

(No Model.)

R. KELSO & M. ROSENBAUM.

FLEXIBLE METALLIC SHEATHING FOR TUBES AND ROPES.

No. 606,557.

Patented June 28, 1898.

FIG. 1.

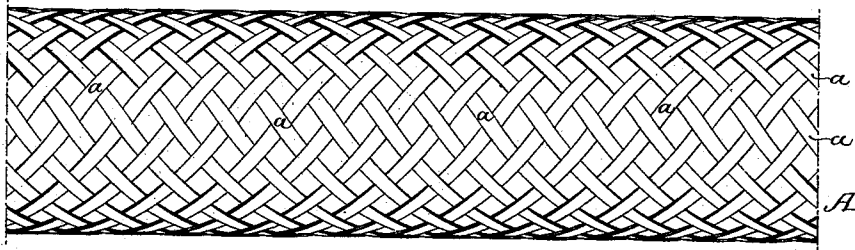


FIG. 2.

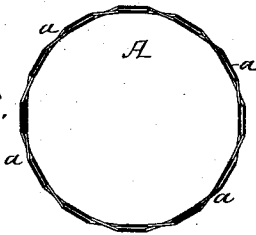


FIG. 3.

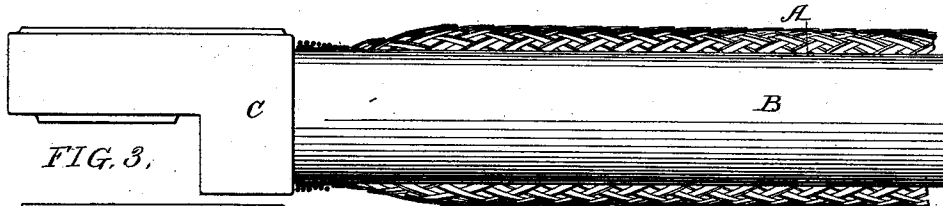


FIG. 4.

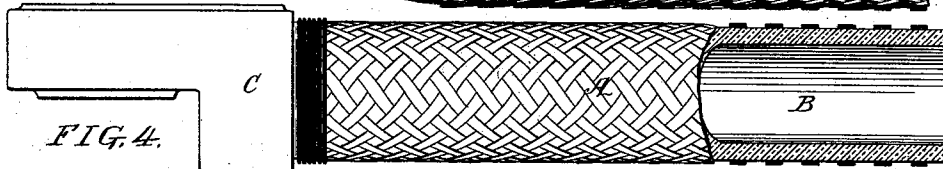


FIG. 5.

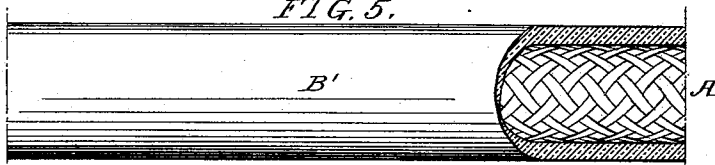


FIG. 6.

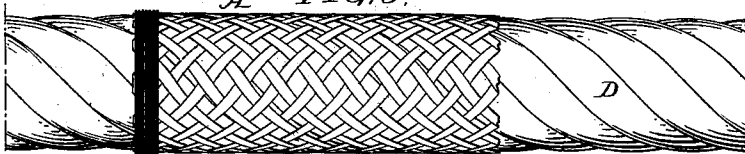


FIG. 7.



FIG. 8.



Witnesses:

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UNITED STATES PATENT OFFICE.

ROBERT KELSO AND MORRIS ROSENBAUM, OF PHILADELPHIA, PENN-
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FLEXIBLE METALLIC SHEATHING FOR TUBES AND ROPES.

SPECIFICATION forming part of Letters Patent No. 606,557, dated June 28, 1898.

Application filed November 22, 1897. Serial No. 659,469. (No model.) Patented in Austria March 29, 1897, No. 47/1,548; in Belgium April 1, 1897, No. 127,330; in France May 29, 1897, No. 267,417, and in Canada August 14, 1897, No. 57,045.

To all whom it may concern:

Be it known that we, ROBERT KELSO and MORRIS ROSENBAUM, citizens of the United States, and residents of Philadelphia, Pennsylvania, have invented certain Improvements in Flexible Metallic Sheathing for Tubes, Ropes, &c., (for which we have obtained Letters Patent in Canada, No. 57,045, dated August 14, 1897; in Austria, No. 47/1,548, dated March 29, 1897; in France, No. 267,417, dated May 29, 1897, and in Belgium, No. 127,330, dated April 1, 1897,) of which the following is a specification.

The object of our invention is to provide a flexible metallic sheathing or casing for flexible tubes, &c., in order to increase the strength of the article incased either against tensile strains in the case of tubes or ropes, against lateral pressure in tubes, against the collapsing of tubes when a vacuum is formed within the tubes, and against abrasion of tubes, ropes, &c.

A further object of our invention is to provide a coupling for ropes or tubes, as fully described hereinafter.

Referring to the accompanying drawings, Figure 1 is a view of our improved casing. Fig. 2 is a transverse sectional view. Fig. 3 is a view showing the method of applying the sheathing to the article to be incased. Fig. 4 is a view showing the casing applied to the outside of a rubber hose. Fig. 5 is a view showing the casing applied to the inside of a rubber hose. Fig. 6 is a view showing the casing applied to a rope. Fig. 7 is a view showing the method of applying the sheathing in splicing ropes so as to form a coupling. Fig. 8 is a view showing the sheathing applied as a tube-coupling.

