A. RYAN.

SPAR, ROD, TUBE, POLE, MAST, AND THE LIKE.

APPLICATION FILED APR. 4, 1918.

1,293,208.

Patented Feb. 4, 1919.

2 SHEETS—SHEET 1.

Fig. 1.

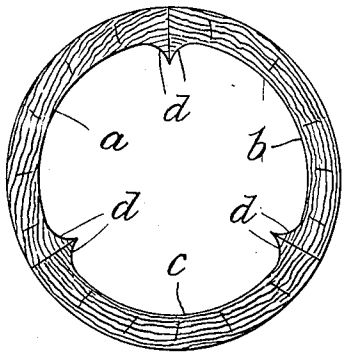


Fig. 2.

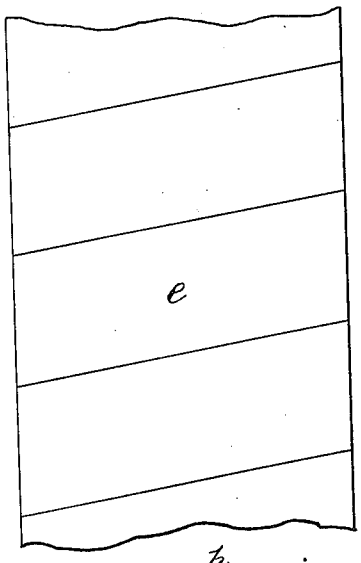
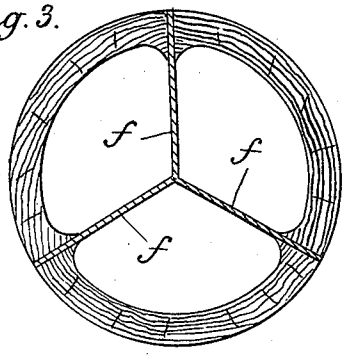


Fig. 3.



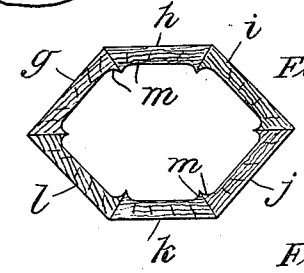


Fig. 4.

Fig. 5.

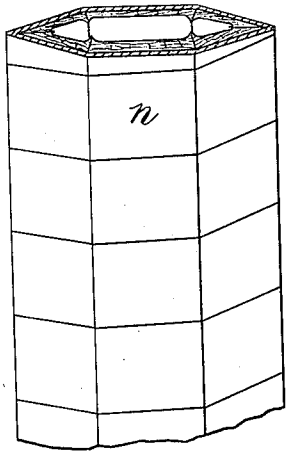


Fig. 6.

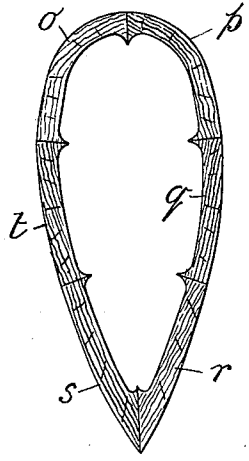
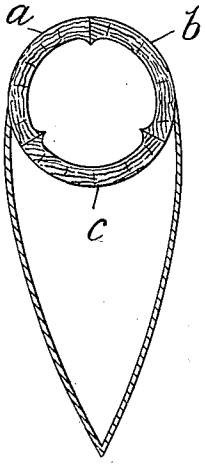


Fig. 7.



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2 SHEETS—SHEET 2.

Fig. 8.

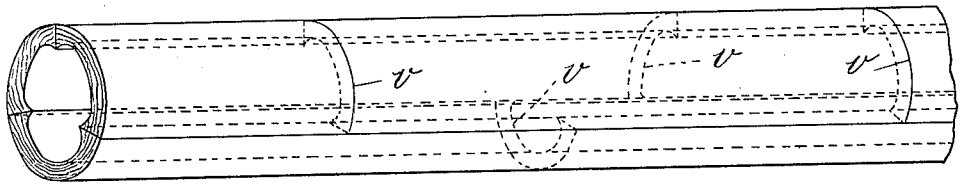
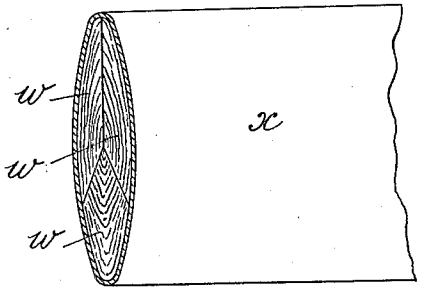


Fig. 9.



