critical areas. The guide lip of the insert has been found to be capable of receiving a very large proportion of the total wear of the former and when it has been worn from its original shape so as to threaten the efficiency of the tube forming operation, all that is necessary is that the insert be removed from the former and replaced with a new insert of the same size having a properly shaped or contoured guide lip. This concept means not only a saving in time for the user or operator of the machine, but also obviously represents a sizable saving in cost due to the relatively simple and inexpensive construction of the tubular insert, as compared to the complete former.

In accordance with another feature of the present invention, the insert may be made adjustable along the longitudinal axis of the tubular body so that as the profile of the guide lip wears, the insert may be repositioned upwardly to compensate for the wear. Because the wear across the profile of the guide lip is usually not even, it has been found to be preferable to remove the worn insert completely and replace it with another insert which has previously been reshaped as required. It will be realized that due to this adjustable feature, the insert may be positioned in the required relationship with the former so that the same insert may be reshaped and used several times.

Because the insert is of a simple tubular shape, it has been found to be more easily and successfully coated with materials having improved friction and wearing properties as is desired. For example, the insert may be coated with chromium or other metallized materials as well as ceramic materials without the usual risk of distortion of the metal and thus destruction of the critical curved portions of the former and preformer. Indeed, an insert of the present invention can be coated with a hard ceramic surface that registers on the order of 9.5 on Moh's scale without distortion; whereas, heretofore the risk of causing distortion and thus destruction of the complete former has limited the hardness obtainable to at least one unit of measurement lower. With the insert thus coated with a hard ceramic coating, in addition to the wear properties of the former being enhanced, the force required to pull the web through the former is reduced significantly by reduction in friction, both at the guide lip and along the interior of the insert. Also, of course, the coating of the insert is significantly less in terms of cost than is involved in coating the entire former, and obviously other coatings, such as the new poly-silicone plastics, for example the plastic

3

sold under the trade name "Teflon" by E. I. du Pont de Nemours and Company, Wilmington, Del., could be substituted for the ceramic or metallized coating, if desired.

Still another aspect of the present invention is concerned with the ease of adaptation of a former with the inventive insert for making different size tubes. This is accomplished by simply using a smaller size insert in a larger or nominal size former so that a range of sizes of tubes, within at least up to one inch less than the nominal size, may be formed with a single former. With this arrangement the changeover of the machine for different but closely related bag sizes is more efficient and less costly to the operator since he needs to have on hand only the different size inserts for use with the same former. When the insert being used is of a smaller size, stabilizing spacers may be placed between the sides of the insert and the sides of the former to insure a smooth transformation. Further in the preferred embodiments shown herein, the guide lip is purposely squared off so as to form transitory creases across the web and thereby induce longitudinal smoothing of the same.

Still other objects and advantages of the present invention will become readily apparent to those skilled in this art from the following detailed description, wherein I have shown and described only the preferred embodiment of the invention, simply by way of illustration of the best mode contemplated by me of carrying out my invention. As will be realized, the invention is capable of other and different embodiments, and its several details are capable of modification in various obvious respects, all without departing from the invention. Accordingly, the drawings and description are to be regarded as illustrative in nature, and not as restrictive.

In the drawings:

FIGURE 1 is an overall side view of the specific area of a form and fill machine in which the former of the present invention can be utilized;

FIGURE 2 is an exploded view of a former with winged preformer portion and an insert to be positioned within said former constructed in accordance with the teachings and principles of the present invention;

FIGURE 3 is a front view of the assembled former and insert of FIGURE 2;

FIGURE 4 is an enlarged detailed view taken along line 4—4 of FIGURE 3; and

FIGURE 5 is a top view of a former with an undersized insert positioned therein for forming a smaller than nominal size tube.

