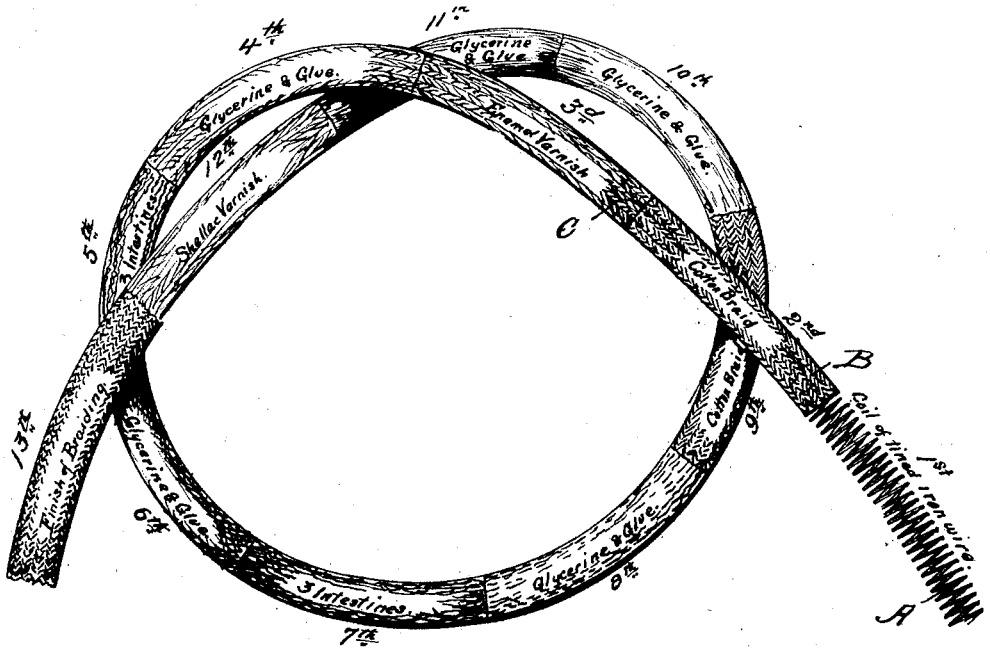
D. K. HOXSIE & T. L. REED.

MANUFACTURE OF FLEXIBLE TUBING.

No. 51,052. Patented Nov. 21, 1865.



Witnesses:

Spencer A. Bonnell.

Norman N. Mason.

Inventors:

David K. Hoxsie

Thomas L. Reed

UNITED STATES PATENT OFFICE.

DAVID K. HOXSIE AND THOMAS L. REED, OF PROVIDENCE, RHODE ISLAND.

IMPROVEMENT IN THE MANUFACTURE OF FLEXIBLE TUBING.

Specification forming part of Letters Patent No. **51,052**, dated November 21, 1865.

To all whom it may concern:

Be it known that we, DAVID K. HOXSIE and THOMAS L. REED, both of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Flexible Tubing or Hose, such as is used for conveying illuminating-gas; and we do hereby declare the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, making part of this specification.

In Letters Patent No. 44,425, and bearing date September 27, A. D. 1864, a description is given of a mode of utilizing and converting animal intestines into an impervious sheath or covering for use in the manufacture of tubing or hose.

The improvement in this case is additional to that described and claimed in the Letters Patent mentioned, and relates to the employment of certain means for preserving the intestinal sheath from splitting or cracking, and thereby becoming leaky, from the usage to which it is necessarily subjected.

Our invention in this case consists in preserving the intestine in its naturally moist condition after it has entered into the composition of the tubing or hose by the application thereto of a composition of glycerine and glue, or any other material or compound that will resist evaporation and stiffening from extremes of heat and cold.

Our invention further consists in the use of a composition of glycerine and glue in proper proportions for rendering the braided sheath or covering which forms part of such tubing or hose impervious, flexible, and smooth on its surface.

Our invention further consists in combining upon a suitable spiral-wire coil forming a skeleton-tube a number of braided sheaths of cotton or other fibrous material and a number (one or more) of intestinal sheaves, in the order of arrangement, and treated and applied and finished to form a flexible tube or hose, as hereinafter described—that is to say:

The said drawing represents a piece of flexible tubing which is composed of a spiral-wire coil, A, which gives form to the tube and prevents it from collapsing by bending it. Over this coil is a covering or sheath, B, of braided cotton, which is saturated or stuffed and coated with "enamel-varnish" C, (so called) to render the cotton sheath impervious to a certain extent and give it a smooth and even surface for the reception of the intestines. The intestines are prepared for this purpose by the process of cleaning and curing to render them imperishable described fully in the Letters Patent above mentioned, and the intestines are drawn upon the tubing in the manner therein shown and described, two or more being drawn one over the other to provide for any damage from the puncture or otherwise which the intestines may sustain by the process of cleaning or otherwise.

