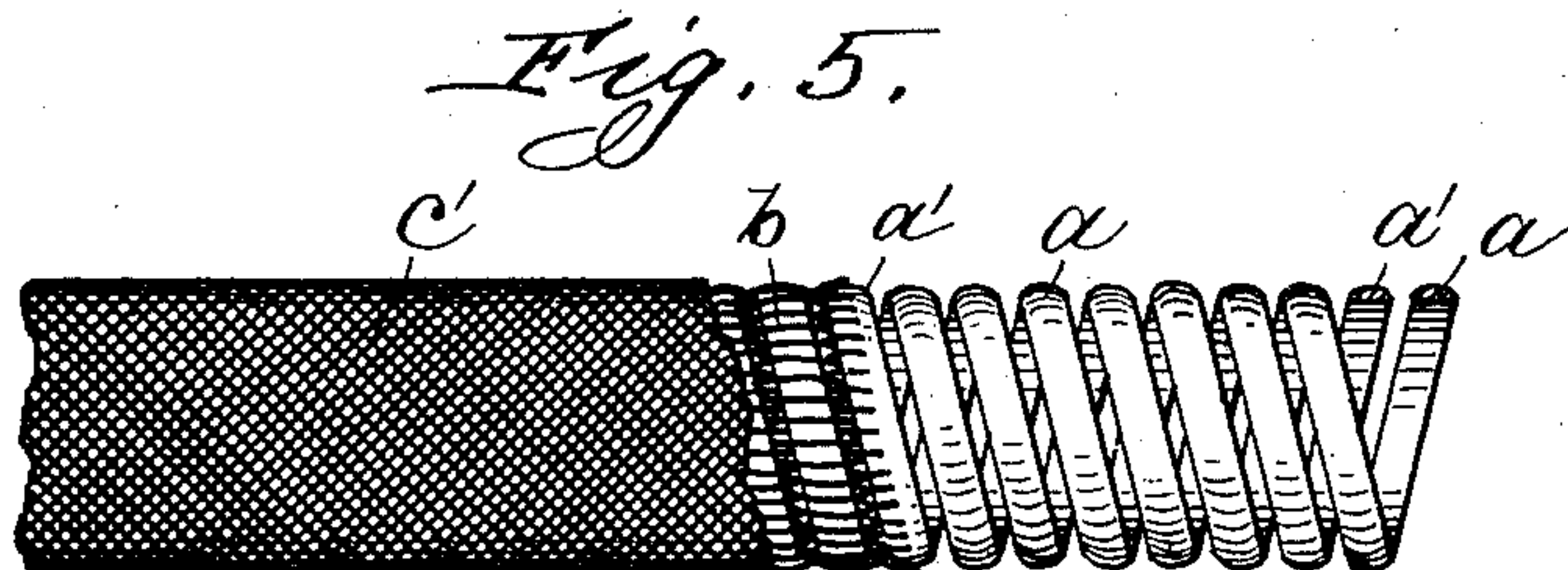
