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H. G. OSBURN

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BINDING STRIP

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Fig. 1.

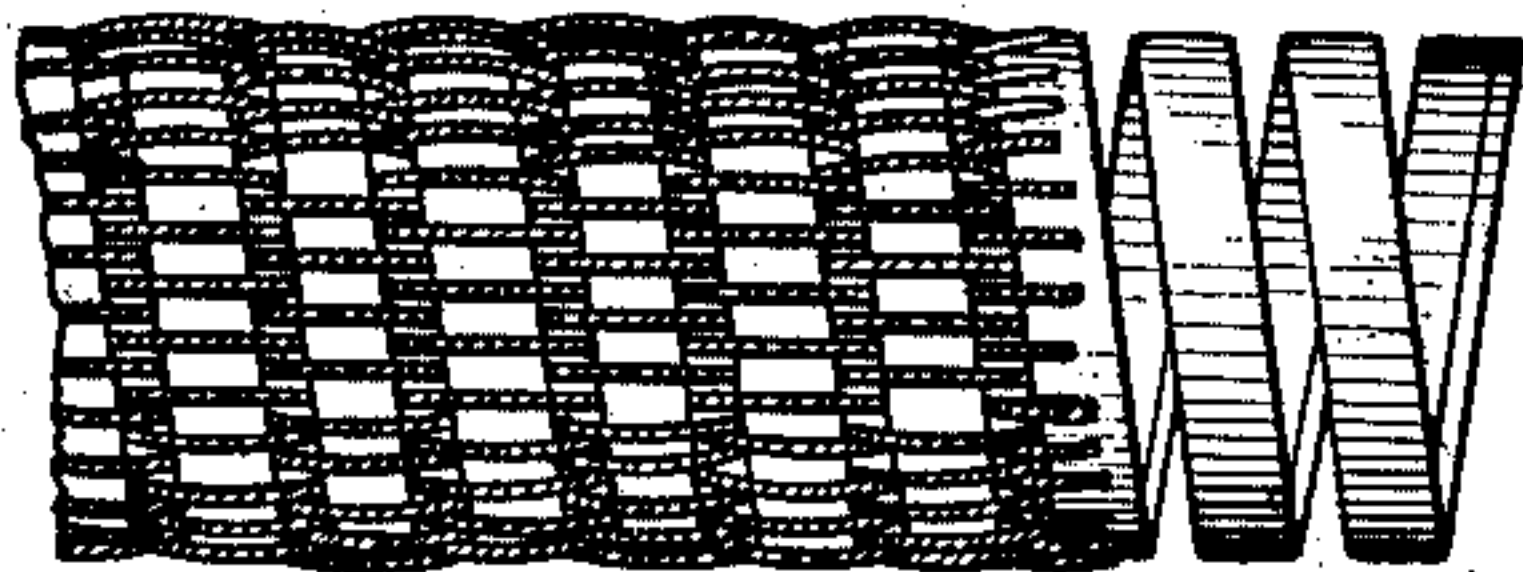


Fig. 2.

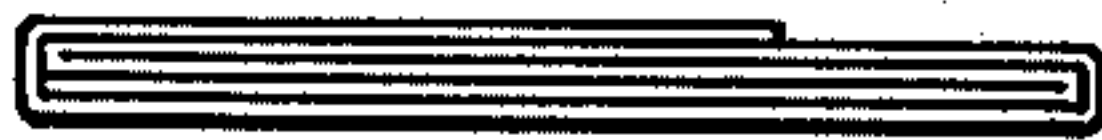


Fig. 3.

10



Fig. 4.

10



Fig. 5.

10



Fig. 3a.

10a



Fig. 4a.

15

10a



Fig. 5a.

10a



Fig. 3b.

11



Fig. 4b.



Fig. 5b.

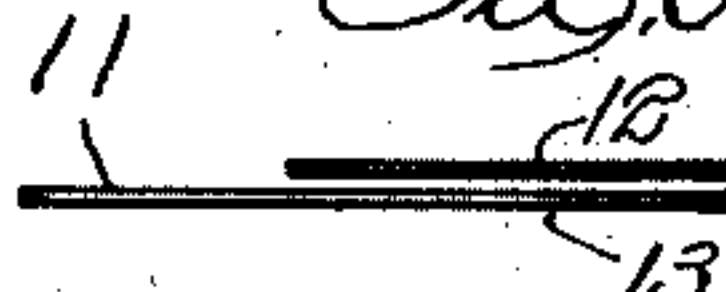


Fig. 3c.

