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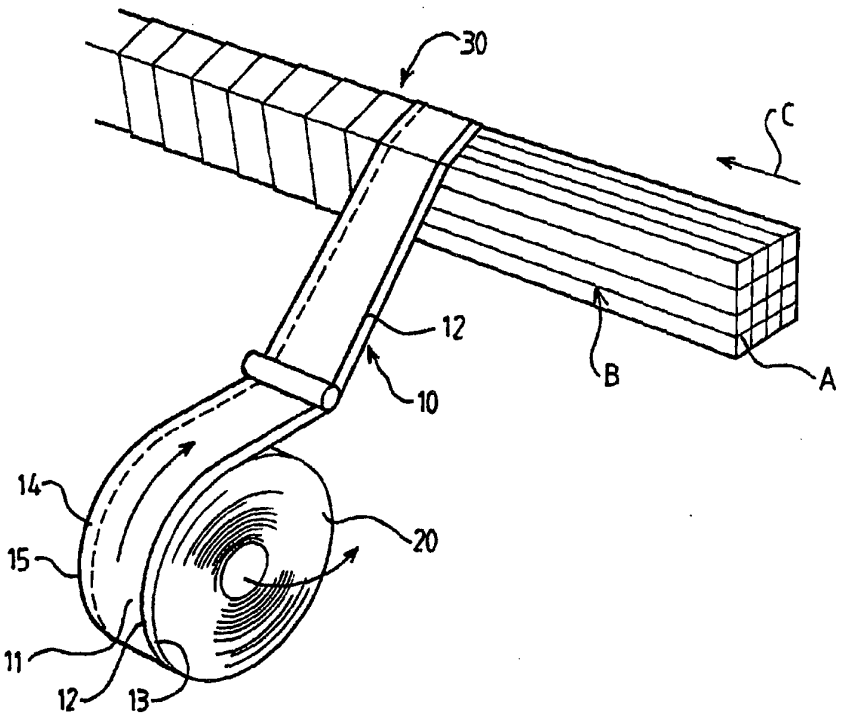
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(54) Title: WRAPPING MATERIAL AND METHOD OF WRAPPING ELONGATE ARTICLES

(57) Abstract

A flexible wrapping material for wrapping elongate articles by forming thereon a helical winding comprises a strip of flexible material (10) having on a first face (11) thereof adjacent to one longitudinal edge (13) of the strip a first band (12) of adhesive substance of a per se known kind which without the application of heat adheres strongly only to itself, and having a further band (14) of such adhesive material on the opposite face of the strip adjacent to the opposite edge (15), the two bands (12, 14) extending away from the respective edges (13, 15) of the strip, on opposite faces of the strip, towards, but preferably not up to the longitudinal centreline so that when formed into a helical wrapping around an elongate article the two bands come into face-to-face contact on adjacent turns of the winding. The adhesive substance is preferably carried by a strip of reinforcement material which is itself adhesively secured to the wrapping material adjacent to the edges (13, 15) thereof.



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Title: "Wrapping Material and Method of Wrapping Elongate Articles"

Description of Invention

This invention is concerned with the wrapping of elongate articles, such as pipes, rods, tubes or the like elements, which may be substantially straight throughout their length, or of curved or other non-linear form, or even in the form of a closed loop (for example a coil of wire), such elements being wrapped either singularly or in bundles.

The single element or bundle of elements may be at least partially enclosed in an inner wrapper of some kind, including for example a wrapping or winding of a soft material such as tissue paper or the like, a heavier paper material such as kraft paper, or other flexible material such as corrugated cardboard or sacking, or a relatively rigid container such as an elongated cardboard carton or sleeve, or a pre-formed container made for example of plastics material.

Throughout this specification, the term "elongate article" is used to refer to any such single elongate element, or bundle of such elements, with or without such an inner wrapper.