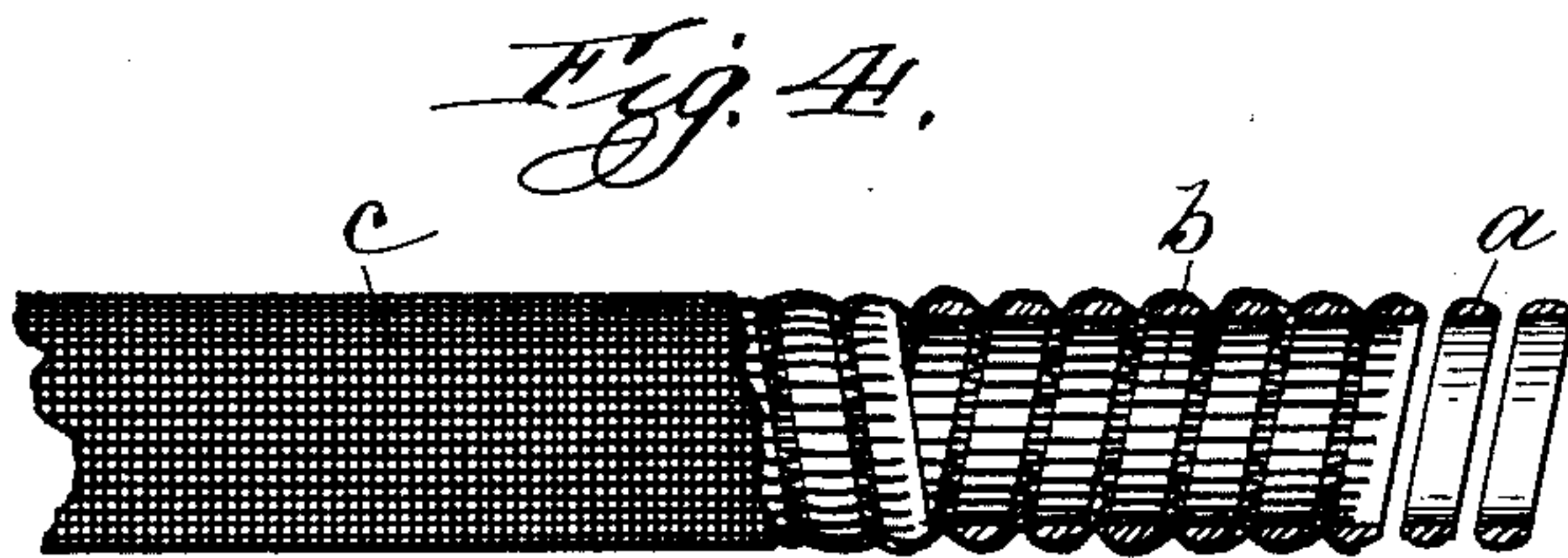
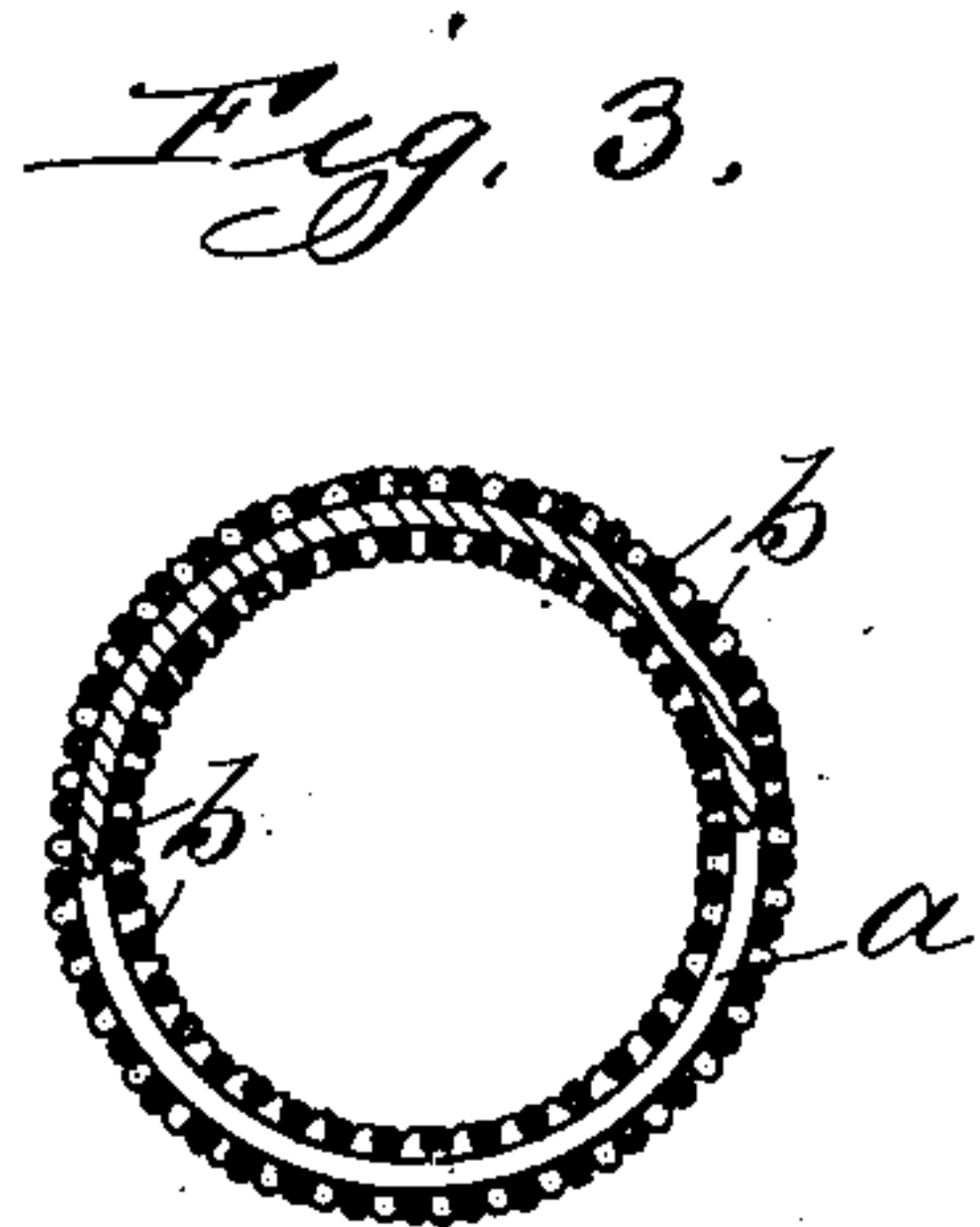