14



Fig. 4c.



Fig. 5c.



Fig. 3d.



Fig. 4d.



Fig. 5d.



Fig. 3e.



Fig. 4e.



Fig. 5e.



Fig. 3f.



Fig. 4f.



Fig. 5f.



Fig. 6.



Witness:
a. a. Brand

Inventor:
Harry G. Osburn
By Jones Addington Ames & Sulist
Attys.

UNITED STATES PATENT OFFICE

HARRY G. OSBURN, OF OWOSSO, MICHIGAN

BINDING STRIP

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My invention relates to an improved form of foundation ribbon or strip and the method of making the same, and it has particular relation to the provision of such a strip or ribbon which can be used in making electrical conduits, artificial cane furniture, and the like.

I will hereinafter describe an improved conduit in which my novel ribbon is employed in order to illustrate one method of using said ribbon, but it is to be understood that other uses of the same contemplate its employment as artificial cane in furniture, and the like. Conduits of the type hereinafter described usually comprise a helically disposed semi-flexible ribbon or strip of material. Interwoven with this strip, in some forms, are fibrous, flexible members, which give longitudinal strength to the conduit and prevent the helical member from being pulled out or disrupted. In the past the ribbon or strip member has been formed of paper or analogous material and has been utilized in a number of different ways. Thick paper or cardboard has been cut into narrow strips, but this has been an uneconomical practice because, in order to obtain the requisite strength in the thick and narrow strips of paper, it was necessary to use a specially made paper. Obviously, the employment of a special paper strip greatly increased the cost of production.

Another form of strip comprised a round twisted member of paper. Here again it was difficult to obtain a uniform strength unless the member became so large as to make the wall of the conduit too thick. Again, in an attempt to eventuate a suitable foundation member such a round twisted strip has been flattened. However, this latter strip also has disadvantages from a production or commercial standpoint. Among the chief of these is that the flattening of the strip tends to weaken it. Moreover, when such a twisted, flattened strip is used as the foundation upon which the body of the conduit is woven, stresses are set

up by the weaving which cause the aforesaid twisted paper to tend to resume its original normal cross-section, which is more or less circular. This results in a very unsatisfactory condition, particularly in a thin-walled conduit. The manner in which my invention overcomes this difficulty will be more clearly understood upon reading the hereinafter description.

It is my purpose to utilize a novel form of ribbon or strip in connection with conduits of this character, said strip being composed of longitudinally folded material, and for purposes of illustration, I shall hereafter refer to such material as paper. It should be understood, however, that I do not intend to limit myself to paper, since other material having analogous characteristics may be used.

When a helically interior member is formed of a strip or folded paper, in contradistinction to a single flat strip or a twisted paper strip, several advantages result. Of course, a flat strip does not always have the requisite strength necessary in a member of this kind. Again, as above indicated, a ribbon composed of twisted paper, which must of course be flattened in order to function as a central foundation, tends to resume its original substantially circular or oval cross-section, as soon as the fibrous, cotton material, which is interwoven in the conduit, is pulled taut. When my improved folded strip is used, however, it is possible to make a much thinner folded tube, and much less material is used when thin paper is folded to eventuate by ribbon.

Not only, therefore, is a thinner-walled and better conduit obtained when my strip is used, but an appreciable reduction in expense is obtained. In this connection ordinary stock paper may be used, such for instance, as craft wrapping, bag, or any of the common wrapping papers which are sold in rolls. It should also be pointed out that the paper used in a twisted ribbon must be of a special twistable type of paper which is much

softer than common wrapping paper, and has, therefore, the disadvantages inherent in such paper.

A more uniform production is obtained from the use of folded paper than by first twisting and thereafter flattening, and in fact my improved strip resembles cane in density and as before indicated, is used as artificial cane or the like in connection with furniture. In this regard I believe my improvement comprehends a legitimate sub-combination when used in this latter respect, and I have hereafter directed claims thereto.