Conventionally, such elongate articles may be wrapped by means of one or more lengths of paper or the like which are wound helically around them using appropriate machinery, for example as shown in German patent specification No. 2,256,708, so that adjacent windings overlap somewhat. In many cases, such articles are relatively flexible, due often to their length which may be some 6 or 7 metres for example. As a result, flexing of the package gives rise to a tendency for adjacent turns of the wrapping material to separate, thereby exposing the elongate article to potential damage. Further, unwrapping such packages is problematic usually resulting in many short lengths of wrapping strip.

To reduce this tendency, it is often desirable for the adjacent windings to be adhesively secured together where they overlap. However, with conventional wrapping systems this requires the application of a liquid or flowable adhesive

substance, e.g. a glue, to the edge zone of the wrapping material as this is unrolled from a roll of stock wrapping material and laid onto the exterior surface of the elongate article being wrapped.

The provision of such gluing apparatus not only increases the cost of the machinery required, but has the additional disadvantage that supplies of an appropriate adhesive must be maintained, and moreover operational difficulties may be encountered in maintaining the gluing apparatus so that it functions properly under actual conditions of usage.

The use of wrapping materials coated with conventional adhesive materials of the kind which are tacky and adhere to most materials which are not specially treated has not generally been considered to be practicable because of the need for a release paper or the like between adjacent turns of the material in the roll on which it is supplied. It will be understood that the quantity of such wrapping material used will be matched by an equal quantity of discarded release paper which itself presents a disposal problem as well as representing an additional cost over and above the wrapping material and adhesive material actually used.

Further, whilst the exposure of the adhesive material to external contamination can be minimised by ensuring that the release paper is removed as close as possible to the point at which the wrapping material is applied to the elongate article being wrapped, nevertheless under conditions of practical usage there is a significant risk of contaminating material becoming attached to the tacky adhesive material during the wrapping process. Additionally, if any of the adhesive material remains exposed after the elongate article has been wrapped, this will rapidly become contaminated and cause the package to appear dirty and generally give a less than favourable impression.

One proposal which attempts, at least partially, to overcome such drawbacks is described in US patent specification No. 4,409,776. This involves using a wrapping material which has an adhesive coating on one face only and forming two layers of the wrapping material around the article, an inner layer in which the adhesive-coated face is presented outwardly and an outer layer in which the adhesive-coated face is presented inwardly. In this way, no adhesive material

contacts the wrapped article, nor is it exposed externally. However, this method has several disadvantages.

In particular, since two layers of wrapping material are required, it involves the use of twice the quantity of wrapping material than would otherwise be required by a single layer wrapping method. Moreover, in this proposal the second layer is specifically formed by reversing the direction of the wrapping machine whilst inverting the wrapping material, so that it is suitable for batch operation rather than continuous wrapping and takes at least twice as long as an equivalent single wrapping process. To adopt such method for continuous operation, it would be necessary to provide two wrapping machines, one for each layer, with consequent increase in capital and maintenance costs as well as extra space requirements.

A significant improvement on such prior wrapping techniques is represented by our prior British patent No. 2,233,956. This involves forming a helical wrapping around an elongate article using a wrapping material which carries on one face thereof a coating of a "cold seal" adhesive substance which will form a strong adhesive bond only with itself, one longitudinal edge portion of the material being folded over immediately prior to the wrapping material being laid on the article being wrapped so that the adhesive material on the turned over portion of one turn of the wrapping material comes into contact with the adhesive material at the opposite, non-turned over edge of the previous turn applied to the article being wrapped.

This arrangement has several advantages. Since the adhesive substance is formulated not to adhere to the uncoated surface of the wrapping material, it can be formed into a roll without necessitating the use of release paper. It can also be handled by wrapping machinery without difficulty, and will not adhere directly to the article being wrapped.