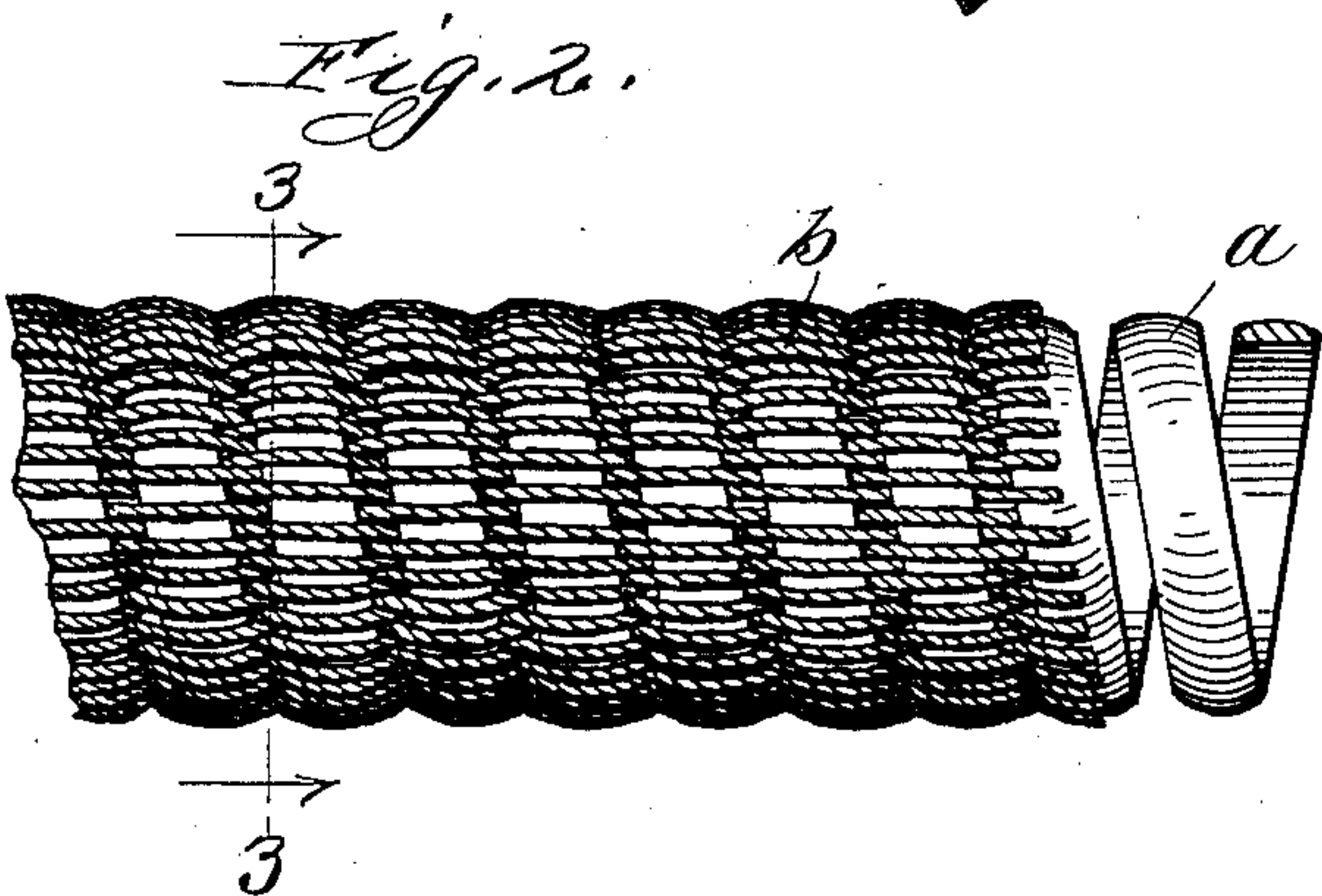