Again, as I hereinafter point out, I fold my strip in a particular manner which admits of the use of adhesive on the paper in an improved fashion. If it is attempted to fold paper in the ordinary way, as by making a roll of it, extending longitudinally, the dies inevitably become covered with the adhesive with the resultant appreciable decrease in the speed of manufacture, as well as in the increased difficulty of cleaning the dies. As I hereafter point out, the adhesive need only be placed on one side of my strip during its manufacture, and this on the upper side, whereby certain advantages are eventuated. I will describe in detail the aforesaid advantages when describing the processes which I employ in making my improved ribbon.

I further contemplate the insertion of reinforcing elements such as cotton, jute string, silk, or linen, wire, etc., between the folds of my ribbon whereby greater permanent strength is imparted to the strip and, therefore, additionally contributes to its advantageous use in connection with flexible conduits. This is particularly true when the latter is used in a damp place, or where moisture is present in the air, since the helical member then holds better, particularly in a single-walled tubing.

For a better understanding of my improved conduit ribbon and the process of making it, reference may be had to the accompanying drawing in which:

Figure 1 is a view, partially in section, of a conduit embodying my invention, the portions being somewhat exaggerated to more clearly illustrate the same;

Figure 2 is an enlarged cross-sectional view of the end of my strip;

Figs. 3, 3^a, 3^b, 3^c, 3^d, 3^e and 3^f are diagrammatic elevational sectional views illustrating the various steps in the process whereby my improved strip is made;

Figs. 4, 4^a, 4^b, 4^c, 4^d, 4^e and 4^f are like diagrammatic views illustrating the steps in the process of forming my strip when reinforcing element is inserted between the folds thereof;

Figs. 5, 5^a, 5^b, 5^c, 5^d, 5^e and 5^f inclusive are likewise diagrammatic views illustrating the process of making my improved strip when

the reinforcing element is inserted between the folds in a different manner from that outlined in Figs. 4 to 4^f inclusive; and

Fig. 6 is an illustration of an improved form of my strip.

On all of the above figures the thickness of the strip is of necessity exaggerated in order to illustrate the method of folding.

I will first, for the purpose of convenience, describe the manner in which I form my improved strip, since this description will also convey to those skilled in the art the form of the finished article of manufacture.

Referring, therefore, first to Figs. 3 to 3^f inclusive, the end of a flat strip of material 10 is shown in elevation. This strip may be fed through a machine having dies therein to cause the various folds hereinafter described, said machine also containing scoring wheels to score said strip at the desired points.

However, I am not claiming the machine for making the strip or conduit in this application, such subject-matter being reserved for inclusion in a copending application. In the present application it is my intention to cover the article and process of making the same.

I may apply adhesive, and preferably do, at the point in my process illustrated in Fig. 3, or may do so at the next step, as illustrated in Fig. 3^a.

The next step in my process consists in running a scoring wheel, or other scoring instrument, relatively to the longitudinal dimension of the strip and on an off-center line of the latter so that when said strip is folded over onto itself to eventuate a two-ply folded portion, as shown in Fig. 3^b, a free margin 11 will be left outside of the two plies 12 and 13 of the folded portion.

The strip in the condition shown in Fig. 3^b is next progressed relatively to another scoring instrument which scores the two-ply folded portion at substantially the middle thereof, as at 14 in Fig. 3^c.

The strip next passes through a die which folds the two-ply portion over onto itself, as shown in Fig. 3^d whereby the ribbon, in cross-section at this stage of the process, presents a four-ply portion, in which the two central plies have their junction very close to the junction between the two outer plies, as shown in Fig. 3^d.

The free margin 11 is also as shown in this latter figure. The next die, or other analogous operating element whereby my process is practiced, folds said margin over onto the four-ply portion and, since adhesive was initially applied to the inside portion of said margin, it having been folded over as shown in Fig. 3^d, secures all of the folds together.

Finally the ribbon in the form shown in Fig. 3^e passes through pressure rolls, or anal-

ogous instrumentalities, which more firmly compress said flat ribbon and give it the final thin folded form shown in Fig. 3^r.

The ribbon in the form of Fig. 3^r is then arranged in a helical manner and fibrous elements are interwoven therewith, as shown in Fig. 1, whereby an electric conduit having the advantages hereinbefore outlined is eventuated.