However, such method can itself have drawbacks. Firstly, modification of conventional wrapping machinery is necessary to incorporate a mechanism, albeit relatively simple, for folding over the edge of the wrapping material as it is drawn from the supply roll and applied to the articles being wrapped. Thus, the

modified wrapping machinery is not immediately available for use with conventional wrapping materials as may sometimes be required. Secondly, because the edge portion of the wrapping material is folded over, the effective width of the material is reduced and as a result a larger quantity of wrapping material is required than would be the case with un-folded wrapping material.

Additionally, the folded edge gives rise to a triple-thickness layer of wrapping material which forms a helical ridge along the length of the package formed, which may impede longitudinal sliding movement of such packages over one another, as may be required for example when loading the packages into, or unloading from, a delivery vehicle.

Moreover, in the preferred arrangement, the wrapping material is provided with a cold seal adhesive coating across its entire width since this provides effective water shielding over the entire wrapping and also improves the stability of the large rolls in which the material is normally supplied to users, which sometimes have a diameter above 1 metre. However, insofar as only marginal portions of the adjacent turns of wrapping material overlap and adhere to one another, a large proportion of the adhesive material applied to the wrapping material is effectively unused, and therefore represents an inefficient use of adhesive material with consequent cost penalties.

Additionally, if, as is preferred, the wrapping material is applied to the article being wrapped so that the adhesive-coated face is presented outwards (except at the turned-over margin), whilst such material will not readily adhere to other materials, adjacent packages formed by this method may adhere strongly together when stacked together for delivery, by virtue of the direct adhesive-to-adhesive contact. Such drawbacks can be largely eliminated by confining the adhesive material to the marginal zones of the wrapping material, but as mentioned above, due to the differing thickness of the wrapping material across its width as a result of the presence of the adhesive coating only in the marginal zones, a large roll of such material is less stable than one formed from material which is coated across its entire width because of the degree of flexibility imparted to the central region of the roll between axial end faces thereof in

consequence of the slight spacing of the uncoated portions of the wrapping material.

Accordingly, the object of the present invention is to provide an improved method of wrapping elongate articles which obviates or reduces such drawbacks, and a novel wrapping material for use in the method.

According to the invention, we provide firstly a novel wrapping material comprising a strip of flexible wrapping material having a first face thereof coated adjacent to only a first longitudinal edge of the strip with a band of adhesive substance of a per se known kind which without the application of heat adheres strongly only to itself, and having the opposite face thereof coated adjacent to only the opposite longitudinal edge of the strip with a further band of said adhesive substance.

The width of each of said bands is preferably not greater than, and more preferably is less than, half the width of the strip, the two bands not overlapping one another on respective faces of the strip. The two bands are preferably of substantially the same width as each other and symmetrically disposed about the longitudinal centreline of the strip.

The material may comprise any suitable grade of paper, reinforced if necessary, single or multiple-ply, crepe, corrugated, embossed, longitudinally or transversely compressed or plain. Other materials such as plastic films, metal foils or non-woven web materials may also be used where appropriate, as well as combinations of any such materials.

Many existing wrapping machines of the type in which such wrapping material is to be applied tend to subject the wrapping material to sudden tensions, thereby rendering it liable to tearing. To overcome this it is, of course, possible to utilise heavier weights of wrapping material, to strengthen the material or increase its tear resistance by methods such as creping or corrugating, but such methods give only a limited improvement and can be costly.

To achieve a satisfactory strength to make a wrapping material which is suitable for use with most types of current wrapping machinery, further strengthening is required, such as reinforcement by means of additional layers of

suitable materials, which may be films or plastics materials or fibres or the like. However, this also adds unacceptably to the cost of making such a wrapping material.

However, in accordance with a particularly preferred feature of the invention, the wrapping material is also specifically or additionally reinforced at its longitudinal edges, added reinforcement being confined to the longitudinal edge zones of the strip, at which tearing is mostly initiated.

By confining the reinforcement to such edge zones, the cost penalty is minimised, but because tearing is mostly initiated at an edge of the strip, localised reinforcement at such edges provides the required protection against tearing of the wrapping material during the wrapping operation.