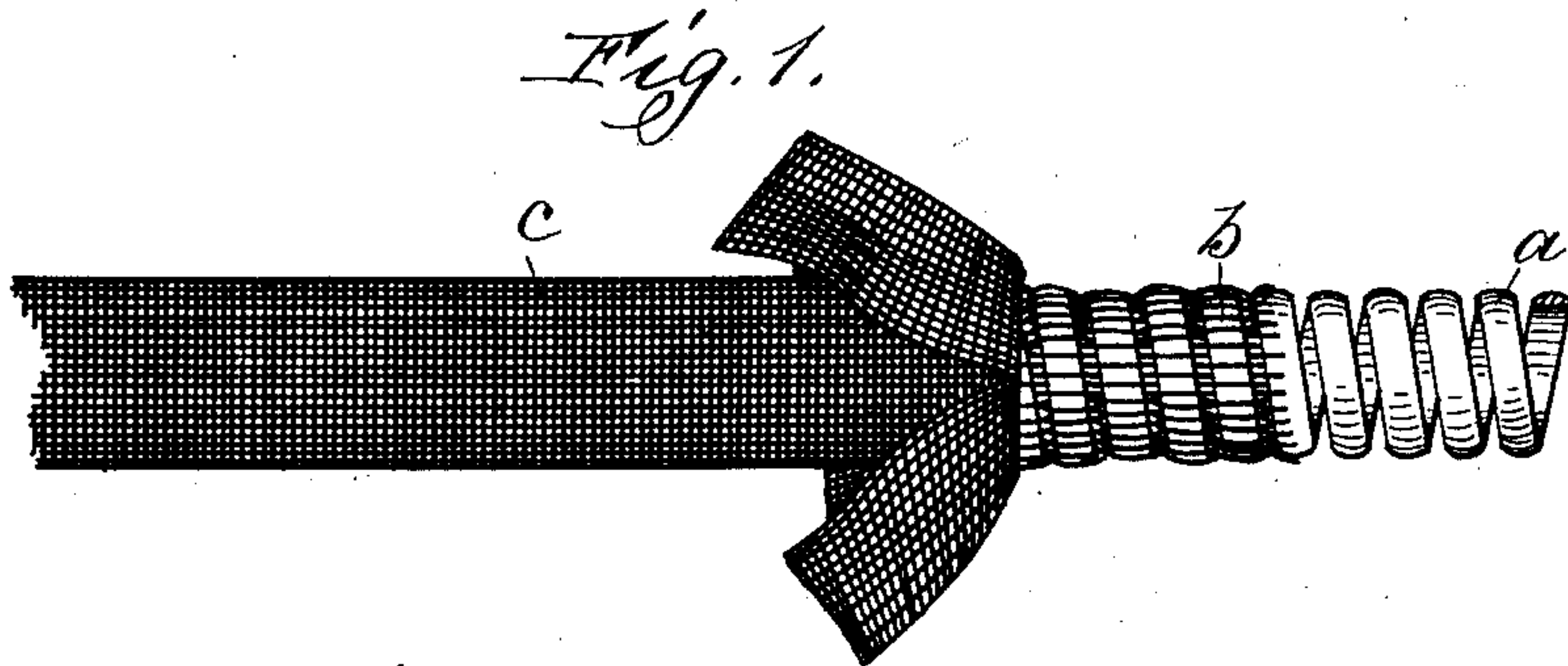