With specific reference now to the drawings for a more detailed explanation of the present invention and its environment, in FIGURE 1 there is illustrated a tube forming station 10 of a conventional form and fill packaging machine wherein a web W of sheet material moves over a series of guide rolls R from the supply roll (not shown) and then into said forming station. The forming station itself includes a former, generally designated by the reference numeral 11, which is operative to form the web W into a continuous tube by a suitable sealing means, as indicated at 12 in the drawings. As is well known in the form and fill packaging art, a transverse seal 13 is then formed across the tube 12, the partly formed package filled with product through said tube, and a similar seal then formed above the seal 13 to complete the package.

The former 11 specifically illustrated to describe the invention includes an elongated, open front tubular body 15 mounted in a generally upright position on a base member 16 having suitable mounting apertures 17 and a winged preformer 18 intersecting the upper limit portion of said body 15 at an acute angle thereto. This intersection of the preformer 18 and the body 15 forms a contoured juncture 19, which in the illustrated embodiment extends around less than the full periphery of said body 15 because of its open front. Thus, in prior art formers of this type this juncture 19 thus forms, partially at least, the line of transformation of the web, i.e. the point at which said

4

web is reversely directed and shaped into the tube. It should be noted at this point that, in fact, if a web were passed over only this part of the complete former 11 of the present invention, it would be reversely directed down into the body 15 from the preformer 18 and a tube would be formed, although somewhat less efficiently, so that for purposes of description the juncture 19 can be referred to herein as a nominal line of transformation. Thus, insofar as the structure which has been recited to this point in this detailed portion of the description, this type of former 11 can be considered in itself to be well known in the art, and therefore it should be understood that the device of the invention now to be described could be equally well adapted for use with other formers of this type having a different shape in the body 15 and/or contour of the juncture 19.

With this proposition in mind, there is shown in FIGURE 2 a wear insert 25 in an unmounted position above the former 11 ready to be inserted therein for use. The wear insert 25 is of tubular shape and is designed in this particular embodiment to substantially conform to or mate with the inside surface of the tubular body 15. The guide ears 26, 27 on the front of the wear insert 25 are designed to make the final laying of the web together for forming of the longitudinal seam of the tube at 12 as is known.

In accordance with an important aspect of the invention, the wear insert 25 has a contoured guide lip 28 formed by the upper edge thereof and in the embodiment shown said lip 28 extends down in a continuous fashion on said guide ears 26, 27 to perform the final laying operation just mentioned. Since the web W passes up and over the former 11 in its assembled condition (FIGURE 3), it will be realized that this continuous guide lip 28 thus forms the actual line of transformation of the web, as can best be seen from viewing the cross section of FIGURE 4. As has been indicated, it has been found that the greatest and perhaps the only appreciable wear in a former of this type occurs along this actual line of transformation; that is, where the web is reversely directed from guided, face-to-face contact with the preformer 18 into the tubular body 15. Also, it has been proven that of this wear, the largest amount occurs at a crown 29 (FIGURE 2) of this actual line of transformation, or at the highest point or apex of the contoured intersection between the two joining surfaces. Thus, because the actual line of transformation is formed at the guide lip 28 of wear insert 25, any wear of the type described above occurs at this point whereby the former 11 of the invention can be simply renewed by just incorporating a new insert 25 with a properly shaped and contoured guide lip 28 whereupon normal, efficient operation is immediately insured.

The cross-sectional profile of the guide lip 28 is preferably squared off, as can be seen in FIGURE 4, for the purpose of causing successive transitory angular creases c_1 , c_2 in the web W during transformation. These pronounced creases c_1 , c_2 in the web W tend to cause an improved longitudinal stretching of the structural molecules within the sheet material thereby tending to straighten the web W to remove any curl that might have been present as a result of said web W being stored in a roll. Also, this sharp turning action and molecular stretching action is of importance in the present combination to positively prevent wrinkling of said web W in the longitudinal direction by more forcibly inducing the web W to spread out in the transverse direction or around the guide lip 28, as is desired.