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UNITED STATES PATENT OFFICE.

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SPAR, ROD, TUBE, POLE, MAST, AND THE LIKE.

1,293,208.

Specification of Letters Patent. Patented Feb. 4, 1919.

Application filed April 4, 1918. Serial No. 226,730.

To all whom it may concern:

Be it known that I, ALFRED RYAN, of 43 Cranbrook street, Oldham, in the county of Lancashire, England, engineer, subject of the King of Great Britain and Ireland, have invented certain new and useful Improvements Relating to Spars, Rods, Tubes, Poles, Masts, and the like, of which the following is a specification.

This invention has reference to spars, rods, tubes, poles, masts and the like, and its object is to construct the same in a novel manner combining great strength and lightness.

Spars, rods, tubes, poles, masts, and the like according to the invention are constructed with built-up bodies formed of longitudinal elements or components of wood, so arranged as to have the grain running in general direction along the length of the built-up body, said elements or components being glued or otherwise attached together and the whole being covered or bound with a fabric which is coated, impregnated or treated with a varnish or solution, (hereinafter referred to as contracting solution) which contracts on drying, thus assisting in binding the built-up body firmly and strongly together. The varnish or solution employed is preferably one having a basis of cellulose acetate, such varnishes or solutions not only contract on drying, and assist in binding the built-up body firmly together, but provide a very superior waterproof and preservative coating for the structure.

The built-up bodies may be of any section and diameters and either hollow or solid. The invention is of particular advantage for the construction of hollow spars, rods, tubes, poles, masts and the like, enabling the maximum of strength to be provided for a minimum of weight.

The grain of the wood of the elements should be so selected that there is as little cross graining as possible at any position. It is preferable so to select the wood of the elements or components that in the cross section of the built-up body the grain of the wood shall as far as possible follow the outline of the section of the body, that is to say that the medullary rays of the wood are approximately at right angles to the external contour of the section at the given part.

If desired, internal reinforcements or stiffeners of metal or other appropriate material may be employed in the built-up body.

In the case of hollow bodies, the adjacent edges of the elements or components of the built-up body are preferably thicker than the general thickness of the element, thereby providing increased strength at the joint.

For binding or covering the body built up of elements of wood, a textile fabric of any suitable kind may be employed. It may be in the form of a tape or strip wound on tightly in a lathe or by other means, or it may consist of a tube of canvas or other fabric drawn tightly on to the built-up body, or of a fabric wrapped or wound tightly around the same and secured by stitching or otherwise. The tape or fabric may be glued or otherwise fixed in position on the built-up body when wound or applied thereon, and be then coated or treated with the contracting varnish or solution, or this latter may itself serve to secure the fabric on the built-up body.

If required, more particularly in the case of long spars, rods, tubes, poles, masts or the like, the built-up body may be made up of wooden segments or elements joined together end to end, with the joints of the segments or elements staggered, the whole being bound or covered with a fabric which is coated, impregnated or treated with a contracting varnish as mentioned.

The accompanying drawings illustrate by way of illustration some examples of tubular spars or rods intended more particularly for use on aircraft.

Figure 1 is a cross section and Fig. 2 a side view illustrating one form.

Fig. 3 is a cross-section of a similar form showing an internal reinforcement of metal.

Figs. 4 and 5 are views similar to Figs. 1 and 2 illustrating a hexagonal construction.

Fig. 6 is a cross section of another construction of stream-line form in section.

Fig. 7 illustrates a spar or rod similar to that of Figs. 1 and 2 having a stream-line fairing fixed thereto.

Fig. 8 is a view illustrating a long spar or rod built up of segments or elements joined up together with the joints staggered.

Fig. 9 is a sectional view of a solid spar

or rod built up of segments and bound by a tubular fabric.

