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 METHOD AND APPARATUS FOR PRODUCING AN UNKINKED TUBE
 FROM A WEB OF MATERIAL
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3,482,491

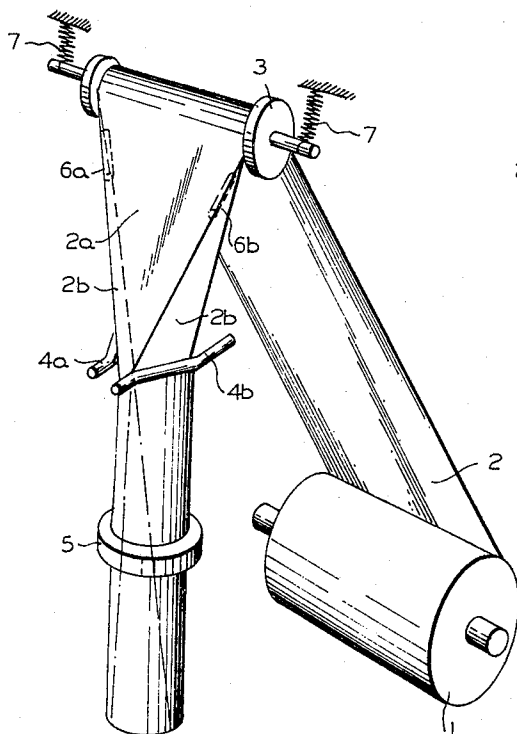


FIG. 1

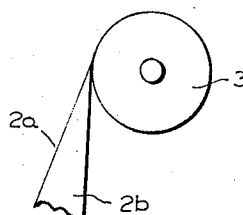


FIG. 2

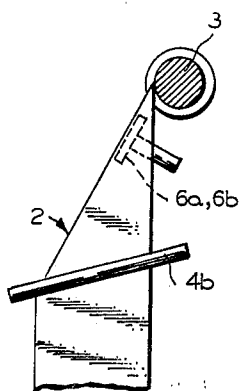


FIG. 3

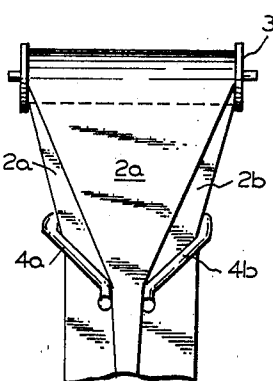


FIG. 4

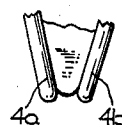


FIG. 5

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METHOD AND APPARATUS FOR PRODUCING AN UNKINKED TUBE FROM A WEB OF MATERIAL

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6 Claims

ABSTRACT OF THE DISCLOSURE

A method of producing an uninked tube from a web of material wherein the web is passed over a guide roller and then passed slidingly through a forming ring. The web after running over the guide roller and before entering the forming ring is passed through a gap between two deflecting elements. Guide means are provided for the web as it travels from the guide roller to the deflecting elements. The apparatus includes a substantially horizontally disposed guide roller with the forming means located below the roller comprising two deflecting rods spaced an average distance apart which is less than the diameter of the tube that is being formed. Such deflecting rods may be parallel or disposed at an angle to one another.

The present invention relates to the production of an uninked tube from a web of material, such as a paper and preferably from a web provided on one or both sides with a synthetic plastics coating.

Such a tube is used for instance for packaging purposes. To this end the raw material, i.e. the paper web, may be drawn off a supply roll located at the foot of the machine and taken over a cylindrical guide roller above. This guide roller deflects the paper web downwards. In a method known in the art the web is then passed through a hollow cylinder in which it is formed into a tube. Such a tube can be used for making packages, such as "Tetra packages," by providing the tube with transverse seams, but can also be used for other purposes.

This conventional method suffers from a number of major drawbacks. For instance on its way from the guide roller into the hollow forming cylinder the paper web must be guided, usually by relatively long guide rails or like means. In order to ensure that the originally flat paper web will deform satisfactorily into a cylindrical tube the path between the guide roller and the hollow forming cylinder must always be of considerable length. Moreover, the ability of the paper web to be deformed also depends upon any internal stresses in the material and these necessitate frequent readjustments.

The present invention seeks to overcome these defects. The method proposed by the present invention of producing an uninked tube from a stiff web of material consists in that, after having run over the guide roller and before entering a forming ring, the web is passed through a gap defined between two deflecting elements.

This arrangement is capable of satisfactorily and reliably forming the web, in a manner permitting of ready adjustment irrespectively of internal stresses in the web, the finished packaging being entirely free from undesirable kinks.

In order to ensure that the web of material lifts off the guide roller in a satisfactory way it is desirable to provide guide means for guiding the web of material between the guide roller and the deflecting elements.

The invention also relates to apparatus for performing the above proposed method. According to this aspect of the invention such apparatus comprises a substantially

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horizontally disposed guide roller and forming means located below said roller, the forming means comprising two deflecting rods spaced a mean distance apart which is less than the diameter of the tube that is to be formed.