For the purpose of allowing accurate adjustment of the guide lip 28 of wear insert 25 with respect to the juncture 19, there is provided means for adjusting the wear insert 25 along the longitudinal axis of the tubular body 15, as compositely shown in FIGURES 2-4. This means preferably comprises a countersunk aperture 30 formed in the wear insert 25 (FIGURE 2), a corresponding

5

elongated slot 31 formed in the rear of the tubular body 15 (FIGURES 2 and 4) and a cooperating fastening means including a machine bolt 32 and nut 33. It will be realized that this arrangement allows the wear insert 25 to be fixedly clamped against the rear of the interior of said body 15 once the proper adjusted position has been located. Furthermore, as wearing of said guide lip 28 occurs this adjusting means may be utilized to raise the insert 25 upwardly to relocate the guide lip 28 in its proper position to most favorably engage the web W. Preferably, since the wear insert 25 may be easily removed from the former 11, when an adjustment is necessary said insert 25 is first removed from the body 15 and the guide lip 28 is reshaped for the proper contour and to give the advantageous squared off cross-sectional profile for the purposes described above and then said insert 25 is replaced and readjusted as required.

The most advantageous or proper position of the wear insert 25 is shown in FIGURE 4 and is such that the guide lip 28 is slightly above and to the inside of the juncture 19 so that as the web passes up and over the preformer 18 it avoids contact with said juncture 19 and is then stretched and reversely directed into the interior of said insert 25. As shown in FIGURE 3, the proper position of the guide lip 28 is in this position of slightly above the juncture 19 around the full periphery of said guide lip 28; however, since the intersection angle is more acute at the rear of the former 11 than at the front, the actual extent above the juncture 19 is progressively less at the front of the former. Thus, the path of the web W is such as to make a smooth transition from contact with the preformer 18 to engagement with the guide lip 28, as is well indicated in FIGURE 4.

In view of the foregoing, it can be realized that the use of the wear insert 25 to receive substantially the full frictional wear force of the web W offers distinct advantages over the prior art in that not only the cost of repair and replacement is reduced but because a more efficient forming action is realized. Further advantages previously mentioned stem from the fact that the interior wear surface of the wear insert 25 and the lip 28 itself may be easily coated with friction reducing materials without fear of distorting or warping the critical contour along the juncture 19 and the guiding surfaces of the preformer 18 and the body 25, as has been a problem in the past. Furthermore, of course, such coating can be carried out more economically on the insert alone, also as has been noted above.

In order to use the former 11 to make tubes smaller than the nominal size of said former 11 in accordance with the present invention, the operator need only select a wear insert 25a which is smaller than the tubular body 15, as shown in FIGURE 5. The insert 25a may thus be fixedly attached to the rear of the tubular body 15 where it is frictionally held in position essentially as before. In operation, the web W passes up and over the preformer 18, spans the gap between the juncture 19 and the guide lip 28, and then is transformed into a tube along the line of transformation formed by the guide lip 28a (note FIGURE 5). In order to assure complete stabilization of the sides of the former 25a, it may be necessary or desirable to provide side spacers 35, 36 to brace the same against the interior of the tubular body 15. As before, the positioning of the guide lip 28a is such that the web W avoids the juncture 19 forming the nominal line of transformation so that substantially the full frictional wear is realized at said guide lip 28a.

Other embodiments and modifications of the device of the present invention are immediately apparent and include, for example, the possible use of a plurality of nested inserts within the interior of the tubular body 15 to render the actual line of transformation of the innermost insert concentric with the nominal line of transformation. In this case, one or more inserts would be removed as required by the size of tube desired to be formed.

6

In either case, it has been found to be practical to utilize the undersized inserts 25a up to one inch less in diameter than the tubular body 15.

In this disclosure, there is shown and described only the preferred embodiment of the invention, but, as aforementioned, it is to be understood that the invention is capable of various changes or modifications within the scope of the inventive concept as expressed by the accompanying claims.