Referring to Figs. 1 and 2 the hollow rod is built up of three longitudinal elements *a b c*, each element being a section of one-third of the circumference of the cross-section and each running parallel to the axis of the rod, and the grain of the wood of each element runs in general direction along the length of the rod. The grain of the wood is so selected that there is as little cross graining as possible at any position, and as seen in Fig. 1, the wood of the elements is so selected that in the cross-section of the body the grain follows generally the outline of the section of the body. The adjacent edges of the elements of the built-up body are made thicker than the general thickness of the element, as indicated at *d d d*, in order to provide increased strength at the joints.

The elements after being machined or cut to shape are glued together along their adjacent edges.

The circular rod so made is then bound with fabric tape *e* wound on tightly in overlapping layers, for example in a lathe or like machine, the tape being glued in position or not as desired. The fabric covering is finally treated with a contracting adhesive varnish or solution such as a cellulose acetate solution.

In the example shown in Fig. 3 the construction is similar to the above except that a metal reinforcement of Y section is fitted in the interior of the hollow rod, having its limbs *f* fixed between the adjacent edges of the segmental wooden parts *a b c*.

In the construction shown in Figs. 4 and 5 the hollow rod or spar of hexagonal section is built up of six wooden elements *g h i j k l* selected and arranged as before mentioned as regards the graining and having thickened edges *m* at the joints, the elements being attached together and bound by a fabric tape *n* and the whole treated with a contracting adhesive varnish as mentioned.

In Fig. 6 the hollow rod or spar is similarly built up of stream-line section of wooden elements *o p q r s t* bound with fabric and treated with a contracting adhesive varnish or solution.

In Fig. 7 a hollow rod constructed as described with reference to Figs. 1 and 2 is shown fitted with a stream-line fairing *u* made of thin wood sheets fixed along the sides of the hollow rod previously constructed and bound as described.

In Fig. 8 a hollow body for a long spar, rod or the like is shown as built up of shorter segments or elements selected and secured together in a similar manner to that described, but also joined together end to end with these joints *v* in staggered relation to each other. The whole is bound or covered with a fabric which is coated, impregnated or treated with a cellulose acetate solution or other contracting varnish as before mentioned.

In Fig. 9 a solid spar or rod is shown as built up of segmental elements *w* glued together and bound by a tubular fabric *x* drawn tightly over same and impregnated with a cellulose acetate solution or other contracting varnish.

It is to be understood that the particular constructions shown are given only by way of example and that spars, poles, tubes, masts and the like may be constructed in accordance with the invention as hereinbefore defined, either hollow or solid, and of any section and dimensions. Also the fabric binding or casing may be of any appropriate form and applied in any suitable way, and the contracting varnish may be applied thereto after the fabric is bound or applied on the built-up body.

Rods made according to the invention may be constructed in any desired lengths or cut up into lengths according to requirement according to the particular application concerned.

What I claim as my invention, and desire to secured by Letters Patent, is:—

1. A spar, rod, tube or the like, comprising longitudinal elements of wood fitted together and tightly bound by an enveloping fabric treated with a cellulose acetate solution which contracts on drying and assists in binding the elements of the built-up body together.

2. A wooden body, comprising longitudinal elements cemented together and surrounded by a covering of textile fabric directly applied to the outside of said body and which is treated with a solution of cellulose acetate which on drying contracts and binds the elements of said body together.

3. A wooden body, comprising longitudinal elements of wood having the grain running in the general direction longitudinally of the body fitted together and in which the medullary rays of the wood are approximately at right angles to the external contour of the section at any given part, said body being tightly bound by an enveloping fabric treated with a solution which contracts on drying and assists in binding the elements of the built-up body together.

4. A spar, rod, tube or the like, comprising a plurality of longitudinal elements of wood fitted together having the grain of the wood running in the general direction longitudinally of the body and in which the general shape of the body follows in transverse section the transverse or annual grain of the wood, and an enveloping fabric treated with a solution which contracts on drying and assists in binding the elements of the built-up body together.

5. A spar, rod, tube or the like compris-

ing a plurality of unbent longitudinal elements of wood cut to shape and fitted together having the grain running in the general direction longitudinally of the body and in which the general shape of the body in transverse section follows the transverse or annual grain of the wood whereby the annual grain rings of the body are disposed in arcs struck from the central axis of the body, and an enveloping fabric treated with a solution which contracts on drying and assists in binding the elements of the built-up body together.

In testimony whereof, I have hereunto subscribed my name.

ALFRED RYAN.