Typically, the strip may have a width of between about 5cm and about 15cm and the width of each adhesive band may be between about 10% and 40% of the overall width of the strip.

The applied reinforcement may comprise plastic film, or fibrous material, woven or non-woven. Most conveniently, the reinforcement is applied in the form of a strip having a width of less than half that of the strip of wrapping material itself. At each edge, the reinforcement strip may be applied to the wrapping material on the face thereof opposite that at which the adhesive substance is applied at that edge, but preferably the reinforcement strip is applied on the same side of the wrapping material as that to which the adhesive substance is applied at the edge concerned.

Thus, the adhesive substance may be applied at least partially over strips of the reinforcement material at the opposed edges of the strip of wrapping material.

Preferably, the adhesive substance is carried by the reinforcement material.

Thus, in a particularly preferred embodiment, the adhesive substance may be formed as a coating on one face of a strip of reinforcement material, e.g. plastic film, the opposite face of which carries a contact adhesive whereby the strip is adhered to the wrapping material itself.

The invention further resides in a roll of wrapping material formed from a strip of such wrapping material.

More particularly, the invention further resides in a method of wrapping an elongate article by forming a winding of at least one strip of such wrapping material around said article so that successive turns of the strip overlap one another and in successive turns of the strip the adhesive band on one face of the strip comes into contact with the adhesive band on the opposite face of the previous turn of the strip.

The invention also resides in a strip of flexible material, for use as the reinforcement material in the manufacture of such a wrapping material, which has on one face thereof a coating of a contact adhesive whereby the strip may be adhered to said wrapping material and on the other face thereof a coating of an adhesive of a per se known kind which without the application of heat adheres strongly only to itself.

The invention is illustrated by way of example in the accompanying drawings, wherein:

FIGURE 1 shows a length of wrapping material in accordance with the invention;

FIGURE 2 illustrates the method of the invention schematically; and

FIGURE 3 is a schematic section through part of an article wrapped in accordance with the invention.

As illustrated in Figure 1, the novel wrapping material in accordance with the invention comprises a strip 10 of any appropriate flexible wrapping material, particularly crepe or corrugated paper, having on one face 11 thereof a first band 12 of adhesive material which extends from one longitudinal edge 13 of the strip towards, but preferably not up to, the longitudinal centreline of the strip. A further band 14 of adhesive material is provided on the opposite face of the strip to extend from the opposite edge 15 towards the longitudinal centreline of the strip, the arrangement being such that the two adhesive bands 12 and 14 preferably do not overlap in the central region of the strip on their respective faces.

The adhesive employed is a conventional "cold seal" adhesive which is of a kind that will, without the application of heat, only form a strong cohesive bond with itself.

Whilst the bands 12 and 14 of adhesive material may be applied directly to the strip 10, in accordance with a preferred feature of the invention, the adhesive material is formed as a coating on one face of a strip of reinforcement material, such as plastic film, the other face of which carries a contact adhesive by means of which the film is secured to the strip 10 of wrapping material adjacent to the edges 13 and 14 thereof.

In this way, the adhesive material can readily be applied to the wrapping material and at the same time the film on which the adhesive material is carried serves to provide local reinforcement of the longitudinal edge zones of the strip, precisely where it is most required to prevent the initiation of tearing, i.e. at the longitudinal edges of the strip of wrapping material.

Whilst the bands 12 and 14 of adhesive material are most conveniently applied to the strip 10 of wrapping material in this way, it will be appreciated that other arrangements are possible. Thus, for example, instead of utilising a film material for the reinforcement material, a fibrous material, woven or non-woven may be employed. Instead of utilising the reinforcement material as a carrier for the adhesive material, the reinforcement material may be applied to the strip of wrapping material prior to the application of the cold seal adhesive material, so that the latter at least partially overlies the reinforcement material. Alternatively, instead of applying the reinforcement material to the same face of the wrapping material as that to which the adhesive material is applied, the reinforcement material may be applied to the opposite face of the wrapping material at each of the edges concerned.

