Nov. 30, 1937. A. N. SPÁNEL 2,100,577

METHOD AND APPARATUS FOR MAKING RELATIVELY LONG LENGTHS OF LATEX SHEETING

Filed March 9, 1936 3 Sheets-Sheet 1

Fig. 1

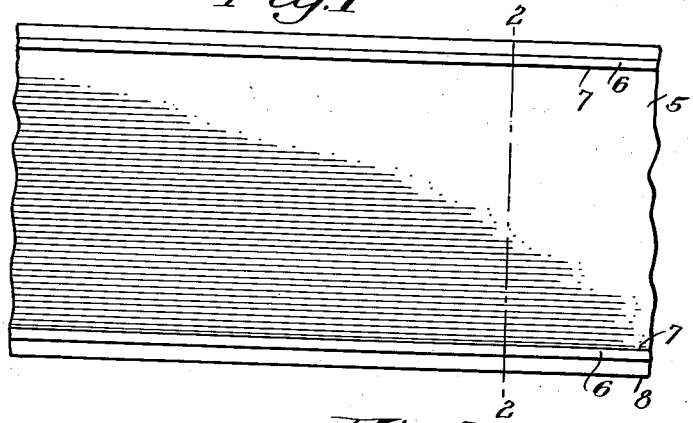



Fig. 2

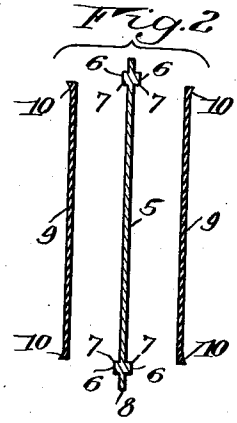



Fig. 3

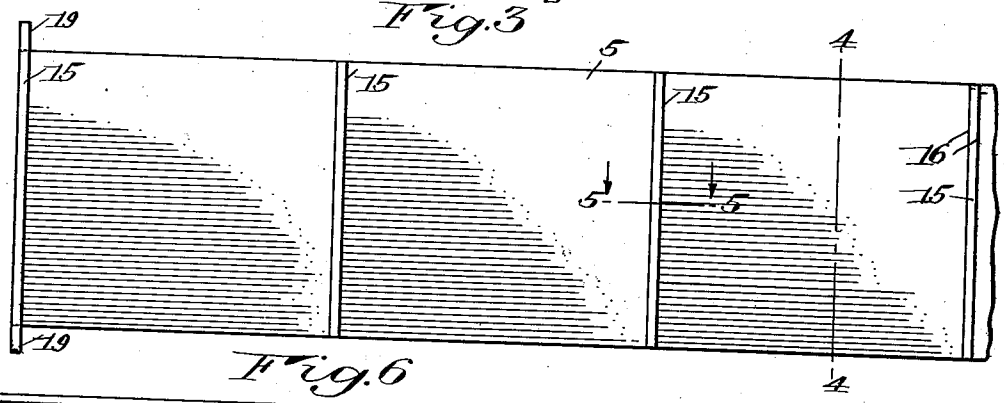



Fig. 6

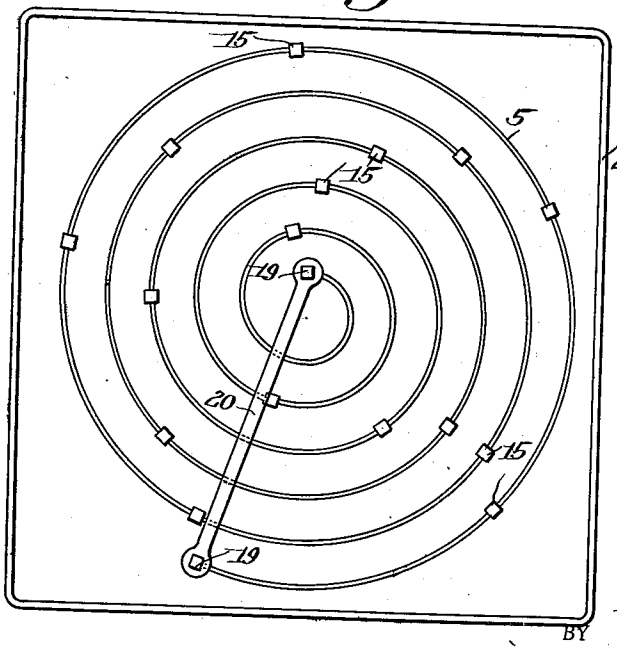



Fig. 5

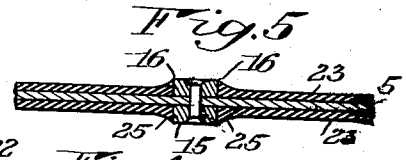
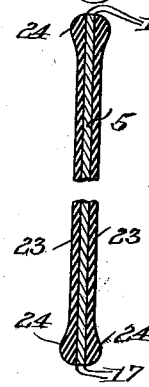



Fig. 4




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Nov. 30, 1937. A. N. SPÁNEL 2,100,577