As before indicated, I may insert reinforcing elements between the folds of my paper ribbon and the process whereby this is accomplished is outlined in Figs. 4 to 4^r, inclusive.

Referring to Fig. 4, the flat strip is again covered with adhesive and is scored at 10^a, as before. A reinforcing element 15 comprising one or more strips or strings of the material heretofore indicated, is then laid on the upper surface of the strip at the point shown, or to the left of the scoring 10^a, relative directions, of course, being used for illustrative purposes only. The various steps outlined in connection with the non-reinforced ribbon are then proceeded with, whereby a ribbon having a cross-section as shown in Fig. 4^r is eventuated, which ribbon may be used as above indicated with distinct advantage in a single wall conduit or where there is a moisture present which might tend to affect the ribbon where paper alone is employed.

In Figs. 5 to 5^r inclusive, I have illustrated what may at times be a preferred process of inserting the reinforcing element. In this latter process, the said reinforcing element is arranged between the two central plies of the folded paper and is, moreover, firmly fixed therein by reason of said disposition.

Referring to Figs. 5 to 5^r inclusive, the first three steps of the process are substantially the same as when a non-reinforced ribbon is formed. However, as shown in Fig. 5^c, the reinforcing elements are laid upon the two-ply portion and to the left of the scoring mark on said portion. When, therefore, the two-ply portion is turned over upon itself as shown in Fig. 5^d, the reinforcing elements are between the two central plies.

My process additionally contemplates the application of adhesive to the reinforcing elements as they are laid onto the strip. Because of this fact, adhesive is carried in between the central plies of the folded ribbon whereby said plies are secured firmly together, as well as to the reinforcing element, as shown in Fig. 5^d.

It will, therefore, be apparent, remembering that adhesive was originally applied to the top surface of the strip before any folding, that all of the plies are cemented to each other and to the reinforcing element, a result, which so far as I am aware, is impossible of attainment unless the strip is folded as contemplated by my invention, since other-

wise it would be necessary to apply adhesive to both sides of the strip, whereby the dies and other portions of the machine would become sticky and the speed of operation would be materially slowed up. This latter ribbon may of course be also employed in a conduit as indicated, and when so employed eventuates a conduit of decidedly improved characteristics as regards strength, decreased use of material, and low cost.

In Fig. 6 I have shown a reinforcing element wrapped with a helically disposed serving of paper to eventuate a strip which is quite useful especially as an artificial cane in the manufacture of furniture or the like.

While I have described a plurality of embodiments of my invention, it is apparent that many modifications therein may occur to those skilled in the art, and I desire that the same be limited only by the scope of the prior art and by the appended claims.

Having described my invention what I claim as new and desire to secure by Letters Patent of the United States is:

1. As a new article of manufacture, a ribbon composed of a strip of flexible material, said strip being folded longitudinally of the length thereof partly upon itself twice in the same direction to form a folded ribbon comprising four plies, and the remaining portion being folded over on top of said four plies to secure the folds together and eventuate a five ply ribbon.

2. As a new article of manufacture, a ribbon composed of a strip of flexible material, said strip being folded partly upon itself twice longitudinally of the length thereof, a securing portion being left during said folding with which the folds of said ribbon are secured together.

3. As a new article of manufacture, a multiple-ply ribbon composed of a strip of paper folded longitudinally of its length and having a reinforcement consisting of a continuous fibrous material contained between two of the inner plies of said folded paper strips.

4. As a new article of manufacture, a multiple-ply ribbon composed of a strip of paper folded longitudinally of its length to eventuate five plies, and a flexible reinforcement member inserted centrally of the plies of said ribbon.

5. The method of forming a multiple-ply flexible ribbon which comprises twice folding a strip of material in a direction longitudinally of itself at a point to one side of the center line of said strip, thereby leaving a free margin, and thereafter folding said margin over on top of said folded portion to secure the folds together.

6. The method of forming a multiple-ply flexible strip which comprises folding a strip of material in a direction longitudinally of itself, at a point to one side of the center line of said strip, thereby leaving a free margin,

then again folding said first folded portion on substantially the center line of said first folded portion, to eventuate a four-ply ribbon, and thereafter securing said margin over the top of said plies.