The wrapping material, as previously stated, may comprise any conventional wrapping material with sufficient elasticity, particularly as afforded by corrugation, creping, embossing or lateral compression. One material which may be employed with particular advantage is a laminated material comprising a first layer of paper adhesively bonded to a second layer, which may be paper,

other fibrous material such as a mat of randomly arranged short fibres, or a woven or non-woven fabric, the laminate subsequently being subjected, after the laminating adhesive has cured, to any suitable treatment to impart elasticity by reducing the planar dimension of the material in at least one direction by preferably between about 10 and 20%.

Such treatment may comprise compression of the laminate in the plane thereof in at least one direction, i.e. longitudinally and/or transversely, or corrugation in one or more lateral directions, or creping in one or more lateral dimensions, or embossing in one or more lateral directions so that the treated laminate is extensible in at least one direction, i.e. longitudinally of the strip 10, and preferably also transversely of the strip.

The strip 10 is formed into a supply roll 20 as illustrated in Figure 2, and it will be understood that in the roll 20 the adhesive band 12 at the edge 13 of the strip comes into contact only with the corresponding opposite, uncoated face of the strip adjacent to the edge 13 on adjacent turns, and that likewise the adhesive band 14 adjacent to the edge 15 comes into contact only with the uncoated margin of the face 11, so that the material may be freely rolled up and unrolled as required without the need for release paper.

Referring now to Figure 2, a bundle B of elongate articles A is advanced, for example by means of rollers (not shown) through a wrapping station in the direction indicated by arrow C. In the wrapping station, the roll 20 of wrapping material 10 is mounted on an annular member (not shown) which surrounds the bundle B and rotates as the bundle B is advanced through the wrapping station. Material is thus withdrawn from the roll 20 and wrapped around the bundle B to form a helical winding 30 in which adjacent turns of the wrapping 10 overlap.

In accordance with the invention, the adhesive band 12 on the outwardly directed face 11 of the strip 10 is brought into register with the adhesive band 14 on the inwardly directed face of the material of the next successive turn applied to the bundle B. Thus, the adhesive bands 12 and 14 come into contact where successive turns of the wrapping material 10 overlap to form a strong adhesive bond thereby causing adjacent turns to adhere firmly to one another under the

tension applied by the wrapping process. Rollers (not shown) downstream of the wrapping station may apply additional pressure to the wrapping in order to further ensure the bonding of successive turns of the wrapping material.

Whilst some tolerance can be allowed on the accuracy of the overlap between successive turns of the wrapping on the bundle B, in general substantially all of the adhesive material is effectively employed for the purpose of forming the required bonds between successive turns and little or no adhesive material is exposed externally of the package or internally allowed to contact the bundle B wrapped by the material. Thus, there is little or no tendency for the wrapped bundles to adhere to one another and such bundles may be slidden relatively freely over one another. However, if greater stability is required, a pattern of non-slip material could be applied to the non-adhered areas.

The features disclosed in the foregoing description, or the accompanying drawings, expressed in their specific forms or in the terms or means for performing the desired function, or a method or process for attaining the disclosed result, may, separately or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

CLAIMS:-

1. A wrapping material comprising a strip of flexible material having a first face thereof coated adjacent to only a first longitudinal edge of the strip with a band of adhesive substance of a per se known kind which without the application of heat adheres strongly only to itself, and having the opposite face thereof coated adjacent to only the opposite longitudinal edge of the strip with a further band of said adhesive substance.

2. A material accordingly to Claim 1 wherein the width of each of said bands of adhesive substance is not greater than half the width of the strip.

3. A material as claimed in Claim 1 wherein the width of each of said bands of adhesive substance is less than half the width of the strip, the two bands not overlapping one another on the respective faces of the strip.

4. A material as claimed in Claim 1 wherein the two bands of adhesive substance are of substantially the same width as each other and symmetrically disposed about the longitudinal centreline of the strip.