METHOD AND APPARATUS FOR MAKING RELATIVELY LONG LENGTHS OF LATEX SHEETING

Filed March 9, 1936 3 Sheets-Sheet 2

Fig. 7

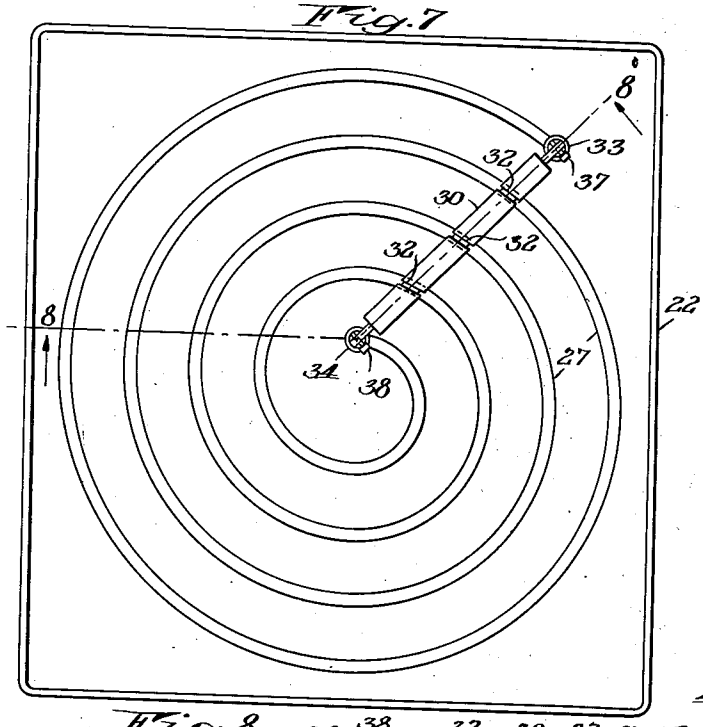



Fig. 9 Fig. 10

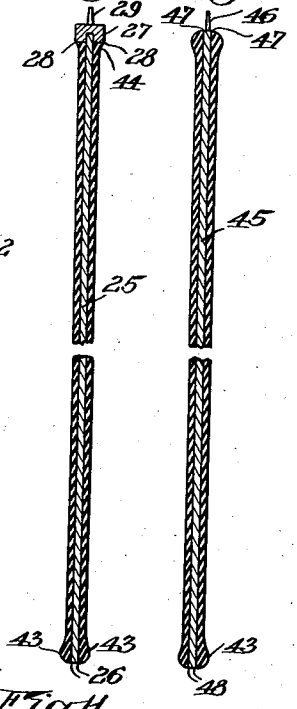



Fig. 8

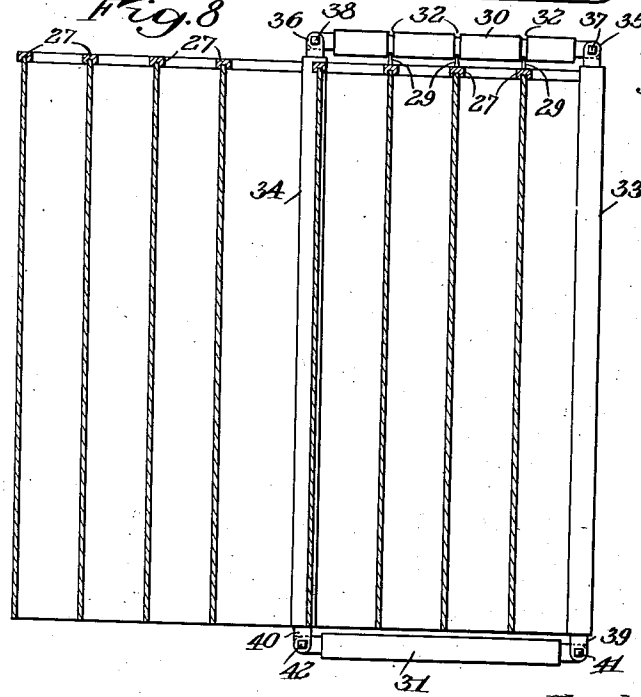



Fig. 11

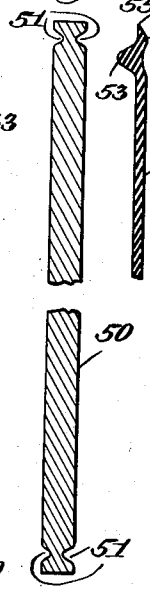
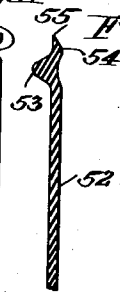



Fig. 12




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Nov. 30, 1937. A. N. SPÁNEL 2,100,577