7. The method of forming a multiple-ply flexible ribbon which comprises longitudinally scoring a strip of material of an off-center line of said strip, folding said strip upon itself on said scoring thereby leaving a margin, scoring said two-ply portion of said strip at substantially the center line thereof, folding said two-ply portion upon itself at said last scoring to eventuate a four-ply portion, and turning said margin up and over said multiple-ply portion to secure the folds thereof together.

8. The method of forming a multiple-ply flexible strip which comprises applying an adhesive to one surface of a strip of material, longitudinally scoring said strip on an off-center line of said strip, folding said strip upon itself on said scoring thereby leaving a margin, scoring said two-ply portion of said strip at substantially the center line thereof, folding said two-ply portion upon itself at said last scoring to eventuate a four-ply portion, and turning said margin up and over said multiple-ply portion to secure the folds thereof together.

9. The method of forming a multiple-ply flexible ribbon which comprises laying out a strip of material, folding said strip upon itself at an off-center longitudinal line, turning up a margin over said folded portion to secure the whole together, and incorporating a reinforcing element within said folded ribbon.

10. The method of forming a multiple-ply semi-flexible ribbon which comprises folding a strip of material upon itself at an off-center longitudinal line, a reinforcing element to which adhesive has been applied being incorporated in said ribbon, the adhesive being carried between the folds of said material by said folding to promote the adherence thereof, and turning up a margin over said folded portion to secure the whole together, said reinforcing element being thereby contained within said folded ribbon.

11. The method of forming a multiple-ply flexible strip which comprises folding a strip of material longitudinally upon itself along an off-center line to eventuate a two-ply portion and a free margin, laying a reinforcing element upon said two-ply portion, folding the latter upon substantially a longitudinal center line thereof, whereby a four-ply portion having the reinforcing element between the two central plies is formed, and thereafter turning said margin over onto said folded portion.

12. The method of forming a multiple-ply flexible strip which comprises applying adhesive to a strip of material, folding a strip of

material longitudinally of an off-center line upon itself to eventuate a two-ply portion and a free margin, laying a reinforcing element to which adhesive has been applied upon said two-ply portion, folding the latter upon substantially a longitudinal center line thereof whereby a four-ply portion having the reinforcing element secured between the two central plies is formed, the latter being secured together and to the said element by the adhesive carried by the latter, and thereafter turning said margin over onto said folded portion.

13. As an article of manufacture, a ribbon composed of a strip of flexible material double folded longitudinally along one side forming a four ply lamination, and having the other side folded over the top of said four plies and forming a fifth ply.

14. As an article of manufacture, a ribbon composed of a strip of flexible material folded and refolded longitudinally along one side forming a four ply lamination, and having the other side folded upon and secured to the top ply of said lamination.

15. As an article of manufacture, a laminated ribbon composed of a strip of flexible material having a portion of its width folded upon itself and having said folded portion refolded upon itself one or more times, and having the other portion of its width folded over upon the top ply of said folded portion.

16. As an article of manufacture, a ribbon comprising a strip of flexible material having a portion of its width doubled and refolded upon itself forming a four ply lamination, and having the other portion of its width folded over upon the top ply of said lamination, and a reinforcing member of greater tensile strength than said material disposed longitudinally between some of said plies.

17. As an article of manufacture, a ribbon comprising a strip of flexible material having a portion of its width doubled and refolded upon itself forming a four ply lamination, and having the other portion of its width folded over upon the top ply of said lamination, and reinforcing members of greater tensile strength than said material disposed longitudinally between some of said plies.

18. As an article of manufacture, a laminated ribbon comprising a strip of flexible material having a portion of its width folded upon itself and having said folded portion refolded upon itself one or more times, and having the other portion of said width folded over upon the top ply of said folded portion, and continuous reinforcing means of greater tensile strength than said material disposed longitudinally between some of said laminations.

19. The method of forming a laminated ribbon which consists in folding a portion of

the width of a strip of flexible material, and refolding the folded portion inwardly upon itself one or more times, and folding the other portion of the width over upon the top ply of the folded portion.

5 20. The method of forming a laminated ribbon which consists in folding a portion of the width of a strip of flexible material, and refolding the folded portion inwardly upon itself one or more times, and folding the other
10 portion of the width over upon and securing the same to the top ply of the folded portion.

In witness whereof, I have hereunto subscribed my name.

15 HARRY G. OSBURN.

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