

J. W. KIECKHEFER.
 PAPER TUBE AND METHOD OF MAKING THE SAME.
 APPLICATION FILED MAY 1, 1918.

1,313,898.

Patented Aug. 26, 1919.

FIG. 1.

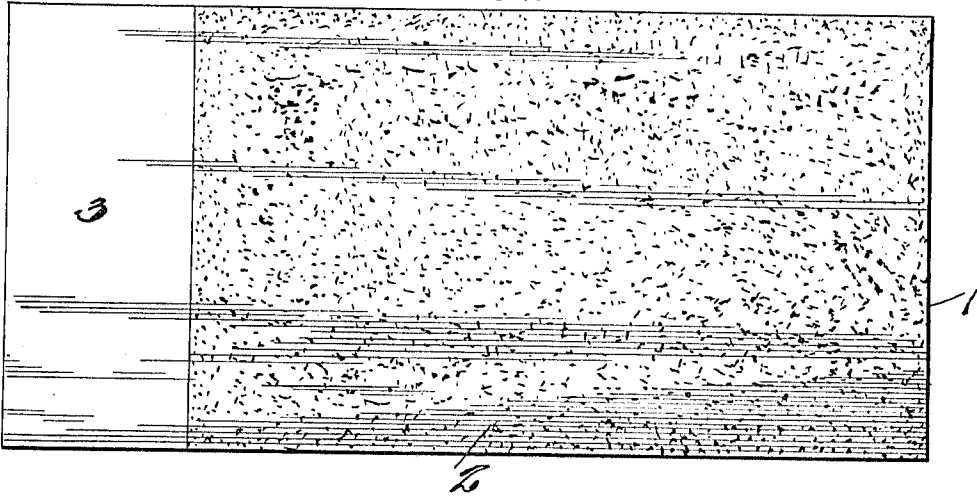


FIG. 2.

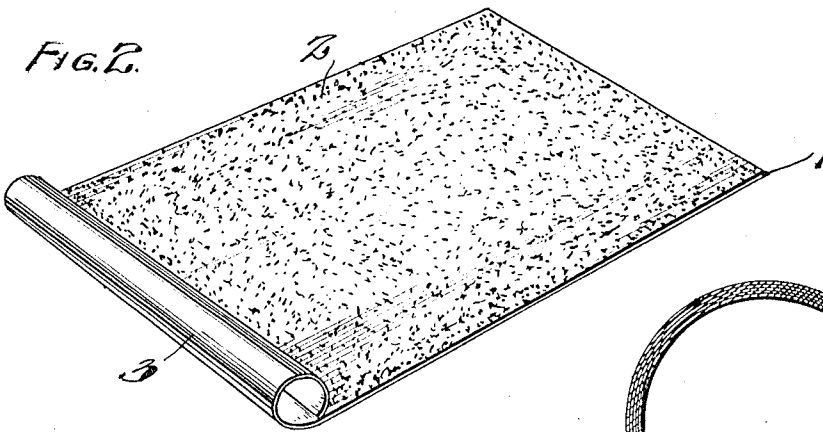


FIG. 4.

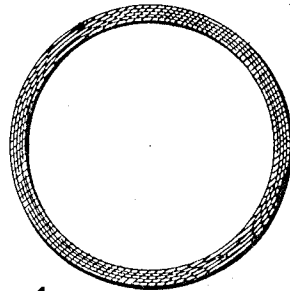


FIG. 3.

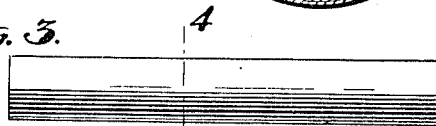
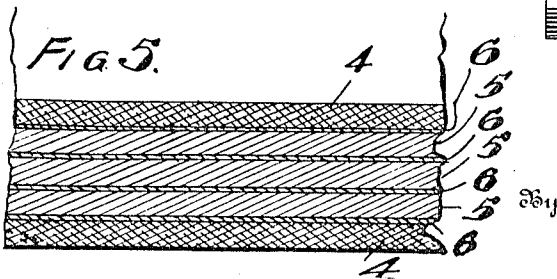


FIG. 5.



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PAPER TUBE AND METHOD OF MAKING THE SAME.

1,313,898.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHN W. KIECKHEFER, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Paper Tubes and Methods of Making the Same, of which the following is a specification.

The object of the invention is the production of a tube of paper or other fibrous material or fabric which shall have the exterior and interior plies or layers impervious to water or moisture and the central or intermediate plies or layers in a normal state or condition preferably united by a suitable waterproof cement or adhesive whereby ample strength and rigidity are secured for the tube.