METHOD AND APPARATUS FOR MAKING RELATIVELY LONG LENGTHS OF LATEX SHEETING

Filed March 9, 1936 3 Sheets-Sheet 3

Fig. 13

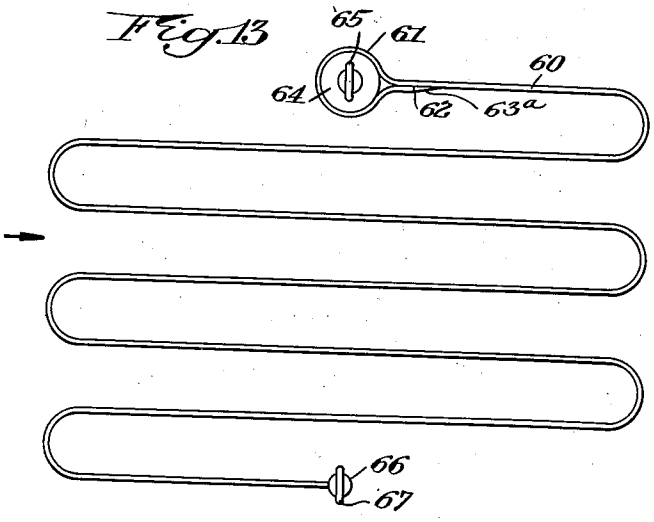



Fig. 15

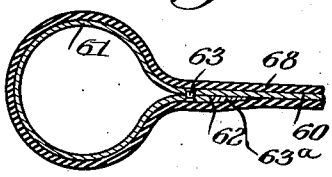
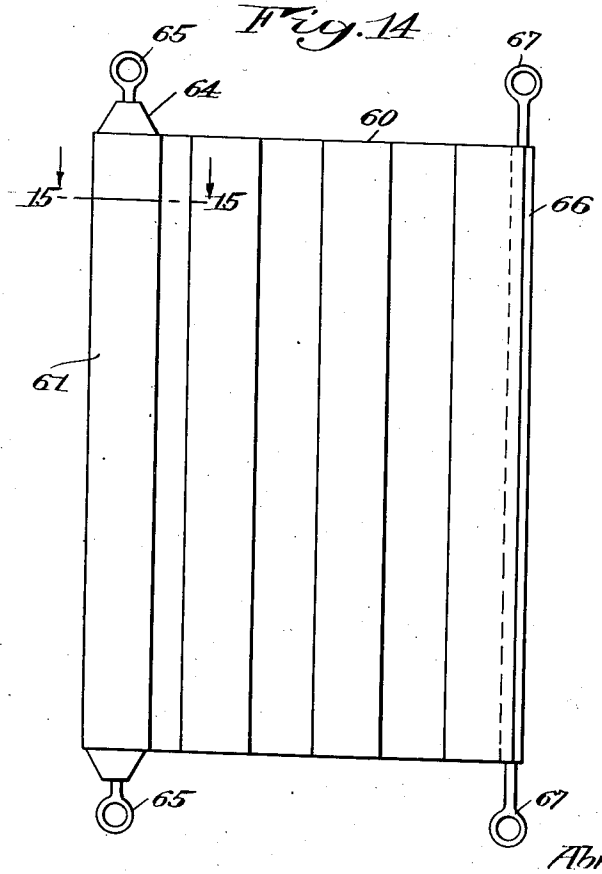



Fig. 14




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Patented Nov. 30, 1937 2,100,577

# UNITED STATES PATENT OFFICE

2,100,577

## METHOD AND APPARATUS FOR MAKING RELATIVELY LONG LENGTHS OF LATEX SHEETING

Abraham N. Spánel, Rochester, N. Y.

Application March 9, 1936, Serial No. 67,947

23 Claims. (Cl. 18—41)

This invention relates to a novel method of and to apparatus for making relatively long lengths of sheeting from liquid latex.

This application is a continuation in part of applicant's copending application Serial No. 740,141 filed August 16, 1934.

In the past it has been the practice to make long lengths of rubber sheeting by depositing rubber on one surface only of an endless flexible metal band passing around suitable guide rolls. Such equipment has been expensive to build and in addition has required a large amount of space to house it. Furthermore, sheeting deposited thereon has not been provided with integral reinforced edges or selvages and consequently the durability of the sheeting has been materially reduced.

In accordance with the main feature of the present invention, a novel method and simple inexpensive equipment has been provided whereby relatively long lengths of latex sheeting can be made economically, in a small space with low maintenance costs for equipment.

Another feature of the invention relates to the method of making relatively long lengths of sheeting from liquid latex and the like, which sheeting has reinforced edges.

An additional feature of the invention relates to the method whereby two relatively long lengths of sheeting can be made simultaneously on the same band or foundation.

A further feature of the invention relates to the method whereby a relatively long length of sheeting can be made having either identical edges or edges of two different types on its opposite margins.

Still another feature of the invention relates to a method whereby a length of sheeting can be made of double the length of the foundation on which it is deposited.