5. A material according to Claim 1 wherein the strip has a width between about 5cm and about 15cm.

6. A material according to Claim 1 wherein the width of each band of adhesive substance is between about 10% and about 40% of the overall width of the strip.

7. A material as claimed in Claim 1 comprising at least one layer of paper.

8. A material as claimed in Claim 7 wherein the paper is creped.

9. A material as claimed in Claim 7 wherein the paper is corrugated.

10. A material as claimed in Claim 7 wherein the paper is embossed.

11. A material as claimed in Claim 7 wherein the paper is compressed in the plane thereof longitudinally and/or transversely.

12. A material as claimed in Claim 1 wherein specific reinforcement is applied to the material and confined to the longitudinal edge zones of the strip.

13. A material as claimed in Claim 12 wherein the reinforcement comprises plastic film.

14. A material as claimed in Claim 12 wherein the reinforcement comprises a fibrous material.

15. A material as claimed in Claim 12 wherein the reinforcement comprises a woven or non-woven fabric.

16. A material as claimed in Claim 12 wherein the reinforcement is in the form of a strip having a width of less than half that of the strip of wrapping material.

16. A material as claimed in Claim 12 wherein the reinforcement is applied to the edge zone of the wrapping material on the face of the edge zone opposite that at which the adhesive substance is applied at that edge zone.

17. A material as claimed in Claim 12 wherein the reinforcement is applied to the edge zone of the wrapping material on the same face of the edge zone at which the adhesive substance is applied at that edge zone.

18. A material as claimed in Claim 17 wherein the adhesive substance is applied at least partially over said reinforcement material at opposed edges of the wrapping material.

19. A material as claimed in Claim 18 wherein the adhesive substance is carried by the reinforcement.

20. A material as claimed in Claim 19 wherein the adhesive substance is formed as a coating on one face of a strip of said reinforcement, the opposite face of which carries an adhesive whereby the reinforcement is adhered to the wrapping material.

21. A material as claimed in Claim 20 wherein the adhesive whereby the reinforcement is adhered to the wrapping material is a contact adhesive.

22. A roll of wrapping material formed from a strip of a material as claimed in any one of the preceding claims.

23. A method of wrapping an elongate article by forming a winding of at least one strip of a wrapping material as claimed in any one of Claims 1 to 21 around said article so that successive turns of the strip overlap one another and in successive turns of the strip the band of adhesive substance on one face of the strip comes into contact with the band of adhesive substance on the opposite face of the previous turn of the strip.

24. A strip of flexible material, for use as reinforcement in the manufacture of a wrapping material as claimed in any one of Claims 12 to 21 which has on one face thereof a coating of a contact adhesive whereby the strip may be adhered to said wrapping material and on the other face thereof a coating of an adhesive of a per se known kind which without the application of heat adheres strongly only to itself.

25. A wrapping material as claimed in Claim 1 and substantially as hereinbefore described with reference to and as shown in Figure 1 of the accompanying drawings.

26. A method of wrapping an elongate article as claimed in Claim 23 and substantially as hereinbefore described with reference to and as shown in Figure 2 of the accompanying drawings.