The invention consists in the fashioned tube itself as an article possessing the characteristics herein set forth, and also in the method or process of making the same, said method consisting generally in cutting to shape preferably an unsized sheet of paper or similar fabric of fibrous material, applying a suitable waterproof cement or adhesive to one surface except an area at one end equal to the area of the inner surface of the fashioned tube, rolling the paper or fabric upon itself, thus producing a united tubular body having the entire areas of the interior and exterior surfaces in a normal state or condition, immersing the tube in a waterproofing compound or applying the waterproofing compound to these surfaces, and finally subjecting the tube thus treated to heat of a temperature high enough to partially liquefy the compound sufficiently to allow its thorough penetration of the interior and exterior plies or layers of the tube, or, in other words, to allow the waterproofing compound to be absorbed by the inner and outer layers only, the cement or adhesive material preventing its material penetration to the interior ply or layer or layers.

The invention further consists in adding to the waterproofing compound wax tailings or linseed oil or other similar material and impregnating the inner and outer plies of the tube with this compound when it is desired to harden and toughen the surfaces of the tube and so it will be smooth and not

crook, and, further, so it will have a polished or glossy appearance.

The accompanying drawing illustrates a tube of the structure and character set forth, also the paper or other fabric treated with the waterproof cement or adhesive, and the first rolled ply or layer of the tube, when made according to my improved method of manufacture.

Figure 1 is a plan view of a sheet of paper part of one surface having the cement or adhesive applied thereunto.

Fig. 2 shows the sheet of paper with the untreated portion rolled with its edge in contact with the edge of the cement covered surface.

Fig. 3 illustrates the completed tube.

Fig. 4 is an enlarged cross section of Fig. 3 on line 4—4.

Fig. 5 is an enlarged section through the wall of the tube to show the plies or layers of paper and cement.

The following is an exposition of the best mode or method of procedure in making the tube which I have so far devised.

A sheet of paper 1 of suitable thickness preferably unsized is cut to the desired dimensions, the width corresponding to the length of the tube to be formed and the length corresponding to the number of plies or layers the tube wall is designed to have when rolled.

To the area 2 of one surface of the sheet a waterproofing cement or adhesive—casein treated with lye and ammonia—is applied, the area 3 being untreated or in its natural or normal state or condition.

Next, the end of the sheet having the untreated area 3 is turned or rolled over so its edge engages the edge of the area 2 covered with the waterproofing cement or adhesive and the rolling process is continued until the entire sheet has been rolled, the surface having the adhesive area engaging the under or untreated surface of the sheet to which it is firmly and adhesively held, as is obvious.

A suitable number of tubes, as thus far fashioned, are then immersed in a bath of asphaltum or preferably asphaltum containing wax tailings, or the compound may be applied to the exposed surfaces in any other way, the compound being heated to a temperature of approximately 135° F.

Finally, the tubes are removed from the bath when the asphaltum is applied by immersing the tubes and subjected to heat for a suitable period of time, preferably in a receptacle or chamber the temperature of which is from 200° F. to 250° F.

The individual tube thus made has the following characteristics: The tube is water and moisture-proof as the waterproofing compound—asphaltum with the wax tailings mixed therewith—has penetrated and impregnated the exterior and interior exposed plies or layers of the paper thoroughly and to the central layer or layers having the waterproof cement or adhesive material between their surfaces, the central or interior plies or layers being in their normal state or condition and not materially penetrated by the asphaltum, thus retaining their original strength and securing the required rigidity of the finished tube. The waterproofing compound has also penetrated for a limited distance into the exposed ends of the tube, making them also water and moisture-proof. Further, due to the presence of the wax tailings in the asphaltum, the interior and exterior surfaces of the tube are relatively hard, tough and smooth, present a polished or glossy appearance, and there is no crock to soil the hands or any object with which the tube may come in contact. The surfaces are such that the tubes will not stick together nor will powdered material or objects contained within the tubes adhere to the inner surface thereof.

Tubes made substantially as set forth have under the Mullen standard test disclosed relatively great strength, and when immersed under water with the ends closed for twenty four hours have shown no sign of leakage or of moisture on the interior, and moreover, no evidence was present of the softening of the tube wall.

Fig. 5 of the drawing shows a tube with the wall composed of five plies or layers, 4 designating the outer and inner plies or layers thoroughly impregnated with asphaltum, as described, 5, the plies in their normal state or condition substantially unimpregnated by the waterproofing compound, and 6 thin layers of waterproof cement.