Other features and advantages of the invention will appear from the detailed description and claims when taken with the drawings in which Fig. 1 is a plan view of a fragment of a flexible band or belt on which latex sheeting can be deposited; Fig. 2 is a cross sectional view of this band taken on the line 2—2 of Fig. 1 and also illustrating in a position slightly displaced therefrom, cross sections of two strips of latex sheeting simultaneously deposited on the band; Fig. 3 is a plan view of a modified flexible band or foundation on which latex sheets reinforced on their four margins can be deposited as a relatively long strip; Fig. 4 is a fragmentary cross section of this band taken on the line 4—4 of Fig. 3 which band has a layer of latex thereon with reinforced margins, at each surface thereof; Fig. 5 is a cross section of this band with latex sheets thereon which section is taken on the line 5—5 of Fig. 3; Fig. 6 is a plan view of a receptacle to contain a latex bath having therein a foundation or band bent into spiral form, in which position it is held by suitable spacing and retaining means; Fig. 7 is a plan view of a receptacle to contain a latex bath also having therein a somewhat modified type of band wound into spiral form with the spacing means therefor; Fig. 8 is a sectional view taken on the line 8—8 showing the spirally wound band and the spacing means for the different turns of the same; Figs. 9 and 10 are cross sections of suitable bands having modified marginal reinforcement-generating means, said bands having a coating of latex deposited on each surface thereof; Fig. 11 is a cross section of a modified type of band or foundation and Fig. 12 is a cross section of a fragment of the latex layer and its marginal reinforcement deposited thereon; Fig. 13 is a plan view illustrating a different way of reducing the length of the band and showing an arrangement whereby a strip of sheeting which has double the length of the foundation can be deposited thereon; Fig. 14 is an elevation of this last-mentioned band, looking in the direction of the arrow of Fig. 13; and Fig. 15 is a sectional view taken on the line 15—15 of Fig. 14 showing ing a continuous layer of latex deposited on the rounded end of the band.