In the manufacture of our improved casing A we take a number of ends of tempered flat steel wire *a*, preferably galvanized to prevent corrosion, and braid this wire to tubular form, as shown in Figs. 1 and 2, the mesh being determined during the process of braiding, and we preferably braid the tubes to be applied to objects from one-half an inch to three inches of one diameter, and by changing the pitch of the wires we may increase or diminish the size of the mesh. By placing a tor-

sional strain on the tube after it is made the diameter will be decreased, and by placing a compressing strain on the end of the tube the diameter will be increased.

The article, as shown in Figs. 1 and 2, is itself a complete article of manufacture and is now sold by us to be applied to tubing, rope, &c., in any length required, and we usually wrap the sheathing upon reels holding one thousand feet, and this sheathing can be cut off in lengths as required.

To apply the sheathing A to a rubber or other hose B, we cut the sheathing the proper length, compress it longitudinally, so as to increase its diameter in order that it may be slipped readily over the hose to be incased, and after it is in position one end of the sheathing is secured to the hose or other tubing in any suitable manner, preferably by wrapping fine soft wire around the sheathing and tube, so as to tightly bind the sheathing to the tube, as shown in Fig. 3. The sheathing is then drawn down upon the hose, either through the hands or by means of a tool, so that its length will be increased, and consequently its diameter decreased, until it fits perfectly tight upon the hose, as shown in Fig. 4, after which the free end is secured to the end of the hose by a wire or other fastening in the same manner as the opposite end was secured. The sheathing is thus secured to the hose or other flexible article at separated points of attachment and is free to expand and contract between said points of attachment when the said article is bent.

Where an ordinary hose-coupling C is used, the clamp for securing the hose to the coupling may be applied over the sheathing, so as to hold the sheathing firmly to the tube and the tube to the coupling.

In incasing tubes with couplings attached—such, for instance, as the tubes of air-brake mechanism of railway-cars—all that is necessary is to longitudinally contract the sheathing, so that it will readily slip over the head of the coupling, as well as over the hose, after which it is fastened at one end and drawn out until it binds tightly upon the hose, and then fastened tightly at the opposite end either by a clamp or other means of fastening.

We have submitted hose incased with our improved sheathing to severe tests, and it has withstood pressures up to one thousand pounds to the square inch.

- 5 The flat wire presents a sufficient surface to prevent the cutting of the tube by the wire, and the braiding is open sufficiently to allow the tube the same free movement as if the sheathing was not applied. Furthermore, a
10 tube with the casing applied will not buckle or kink and in time crack, as will the tube not provided with a casing.

- In Fig. 5 we have shown the sheathing A applied to the inside of a tube B' instead of
15 the outside where it is wished to resist atmospheric pressures, and in order to apply the sheathing to the tube we stretch the sheathing so that the diameter is less than the internal diameter of the tube. We then slip
20 the sheathing into the tube and increase its diameter by longitudinal compression until it fits tightly against the tube, when it is fastened at each end.

- Fig. 6 is a view illustrating the sheathing
25 A applied to a rope D, and may be either applied to ordinary fiber rope or wire rope. By applying this sheathing to the rope we find that the strength is materially increased, the strands are confined closely together, thus
30 preventing fraying, and, furthermore, when the rope is used in a winding-drum, for instance, the sheathing prevents chafing.

- The sheathing being braided allows for the free contraction of the rope when wet and
35 expansion of the rope when dry, and it will allow the rope to swell, yet will keep it taut at all times, the flat surface of the wire preventing cutting, the same as described above in connection with the rubber hose.

- 40 We may use the tube as a means of coupling together two pieces of rope or two sections of hose. For instance, as shown in Fig. 7, some of the strands of one section of rope may be cut back some distance from the end
45 of the section and some of the strands of the other section may also be cut back of the end and the loose strands twisted together, so as to form a joint of an even diameter without resorting to the ordinary method of splicing.
50 Previous to joining the ends of the rope together our improved sheathing is slipped over one section, so that when the sections are wrapped together by drawing the sheathing over the joint and pulling it out, so that it
55 will bind tightly upon the rope, and securing it to the rope at the ends we are enabled to tightly bind the uncut strands of rope to-

gether, and the more strain that is placed upon the rope the tighter the strands will bind, so that we not only rely upon the tensile
60 strength of the sheathing, but also upon its quality to hold the strands of rope in frictional contact.

Hose or tubing may be coupled in the manner shown in Fig. 8 by inserting in the ends
65 of the two sections to be joined a tubular coupling-section, and by slipping a short section of our improved sheathing over the tubes at the joint and stretching it, so as to tightly grasp the tubes at the joint, we are enabled
70 to make a joint that is strong and which will withstand more than the ordinary pressures.

It will be understood that if it is wished the tube with the sheathing may be inclosed in an outer casing of flexible material, although
75 we have found that by galvanizing the wire corrosion is prevented and the inclosing casing may be dispensed with.

We prefer to use a flat wire, because it can be used without any such tendency to cut into
80 the article to which it is applied as may in some cases exist where a round wire is used; but a round wire may be used in some cases, and it will be understood that we do not limit
85 ourselves to a flat wire.

We claim as our invention—

1. The combination of a flexible article, such as a hose, rope, &c., a sheathing composed of a series of flat wires braided or interlaced, said
90 sheathing being secured to the finished flexible article at separated points of attachment, and being free to expand and contract between said points of attachment when the flexible article is bent, substantially as described.
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2. The combination of a finished tube, a sheathing made of a series of flat wires braided into the form of a tube, said sheathing being
100 slipped over the finished tube so as to snugly fit thereon, with means for securing the wires forming the sheathing to the tube at separated points of attachment so that the wires will have free movement between the points of attachment when the tube is bent, substantially
105 as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

ROBERT KELSO.
MORRIS ROSENBAUM.

Witnesses:

CHAS. H. BANNARD,
WILL. A. BARR.