The invention will now be further described, by way of example, with reference to the accompanying drawing, in which:

FIGURE 1 is a schematic representation of apparatus for forming a web of material into a tube, and

FIGURES 2 to 5 illustrate details of the apparatus shown in FIGURE 1.

With reference to FIGURE 1, a band-like web of material 2 is continuously withdrawn from a rotatable supply roll 1 which is mounted in fixed bearings. In view of its intended purpose as a package and the stresses which the web of material experiences during the forming process, the material should possess a certain degree of stiffness combined with a minimum tendency to crease and to tear. The material may therefore consist of a paper which has been coated on one or both sides with a synthetic plastics, preferably polyethylene or like synthetic which satisfactorily welds when subjected to heat.

The web 2 travels over a horizontal guide roller 3 from which it is drawn downwards to be formed into a tube. The material is deflected into the form of a tube by two deflecting rods 4a and 4b and a ring 5. The two roughly horizontally and relatively angularly disposed rods preshape the web to enable it easily to slide through the ring 5 to form the completed tube. The deflecting rods 4a and 4b do not make contact and in the illustrated embodiment their converging ends are extended in the form of two relatively spaced parallel terminal sections. This arrangement permits the rear arch formed by the material during its deflection freely to expand without the formation of a permanent crease.

Whilst the web 2 runs off the guide roller 3 the central portion 2a (FIGURE 2) of the web will lose contact with the roller surface before the two marginal portions 2b of which the edges will have already slightly curled. This may generate undesirable strain and mechanical stress in the web which can be avoided by the provision of two further guide members 6a and 6b. These guide members 6a and 6b may have the form of smooth cylindrical pins with well rounded edges, urged by gentle pressure against the two edges from the back of the web and thus operating slightly to lift the portion 2b (FIGURE 2) of the web off the roller. Instead of having the form of pins, the guide members 6a and 6b could also be constituted by free running, possibly lightly spring-loaded rollers.

FIGURE 3 is a vertical section of the apparatus illustrated in FIGURE 1 which more clearly indicates the position of the guide pins 6a and 6b at the back of the web 2 as well as the disposition of the deflecting rods 4a and 4b which are slightly inclined downwards out of the horizontal. Moreover FIGURE 4 shows that the deflecting rods are formed with two opposite bends. However, it would be quite feasible to use completely straight rods for guiding the rear arch at the back of the web between the ends of the rods, roughly as indicated in FIGURE 5.

When using deflecting rods 4a and 4b of the afore-described kind and as illustrated in the drawing, the web of paper sliding between the rods is substantially so deformed that its cross-section assumes at least roughly the shape of a V, the edge of the V being rounded without forming a kink. However, in some circumstances it may be useful to dispose the deflecting rods 4a and 4b in parallel, in which case the deformed web of paper will assume a roughly U-shaped cross-section.

Preferably the web material 2 will consist of a stiff paper web provided at least along one of its marginal

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zones with a coating of flexible material, such as a polyethylene foil. However, other materials that are resistant to kinking may also be used.

Generally, one or more pairs of sealing jaws will be provided below the ring 5 for the purpose of forming transverse seams. The periodical closing of these sealing jaws causes the travelling web of material 2 to be subjected to undesirable fluctuations in speed. In order to avoid this effect, or to reduce the same to tolerable proportions, the guide roller 3 may be resiliently suspended in such a way that it can somewhat yield when the web of material experiences increased tension. The resilient suspension may comprise the use of rubber or spring elements 7.

Preferably the deflecting rods 4a and 4b are so disposed that their relative spacing is easily adjustable.

I claim:

1. A method of producing an unkinked tube from a web of material comprising passing said web over a guide roller in a substantially vertical direction, preshaping the web by moving it between two mutually converging rod members and then passing said web through a circular forming ring to complete its tubular shape.

2. A method according to claim 1, in which the two edges of said web upon leaving said guide roller are slightly lifted by means of said two converging guide members.

3. Apparatus for producing an unkinked tube from a web of material comprising a substantially horizontally disposed guide roller, a circular forming ring arranged

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below said guide roller, a preshaping means located between said guide roller and said forming ring, said preshaping means comprising two mutually converging deflecting rods spaced a mean distance apart which is less than the diameter of the tube to be formed, said two deflecting rods being arranged in substantially the same plane with the ends of said rods spaced from one another to avoid kinking of the web material.

4. Apparatus according to claim 3, in which said deflecting rods are disposed relative to one another at an angle.

5. Apparatus according to claim 3, in which said two deflecting rods are parallel.

6. Apparatus according to claim 3, in which the ends of said two deflecting rods which extend away from said web of material are parallel.

References Cited

UNITED STATES PATENTS

2,555,758	6/1951	Noble et al.	93—82 X
2,856,742	10/1958	Ballard	93—82 X
3,195,428	7/1965	Tuma	93—82 X
3,296,770	1/1967	Wilson	93—82 X

BERNARD STICKNEY, Primary Examiner

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53—28; 156—203, 466