Referring especially to Fig. 1, the numeral 5 designates a flexible band made of stainless steel, aluminum or the like which can be in the form of a continuous loop or which can be of relatively long length, each margin of the strip being provided with a raised rib 6 having an abrupt edge or corner 7. It will be noted that each rib 6 is spaced a short distance from its adjacent edge of the band thereby providing fins 8 by which the margins of the band may be supported by suitable guide rolls or other supporting means.

In making sheeting on this band, a coating or layer of latex 9 is deposited on each surface of the band. It will be understood that the latex can be deposited as a layer 9 thereon, in various ways such as by dipping the band one or more times into an aqueous dispersion of rubber commonly known as latex, with a drying interval after each dip altho the invention is not limited to this manner of latex deposition. It will be understood that during the depositing operation the latex will accumulate as a reinforcement

10 in the junction between the band proper and each rib 6 while at the abrupt edges 7 of these ribs the layer will have a line of weakness developed therein, so that the excess portions of the layer on the faces of the ribs 6 can be stripped away leaving a sheet strip 9 having reinforced edges 10 as illustrated in Fig. 2. It will be appreciated that two such lengths of sheeting are simultaneously deposited, one being deposited on each surface of the band.

Instead of making relatively long strips of sheeting, the present method lends itself to the production of latex sheets or table covers and the like, having each of their four margins reinforced. In this instance the flexible band 5 which may be permanently in spiral form or else is wound and held in this form, will be provided with transverse ribs 15 spaced apart a distance equal to the desired width of the individual sheet or table cover. The ribs 15 are provided on each surface of the band and rise abruptly therefrom to terminate in an abrupt edge 16 (Fig. 5). The surfaces of the band at each margin may terminate in abrupt edges as illustrated at 17 in Fig. 4. The rib 15 at each end of the band is preferably provided with extensions 19 to prevent the edges of the band from contacting with the bottom of the receptacle containing the latex bath, into which the band is to be dipped. Before the band is dipped it is preferably wound into spiral form as illustrated in Fig. 6 and the rectangular end extensions 19 extending from each edge of the band are preferably engaged by a spacer 20 having a rectangular opening in each end thereof to receive a related pair of extensions. One such spacer is preferably fastened to the band at each edge thereof to maintain the spiral relation of the band so that adjacent surfaces will not contact each other. With the band thus wound into spiral shape it is dipped edgewise into the bath of latex contained in the receptacle 22. After the band has been immersed, it is withdrawn slowly from the bath and held with one of its edges in the lowermost position, so that the latex layer 23 thereon is provided with an accumulation of latex 24 adjacent the edge of the band. After a suitable drying interval the band may be dipped again with the same edge in the lowermost position or it may be inverted so that its other edge is in the lowermost position and then dipped into the bath. The band is then preferably removed slowly from the bath and permitted to drain and dry. The operations of dipping, draining, and drying may be repeated until the layer 23 on each surface of the band is of the desired thickness. During the dipping, the band should preferably be inverted a sufficient number of times so that the accumulations 24 will preferably be of equal size. Also during the dipping operation the latex will accumulate in the layer as transverse reinforcing ridges 25 (Fig. 5) in the junction between the band and each transverse rib 15, while the layer will have a line of weakness therein at each abrupt edge 16 of said ribs. When the layer has properly "set", the excess portions thereof between the two adjacent edges 17 is stripped away leaving two sheets 23 having margins reinforced by the accumulations 24. In order to remove the sheets from the band, the spacers 20 at each edge thereof are removed so that the band can be unwound, if it is the type of band which is designed for winding and unwinding. Otherwise the band remains in its wound condition permanently and the coating is pulled off after drying, leaving the band ready for repeating the process of depositing another sheet. When the excess layer (not shown) on the faces of the ribs 15 is torn away, individual sheets or table covers or the like of the desired size result, which have all of their marginal edges reinforced.