In the practice of the particular method of manufacture set forth I have found that the waterproofing cement or adhesive specified—casein treated with lye and ammonia—serves well for the purpose intended, as it does not appear to penetrate the paper excessively or to be soluble in the asphaltum or to be injuriously affected by heat to the extent of rendering it unsuitable for its purpose, but other waterproof adhesives may be used in lieu thereof, especially such as will not allow the waterproofing compound, as asphaltum, excessively to penetrate and im-

pregnate the inner ply or plies of the tube. Likewise impregnating waterproofing compounds other than asphaltum and its compounds may be used for the same purpose. I have specified the particular cement and impregnating compound by way of example, as they have been found efficient and satisfactory in practice.

The completed tube is of the character herein set forth; all the plies are united by the cement, the exterior and interior plies are thoroughly impregnated by the waterproofing compound which does not at all, or only slightly, reach the intermediate ply or plies, the tube is of ample strength, and the exterior and interior surfaces when the wax tailings or linseed oil are added to the waterproofing compound are smooth and considerably toughened and have a polished or glossy appearance.

In the practice of the invention any suitable tools or machinery may be employed in carrying out the method or process of manufacture and unsubstantial changes in the steps be introduced without constituting real departures from the method.

What I claim is:

1. As an article of manufacture, a tube of paper or other fibrous material comprised of a plurality of superimposed plies or layers, the exterior and interior plies only being impregnated with a waterproofing compound.

2. As an article of manufacture, a tube of paper or other fibrous material comprised of a plurality of superimposed plies or layers, the exterior and interior plies being impregnated with a waterproofing compound, and a waterproof cement or adhesive interposed between the surfaces of the central and the inner and outer plies.

3. As an article of manufacture, a tube of paper or other fibrous material comprised of a plurality of superimposed plies or layers, a waterproof cement or adhesive interposed between the central plies, and the exterior and interior plies impregnated with a waterproofing compound.

4. As an article of manufacture, a tube of paper or other fibrous material comprised of a plurality of superimposed plies or layers the exterior and interior plies being impregnated with a waterproofing compound containing oil.

5. As an article of manufacture, a tube of paper or other fibrous material comprised of a plurality of superimposed plies or layers the exterior and interior plies being impregnated with a waterproofing compound containing an oil, and a waterproof compound interposed between the central and the outer and inner plies.

6. As an article of manufacture, a tube of paper or other fibrous material comprised of a plurality of superimposed plies or lay-

ers the exterior and interior plies being impregnated with a waterproofing compound containing an oil, and a waterproof cement or adhesive interposed between the central plies.

7. As an article of manufacture, a tube of paper or other fibrous material comprised of a plurality of superimposed plies or layers, the inner and outer layers being impregnated with a waterproofing compound containing asphaltum and an oil.

8. As an article of manufacture, a tube of paper or other fibrous material comprised of a plurality of superimposed plies or layers, the inner and outer plies or layers only being impregnated with a waterproofing compound containing a material such as wax tailings which impart to the exterior and interior surfaces a smooth and polished appearance.

9. As an article of manufacture, a tube of paper or other fibrous material comprised of a plurality of superimposed plies or layers the inner and outer layers being impregnated with a waterproofing compound containing asphaltum and an oil, and a waterproof cement or adhesive interposed between the central plies or layers.

10. The method of making a tube of paper or other fibrous material consisting in applying to part of one surface of a sheet of the material a waterproofing cement or adhesive, rolling the sheet to a tubular shape, applying to the exposed surfaces of the tube a waterproofing compound, and finally subjecting the tube thus treated to heat.

11. The method of making a tube of paper or other fibrous material consisting in applying to part of one surface of a sheet of the

material a waterproofing cement or adhesive, rolling the sheet to a tubular shape, treating the interior and exterior plies with a waterproof compound containing an oil, and finally subjecting the tube thus treated to heat.

12. The method of making a tube of paper or other fibrous material consisting in applying to part of one surface of a sheet of the material a waterproof cement or adhesive, rolling the sheet to a tubular shape, treating the exterior and interior plies with a waterproofing compound containing asphaltum, and finally subjecting the tube thus treated to heat.

13. The method of making a tube of paper or other fibrous material consisting in applying to part of one surface of a sheet of the material a waterproofing cement or adhesive, rolling the sheet to a tubular shape, treating the exterior and interior plies with a waterproofing compound containing asphaltum and wax tailings, and finally subjecting the tube thus treated to heat.

14. The method of making a tube of paper or other fibrous material consisting in superimposing a plurality of plies of the material one upon another to form a tubular body, interposing a waterproofing cement or adhesive between the central and outer and inner plies, treating the outer and inner surfaces of the tubular body with a waterproofing compound, and finally subjecting the tube thus treated to heat.

In testimony whereof I affix my signature.

JOHN W. KIECKHEFER.

Witnesses:

H. Z. LOWTHER,
R. J. FREEMAN.