I claim:

1. The combination of a former for transforming an open web of sheet material into an elongated continuous tube by movement of said web through an acute angle over said former including a tubular body and a web preformer portion extending at said acute angle to said body forming a juncture with said body and for guiding said open web of sheet material, and a wear insert fixedly positioned on said tubular body and extending around substantially the full periphery of said juncture, said insert being on the exterior of said continuous tube and in juxtaposition thereto, said insert being within the interior of said body and over which said web passes so as to be located between said body and said web to substantially prevent wear of said juncture and said interior by said web during the transforming operation, said insert having a guide lip spaced above said interior of said body, and over which said web moves for the transforming operation of said open web into said tube whereby the actual line of transformation for said web is spaced from the nominal line of transformation of the former located at said juncture.

2. The combination of claim 1 wherein is further provided means for adjusting said wear insert along the longitudinal axis of said body whereby said guide lip of said insert may be repositioned with respect to said juncture to compensate for any wear.

3. A former assembly for transforming an open web of sheet material into an elongated continuous tube by movement of said web through an acute angle over said former assembly comprising a tubular body, a depending collar-like preformer intersecting said body at said acute angle along a curved juncture, said preformer being shaped to direct said open web of sheet material toward said juncture formed by the intersection, and a wear insert positioned on said tubular body and extending around substantially the full periphery of said juncture, said insert being on the exterior of said continuous tube and in juxtaposition thereto, said insert being within the interior of said body between said body and said web to guide said web, a guide lip on said insert defining the line of transformation of said open web into said tube and receiving substantially the full frictional wearing force caused by said transforming operation, said guide lip being spaced above said interior of said body and over which said web passes to form said transformation line spaced from said preformer and said body, whereby said transformation line is also spaced from said juncture.

4. A former for transforming an open web of sheet material into an elongated continuous tube by movement of said web through an acute angle over said former comprising a web preformer extending at said acute angle to the longitudinal axis of said continuous tube, the open preformed portion of said web at said preformer forming a transformation line with said continuous tube, a support body positioned adjacent to said continuous tube and said preformer, a wear insert fixedly positioned on said support body and extending around substantially the full periphery of said line, said insert being positioned on the exterior of said continuous tube and in juxtaposition thereto, said web passing over said insert whereby said insert is located between said body and said web to substantially receive the entire wear caused by said transformation line in said web during the transforming operation of said open preformed portion into said tube, said insert having a guide lip extending above said preformer

7

to form said transformation line spaced from said pre-former and said body.

5. The combination of claim 4 wherein is further provided means for adjusting said wear insert along said longitudinal axis of said tube whereby said guide lip may be repositioned upwardly to compensate for any wear.

6. The combination of claim 3 wherein the corresponding sides of said insert are spaced radially inwardly toward said longitudinal axis from the sides of said body whereby the transformed tube is smaller than the nominal size of said former.

7. The combination of claim 6 wherein is further provided spacers positioned between said wear insert and said body whereby said wear insert is stabilized.

8. The combination of claim 5 wherein said adjusting means comprises a longitudinally extending slot formed in said body at a location underlying the center line of said web, a corresponding aperture formed in said insert, and locking means passing through said aperture and said slot for clamping said insert against the interior surface of said body for frictionally holding the same in position.

9. The combination of claim 3 wherein said guide lip is squared off to form at least 2 successively pronounced

8

transitory creases across said web at said actual line of transformation to induce longitudinal smoothing of said web.

References Cited

UNITED STATES PATENTS

3,122,072	2/1964	Monsees	93—82
3,125,008	3/1964	Herdina	93—82
3,155,018	11/1964	Kirsten	93—82
3,267,822	8/1966	Harrison	93—82
3,296,770	1/1967	Wilson	93—82 X
3,370,517	2/1968	Vichos	93—82
2,951,322	9/1960	Wood	93—20 X
3,415,171	12/1968	Wilson	93—82

FOREIGN PATENTS

1,311,341	10/1962	France.
-----------	---------	---------

WAYNE A. MORSE, JR., Primary Examiner

U.S. Cl. X.R.

53—28; 93—20