In Figs. 7, 8 and 9 a slightly modified arrangement for making latex sheeting is disclosed. In this instance, the form 25 at one margin, terminates in the abrupt edges 26 while its other margin is provided with a rib 27 having the abrupt edges 28. A fin 29 projects from the rib 27 in a direction parallel to the plane of the band. This band is also adapted to be wound into spiral form in which condition it is held by the spacers 30 and 31. The spacer 30 has formed therein spaced grooves 32 which receive the fin 29 on one edge of the band, to maintain the desired spacing between the spirals thereof. The ends of the band are provided with reinforcing bars 33 and 34 which at their upper ends are respectively provided with spaced ears 35 and 36 to receive pins 37 and 38 passing through the reduced ends of the spacer 30. The ends of the spacer 31 are likewise attached to the spaced ears 39 and 40 being retained by the pins 41 and 42. It will be noted that the lower edge of the band, as illustrated, is not provided with a fin and therefore the spacing bar 31 is not provided with grooves, since the grooves 32 in the upper bar 30 are sufficient to maintain the desired spiral arrangement of the different turns of the band.

In making sheeting on this band, after it is wound into spiral form as described, it is dipped edgewise one or more times into a bath of latex contained in a receptacle 22 wherein the band is dipped several times with a drying interval between each dip. With this type of band, it is unnecessary to repeatedly invert the band but it is merely necessary to submerge the band and rib 27 until the abrupt edges 28 are covered. During the dipping operation the latex layer will accumulate as a tapered edge indicated at 43 while in the junction between the band and the rib 27 the latex will accumulate as indicated at 44 as a generally triangular reinforcement. At the abrupt edges 26 of the rib, the latex layer will have a line of weakness therein whereby the excess portion of the layer on the faces of the rib can be torn away leaving the reinforcement 44 with a thin, torn or feather edge. After the latex layer is suitably dried or "set", the spacers 30 and 31 may be removed so that the band can be unwound, if it is designed to be wound and unwound, otherwise the band may be permanently wound. The excess portions of the layer on the faces of the rib 27 are torn away as far as the abrupt edge 28 and the excess portion of the layer between the adjacent abrupt edges 26 is also torn away. Thereafter, the sheet deposited on the surface of the band is suitably treated to prepare it for sale in the usual manner.

Instead of the band illustrated in Fig. 9 the band 45 of Fig. 10 may be used in the arrangement just described. This band at one of its edges is provided with spaced projections or fins 46 to be received and retained in the grooves 32 in the spacer 30. However, both edges of this band are provided with abrupt edges 47 and 48.

The operations of simultaneously depositing two lengths of sheeting on the surfaces of the band 45 may be identical with that just described, in that the band is wound into spiral form, temporarily or permanently, in which position it is retained by the spacers 30 and 31. This form is

likewise repeatedly dipped into a bath of latex contained in the receptacle 22 with a drying interval between each dip. When this type of band is employed, it is necessary to invert the band one or more times, so that each of its edges is successively in the lowermost position during the draining operation.

A further modified type of band 50 is illustrated in Fig. 11, which band may be wound into spiral form and retained in that position in the manner disclosed in Fig. 6. The band 50 is somewhat thicker than those previously described and in each margin of the band adjacent the edge thereof, there is provided opposing grooves 51 extending substantially throughout the length of the band. This band is adapted to generate a sheet 52 having a ridge 53 on one surface thereof near each margin of the sheet while the other surface of the sheet is provided with a ridge 54 which tapers to a wedge-shaped edge 55.

