J. H. BROWN.

TUBULAR STRUCTURE.

APPLICATION FILED JAN. 10, 1906. RENEWED FEB. 18, 1911.

1,004,142. **Patented Sept. 26, 1911.**

Fig. 1.

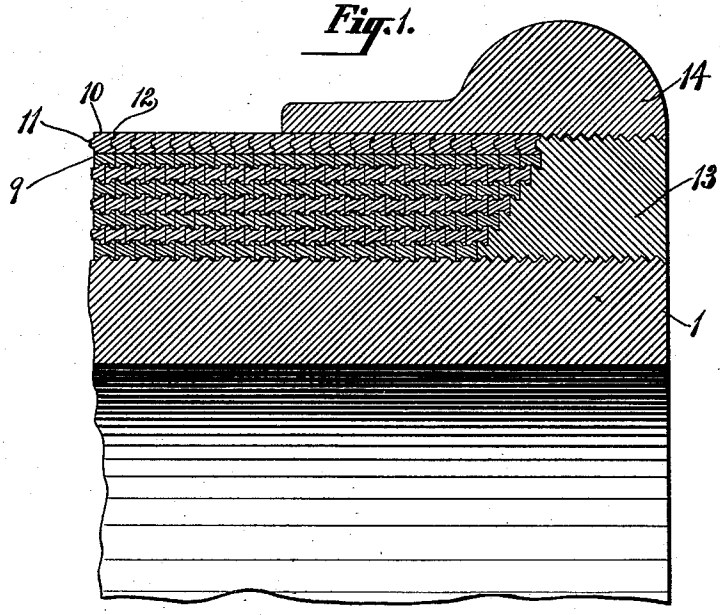


Fig. 2.

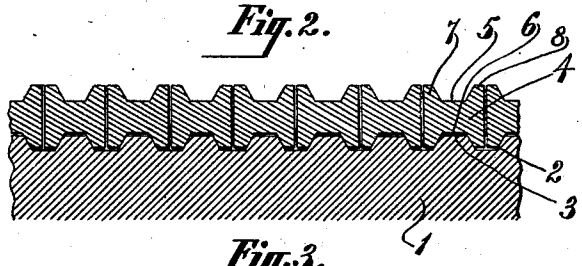


Fig. 3.

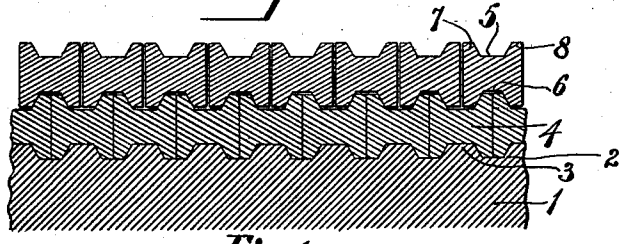
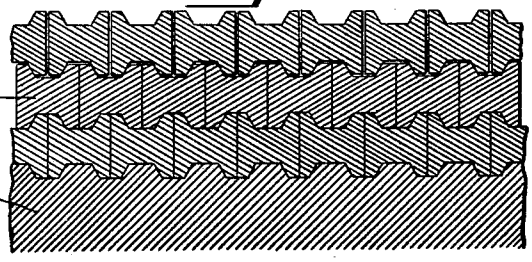


Fig. 4.



Witnesses:

F. S. Hachenburg.

Henry Thieme.

Inventor:

John H. Brown

By Brown & Wood

his attorneys

UNITED STATES PATENT OFFICE.

JOHN H. BROWN, OF JERSEY CITY, NEW JERSEY, ASSIGNOR TO UNITED STATES ORDNANCE & PROJECTILE COMPANY, A CORPORATION OF MAINE.

TUBULAR STRUCTURE.

1,004,142. Specification of Letters Patent. Patented Sept. 26, 1911.

Application filed January 10, 1906, Serial No. 295,357. Renewed February 18, 1911. Serial No. 609,425.

To all whom it may concern:

Be it known that I, JOHN H. BROWN, a citizen of the United States, and resident of Jersey City, in the county of Hudson and State of New Jersey, have invented a new and useful Tubular Structure, of which the following is a specification.

My invention relates to tubular structures and more particularly to the wire jacket and its coaction with a core, with the object in view of providing a stiff and durable structure at low cost.

In illustrating my invention, I have chosen to show the tubular structure as fitted for the barrel of a cannon but I do not wish to limit myself to this particular use as the invention may be applied with equal advantage wherever a stiff, light tubular structure is desired.