The natural condition of the intestines during existence of the animal is moist and supple; but after being removed from the animal and treated with the chemical solution which is relied on to cure and preserve the strength and utility of the membrane, and disposed upon the tubing in the manner intended, the intestines become dry and husky, and are liable after a time to split and crack with being frequently bent and twisted in the way the tubing is used, and after a time the gas will penetrate and escape through the cracks or openings thus formed; and to obviate and effectually prevent this casualty is the object of the present invention, which will now be described.

The animal-intestines may be prevented from cracking and splitting by being preserved in a permanently moist and supple condition by means of a solution of glycerine and glue in equal parts, the glue being first soaked and dissolved in the usual way by boiling and afterward adding the requisite quantity of glycerine. This compound is applied while it is warm to the intestines with a cloth or brush and rubbed lengthwise on the tubing vigorously with the hand. When this compound is intended for use on the braided covering to render it smooth and impervious, the relative proportions should be about two-fifths ($\frac{2}{5}$) glycerine to three-fifths ($\frac{3}{5}$) glue; or the latter may be in still greater excess, according to the consistency required by the nature of the fabric.

The enamel-varnish above mentioned as forming a smooth coating or surface for the reception of the intestines may be made as follows: linseed-oil, twenty (20) gallons; Prussian

blue, six (6) pounds. Boil together until the compound is of suitable consistency—say that of molasses—when withdraw it from the fire, and when it is nearly cool, it being allowed to cool gradually, add and stir in thoroughly about two-thirds (⅔) the quantity of naphtha. Great care should be taken in adding the naphtha that the vessel is sufficiently removed from the vicinity of the fire, and as well that the boiled compound has so far cooled as not to ignite the naphtha, frequent and terrible accidents resulting from these causes when care is not observed.

A superior article of impervious flexible tubing may be manufactured from the foregoing materials combined and prepared as follows, namely: first, a lengthened coil of tinned-iron wire; second, a covering of cotton braid thereon; third, a stuffing and coating of enamel-varnish, allowed to dry thoroughly in the open air, if possible, otherwise in an oven; fourth, a coating of glycerine and glue, equal parts of each, allowed to set or dry, after which a second coating may be applied; fifth, three intestines, drawn one over the other; sixth, a coating of glycerine and glue, equal parts of each; seventh, three intestines, one over the other; eighth, a coating of glycerine and glue, equal parts of each; ninth, a covering of cotton braid; tenth, a coating of glycerine and glue, two-fifths glycerine to three-fifths glue; eleventh, a coating of glycerine and glue, one-fifth glycerine to four-fifths glue; twelfth, a coating of shellac varnish, (or this may be omitted;) thirteenth, a covering of colored worsted, silk, or cotton braiding for outside finish, or cotton stuffed with oil (linseed) and varnished.

Instead of the enamel-varnish, a coating of glycerine and glue, the latter being in excess, may be employed on the braid 2 to form a smooth and even surface for the intestinal sheath.

The use of the processes and materials herein described is also contemplated for preserving and utilizing other animal-tissues of a similar nature to intestines, the bladder, &c., for kindred useful purposes, and the same is herein also claimed.

Having described our invention, what we claim, and desire to secure by Letters Patent, is—

1. Preserving animal-intestines and like animal tissues in their natural moist condition by means of a compound of glycerine and glue or other material or compound that will remain unaffected by extremes of temperature, as described.

2. The use of a compound of glycerine and glue in the requisite proportions, in combination with a covering of fibrous material, as and for the purpose described.

3. The tubing constructed wholly or in part of the materials combined in the manner for the several purposes herein set forth and described.

4. The enamel-varnish compound, substantially as described.

In witness whereof we have hereunto set our hands, and affixed our seals this 28th day of August, A. D. 1865.

DAVID K. HOXSIE. [L. S.]
THOMAS L. REED. [L. S.]

In presence of—
ISAAC A. BROWNELL,
NORMAN W. MASON.