In Figs. 13, 14 and 15, a band 60 is disclosed on which there can be deposited a latex sheet having a length at least equal to twice the length of the band. This band may also be made of stainless steel, aluminum or like material and one of its ends is formed into a loop 61 with the end margin adjacent the edge 62 thereof attached to the body of the band as by welding or by riveting 63 or other suitable means, so that the exposed surfaces of the band at this point are smooth. The recess between the edge 62 of the band and the body thereof is filled with solder or like material 63 (Fig. 15) so that there will be no uneven surface at the junction between these parts. The loop 61 is adapted to receive a rod 64 which is frictionally held within the loop. The ends of this rod preferably terminate in eyelets 65. The other end of the band is provided with a reinforcing bar 66 which also terminates in eyelets 67. While this band may be wound in spiral form as indicated especially in Figs. 6 and 7, it may also be looped back and forth upon itself as indicated at Fig. 13, the looped relation of the band being maintained by suitable spacers (not shown) engaging the adjacent eyelets 65 and 67.

Latex sheeting may be deposited on this band when it is wound in spiral form or wound back and forth upon itself, by dipping the band edgewise into a bath of latex one or more times. The band is withdrawn slowly from the latex and is permitted to drain to form a reinforcing edge at one margin of the band. Next, the band is inverted with the other edge in the lowermost position and again immersed into the latex bath and withdrawn slowly therefrom. The dipping and draining is repeated until a layer of latex of the desired thickness is deposited on the surfaces of the band. After the latex has set, the band may then be unwound (if it is that type of band) and the resulting latex sheeting 68 is removed from the surfaces of the band. It will be noted especially from Fig. 15 that this layer of latex is continuous about the loop 61 from one surface of the band to the other, so that the resulting latex sheeting will have a length at least equal to twice the length of the band. It will be understood that the band may be provided with any of the reinforcement-generating margins herein disclosed.

The terms "winding", "bent" and "folded" are intended to cover any arrangement of the band whereby its overall length is less than its actual length.

The procedure of manufacture may utilize precured liquid latex, compounded latex or uncompounded latex. The deposition may be carried out by straight dipping, by acid coagulation or by spraying.

The present disclosure is given merely by way of example and it will be understood that there can be many modifications and variations therein within the scope of the appended claims without departing from the spirit of the present invention.

What I claim is:

1. The method of making latex sheeting which comprises providing a relatively long band folded back and forth upon itself in spaced relation to reduce its overall length, dipping the band edgewise into a bath of latex, inverting the band and dipping the same edgewise into a bath of latex to deposit a layer of latex thereon, drying the latex, parting the layer of latex at each edge of the band, and removing the resulting portions of the layer from the band.

2. The method of making latex sheeting which comprises providing a relatively long band folded back and forth upon itself in spaced relation to reduce its overall length, coating the band, drying the coating, inverting the band, again coating the band, drying the coating and removing the resulting coating from the band.

3. The method of making latex sheeting which comprises providing a relatively long band folded back and forth upon itself in spaced relation to reduce its overall length, coating the band, drying the coating, inverting the band, again coating the band, drying the coating and vulcanizing the same before or after removing it from the band.

4. The method of making latex sheeting, which comprises providing a relatively long band having abrupt edges extending lengthwise thereof, said band being bent to reduce its overall length, depositing latex on the band, causing the latex to drain toward one abrupt edge of the band, again depositing latex on the band, causing the latex last deposited to drain toward the other abrupt edge of the band, drying the latex, and removing the deposited latex from the band.

5. The method of making latex sheeting, which comprises providing a relatively long band having abrupt edges extending lengthwise thereof, said band being bent to reduce its overall length, depositing latex on the band, causing the latex to drain toward one abrupt edge of the band, drying the latex, again depositing latex on the band, causing the latex last deposited to drain toward the other abrupt edge of the band, drying the latex, and removing the deposited latex from the band.

6. The method of making latex sheeting, which comprises providing a relatively long band having raised borders with abrupt edges extending lengthwise thereof, said band being bent to reduce its overall length, depositing latex on the band, and causing the latex to drain toward one border of the band, again depositing latex on the band, causing the latex last deposited to drain toward the other border of the band, drying the latex, and removing the deposited latex from the band.