27. A strip of flexible reinforcement material as claimed in Claim 24 and substantially as hereinbefore described.

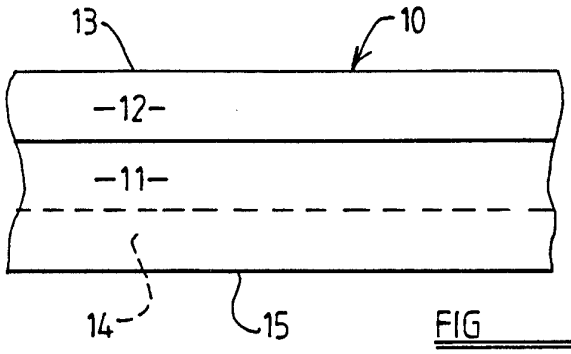


FIG 1

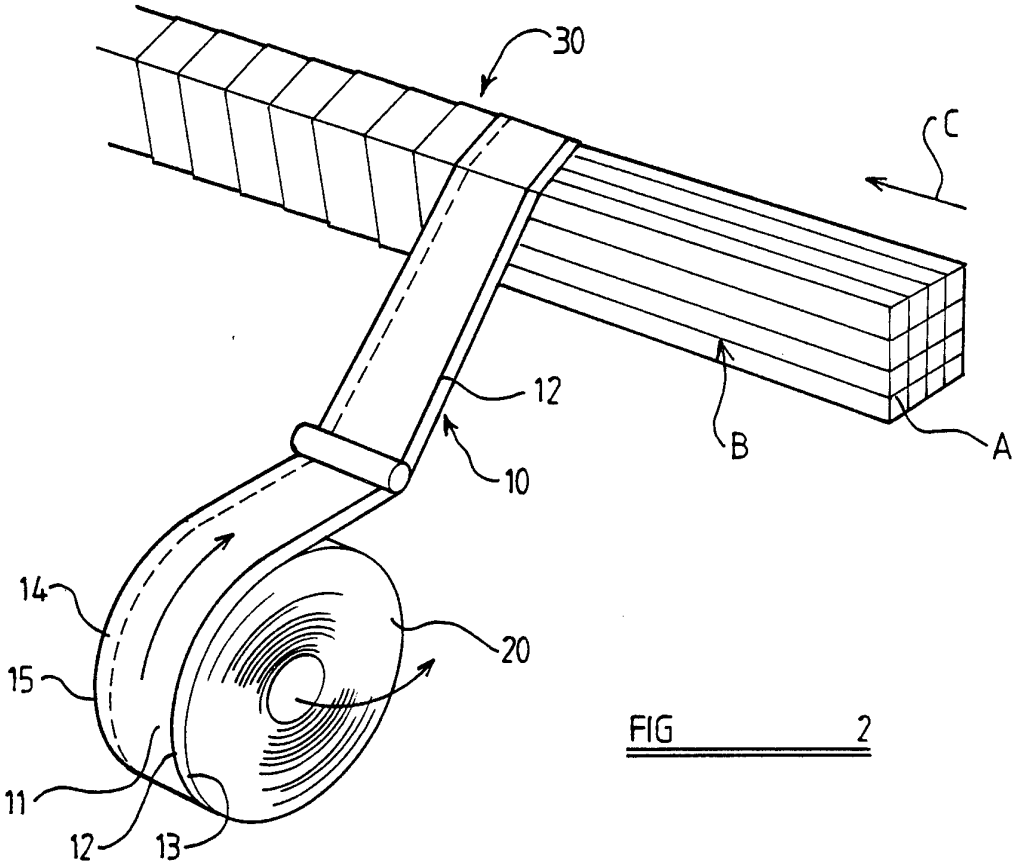


FIG 2

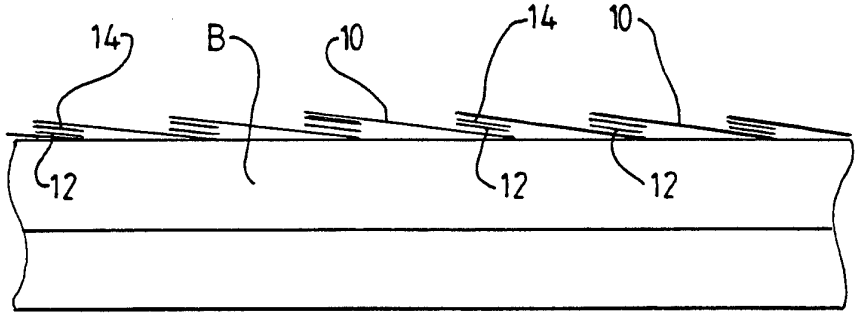


FIG 3