In the accompanying drawings, Figure 1 is a partial vertical section at the muzzle of the cannon, Fig. 2 is an enlarged partial vertical section showing the application of a single layer of wire on the core, Fig. 3 is a similar view showing the application of two layers of wire, and Fig. 4 is a similar view showing the application of three layers of wire.

The core with which the wire coacts is denoted by 1. It may be of any well known or approved structure either in one piece or in several longitudinal sections. Its exterior is provided with a groove 2 arranged spirally thereon, the raised portion 3 between two consecutive turns of the groove 2 corresponding in cross section to the cross section of the groove 2, said cross section being in the form of the vertical central section of the frustum of a cone. A wire 4 rectangular in cross section is provided on its opposite sides with grooves 5 and 6, the said grooves corresponding in shape to the section 3 between two consecutive turns of the groove on the core. Furthermore, the flanges 7 and 8 on opposite sides of the groove 5 and in like manner the flanges on opposite sides of the groove 6 are each in cross section one-half the cross section of the groove 5 or groove 6 so that when the two consecutive turns of wire are brought into juxtaposition the adjacent flanges will make, together, a projection corresponding in shape and size to the groove 5 or groove 6 or to the projection 3 on the core or groove 2 in the core.

In practice, the grooves in the core and in the wire are made slightly smaller than the projections which are intended to enter them so that when pressure is applied tending to force the wire radially toward the axis of the core, it will tend to force the adjacent turns of wire into close engagement one with another and will also wedge a superposed layer tightly into interlocking engagement with the interior layer to effectually prevent lost motion or any possible loosening of the turns under shock or strain.

To illustrate the wedging and crowding action of the layers which are assumed to be wound under tension, the turns in Fig. 2 where there is a single layer are shown slightly apart and slightly off their seat in the core while in Fig. 3 the inner layer is tightly seated while the outer layer is shown with its adjacent turns slightly separated and not quite seated, and again, in Fig. 4, where a third layer is wound, the inner layer is still more tightly interlocked with the core while the adjacent turns of the next outer layer are closed more tightly and the outer layer has its turns slightly separated and not seated, awaiting, in turn, the effect of another superposed layer to more tightly settle its parts into their locking engagements.

To finish the exterior of several layers with a smooth surface, I provide a wire 9 having a groove corresponding to the groove 5 or 6 in its inner face only so that when wound on an under layer its exterior surface will be smooth and uninterrupted and to further finish the jacket of the tubular structure, I may apply a wire 10 preferably somewhat heavier than the wire 4 having a tongue 11 on one face and a corresponding groove 12 on the opposite face, this wire being laid with its smooth sides exterior and interior and its interlocking sides in planes transverse to the axis of the structure.

When a structure is set up to form a gun, the end of the core may be provided with an annular nut 13 screwed on to form an abutment for the wire layers and a finishing cap 14 may be screwed on over the end and over several layers of the jacket wire 10. In forming the interlocking wire 4, the diameter of the web or that portion located between the bottoms of two opposite grooves 5 and 6 is intended to be substantially the same as the diameter of two consecutive

flanges 7 at their bases so that the strain upon the wire will not be in favor of either parting it at a point intermediate of two grooves or shearing it at the flanges, the strength at the one place being substantially equal to the strength at the other. By thus interlocking the wire with the core and subsequently interlocking a superposed layer with an inner layer, the entire body of wire becomes substantially rigid under longitudinal strain as well as under lateral strain and it is a structure which may be built up with great facility while the rolling of the wire in the shape required is a simple and feasible undertaking.

What I claim is:—

1. A tubular structure including several layers of grooved wire wound under tension, a side wall of the groove being inclined forming an inclined faced flange, an outer layer being wound with adjacent flanges of two consecutive turns in position to enter the groove in an inner layer, the transverse section of the two adjacent flanges which enter a groove in an inner layer being slightly greater than the transverse section of the groove, whereby a wedge-like engagement with an inner layer is effected and a normal longitudinal stress is established in the completed structure.

2. A structure comprising a core provided on its exterior with a spiral groove and a grooved wire wound thereon in superposed layers with consecutive flanges entering the grooves in the wire and core, the projections between consecutive turns of the groove in the core having a transverse section corresponding to the vertical central section of the frustum of a cone and the said grooves in core and wire having a normal transverse section slightly less than the normal transverse section of the said projections which enter the groove in the wire and of the two consecutive flanges of the wire which enter the groove in the core.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two witnesses, this 9th day of January 1906.

JOHN H. BROWN.

Witnesses:
FREDK. HAYNES,
HENRY THIEME.