7. The method of making latex sheeting, which comprises providing a relatively long band having raised borders with abrupt edges extending lengthwise thereof, said band being bent to reduce its overall length, depositing latex on the band, and causing the latex to drain toward one border of the band, drying the latex, again depositing latex on the band, causing the latex last deposited to drain toward the other border of the

band, drying the latex, and removing the deposited latex from the band.

8. The method of making latex sheeting, which comprises providing a relatively long band having reinforcement-generating portions on each long margin thereof, said band being bent to reduce its overall length, depositing latex on the band, causing the latex to drain toward one mentioned portion of the band, again depositing latex on the band, causing the latex to drain toward the other mentioned portion of the band, drying the latex, and removing the deposited latex from the band.

9. The method of making latex sheeting, which comprises providing a relatively long band having reinforcement-generating portions on each long margin thereof, said band being bent to reduce its overall length, depositing latex on the band, causing the latex to drain toward one mentioned portion of the band, drying the latex, again depositing latex on the band, causing the latex to drain toward the other mentioned portion of the band, drying the latex, and removing the deposited latex from the band.

10. A form for making latex strips which comprises a relatively long winding band, said band having oppositely disposed free ends one of which terminates in a curved portion uninterruptedly connecting one surface of the band with the other.

11. A form for making deposited strips which comprises a relatively long band having portions thereof looped back and forth on itself in spaced relation.

12. A form for making deposited strips which comprises a relatively long band having portions thereof looped back and forth on itself in spaced relation, and means for retaining the band in the mentioned looped condition.

13. A form for making deposited strips which comprises a relatively long band, a surface of the band at one end thereof being connected to the other surface of the band by a looped portion of the band.

14. A form for making deposited latex strips comprising a relatively long winding band having means adjacent each of its long margins for developing thickened margins on the deposited latex strip.

15. A form for making deposited latex strips comprising a relatively long winding band having a raised border adjacent at least one of its long margins for developing a thickened margin on the deposited latex strip.

16. A form for making deposited latex strips comprising a relatively long winding band having a raised border on each of its long margins for developing thickened margins on the deposited latex strip.

17. A form for making deposited latex strips comprising a relatively long winding band having a groove formed adjacent at least one of its long margins to develop a thickened margin on the deposited latex strip.

18. A form for making deposited latex strips comprising a relatively long winding band having a raised border on one of its long margins and having its other long margin terminate in an abrupt edge for developing thickened margins on the deposited latex strip.

19. A form for making deposited latex sheets, said form comprising an elongated strip having an enlarged rounded portion at one end of the strip uninterruptedly connecting one surface of the strip with the other.

20. The method of making latex sheeting which comprises providing a relatively long band bent upon itself in spaced relation to reduce its overall length, dipping the band edgewise into a bath of latex to deposit a layer of latex thereon, inverting the band and dipping the same edgewise into a bath of latex to deposit a layer thereon, drying the deposited latex, parting the latex at the edge of the band, and removing the resulting portions of the layer from the band.

21. The method of making latex sheeting which comprises providing a relatively long band bent upon itself in spaced relation to reduce its overall length, dipping the band edgewise into a bath of latex to deposit a layer of latex thereon, drying the deposited latex, inverting the band and dipping the same edgewise into a bath of latex to deposit a layer thereon, drying the additionally deposited latex, parting the latex at the edge of the band, and removing the resulting portions of the layer from the band.

22. A form for making strip latex sheeting by dipping, comprising a band having at its upper margin a reinforcement-generating means consisting of a projecting border so positioned as to retain a reinforcing mass of the latex at the edge of the resulting strip.

23. The method of making latex sheeting which comprises providing a relatively long winding band on which latex will adhere, depositing a layer of latex on a surface of the band while simultaneously developing, as a result of said band, an integral reinforcement of latex on each margin of the layer, and unwinding the latex layer from the band.

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