H. G. OSBURN.
FLEXIBLE ELECTRICAL CONDUIT.

(Application filed Dec. 8, 1898.)

(No Model.)



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UNITED STATES PATENT OFFICE.

HARRY G. OSBURN, OF CHICAGO, ILLINOIS.

FLEXIBLE ELECTRICAL CONDUIT.

SPECIFICATION forming part of Letters Patent No. 652,806, dated July 3, 1900.

Application filed December 8, 1898. Serial No. 698,619. (No model.)

To all whom it may concern:

Be it known that I, HARRY G. OSBURN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Flexible Electrical Conduits, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to a flexible conduit for electrical conductors, my object being to provide a form of conduit which while possessing the necessary rigidity and insulating properties may be readily flexed or bent laterally to accommodate itself to the conditions of use and, furthermore, to provide a conduit which can be manufactured at comparatively small cost.

In the preferred form of my invention the conduit is formed from an element of semiflexible material, which is bent or coiled into helical form to produce a tube-like structure, the convolutions or turns being bound together or locked in a longitudinal direction by means of elements of pliable or flexible material interwoven or interconnected with the successive turns or convolutions to impart longitudinal strength to the tube—that is, strength to withstand distortion under a tension or pull lengthwise of the tube. I have employed the term “semiflexible” with reference to the material used to indicate that property which the material should possess of being sufficiently flexible to permit of the same being bent into tube-like form, while having sufficient permanency of form to preserve the tube-like shape without undue tendency to collapse or flatten, as would be the case if the material were too pliable. The term therefore contemplates any material capable of being bent into the proper form and having sufficient rigidity of structure to preserve its form under the conditions of use. I may employ for the semiflexible element cardboard, fiber, metal—such as steel ribbon, wire, and the like—and I have found strips of cane or bamboo particularly adapted for the purpose of my invention. For the pliable or flexible material used to bind or lock the

convolutions together I may employ thread, yarn, wire, or any similar material lending itself to being readily interwoven with the semiflexible element. The convolutions of the helical coil form, as it were, the woof threads or elements of the fabric, while the elements of pliable material extending longitudinally constitute the warp threads or elements, the two series of elements being interwoven to form as a whole a tube-like structure or fabric possessing the necessary resistance to collapsing and the necessary longitudinal rigidity, while being readily flexed due to the relative movement permitted between the adjacent turns or convolutions. My structure thus comprises, in effect, a series of woofs extending circumferentially and a series of warps extending transversely thereto to interlock and bind the same together into a tube-like structure. I do not limit myself to any particular manner of forming the circumferential elements or woofs of semiflexible material nor to any particular manner of interlocking the warp elements therewith, as these may be varied without departing from the spirit of my invention.

In one embodiment of my invention I have employed for the woof thin strips of cane and for the warp cotton thread or twine and find this combination to be well adapted for the conduits on account of the insulating properties of the cane and the cotton, the cost, and the ease with which they can be handled during manufacture. Where material, as steel ribbon, is used for the woof, wire may be used for the warp or, preferably, cotton thread or twine, since the thread or twine passing across the inner and outer faces of alternate convolutions of the metal will form layers of insulating material upon the interior and exterior of the tube or conduit, while at the same time serving to effectively fasten the parts of the tube together.

Any preferred covering may be employed for the tube to complete the conduit. The covering may be formed of woven threads or of threads braided together. In flexible conduits of the prior art the structure has been such that the covering has been relied upon to impart longitudinal strength to the tube,

and it has therefore been necessary to employ for the covering threads woven together, with one series of threads extending circumferentially and another series extending longitudinally. Due to the fact that the tube-like skeleton of my construction possesses in itself longitudinal rigidity and strength other forms of covering having little or no tensile strength may be employed—as, for instance, a braided covering—and the cost of the conduit may thus be materially decreased.

By the term “interwoven” as employed herein, is contemplated any association of the binding material with the outer and inner faces of the circumferentially-extending elements or with the spaces between the same to impart strength to the structure in a longitudinal direction.

I have illustrated my invention in the accompanying drawings, in which—

Figure 1 is a view of a conduit embodying my invention. Fig. 2 is an enlarged view of the skeleton of the conduit. Fig. 3 is a sectional view on line 3 3, Fig. 2. Fig. 4 is a view showing the conduit partially cut away to expose the interior. Fig. 5 is a view of a modification.

Like letters refer to like parts in the several figures.

In the specific embodiment of my invention illustrated in Figs. 1, 2, 3, and 4 of the drawings a strip *a* of semiflexible material is coiled into a helix and a series of threads *b b* are interwoven therewith, the threads extending longitudinally to securely lock the successive layers or convolutions together and impart strength to the tube in a longitudinal direction. Upon the exterior of the skeleton as thus formed a covering *c* of any suitable material is provided—as, for instance, a woven covering, as illustrated in Fig. 1, or a braided covering *c'*, as illustrated in Fig. 5.

In Fig. 5 is illustrated a modification wherein two strips *a a'* of semiflexible material are coiled together, the successive layers or turns of the two elements being interwoven with the longitudinal threads to bind the same together and complete the tube.

As shown more clearly in Figs. 3 and 4, the threads upon the inner faces of the turns of flexible material lie quite close together and constitute, in effect, an insulating-lining for the conduit, while the threads upon the exterior of the flexible material constitute an insulating covering or sheath. When the strip of semiflexible material *a* is formed of metal or other conducting material, interior and exterior layers of insulating material are thus provided.

The conduit may be employed without the provision of an additional covering, as shown, for instance, in Fig. 2, although I preferably provide an exterior protecting covering, as shown in the other figures.

By the above construction the conduit is

readily flexible and may be bent into any desired position to accommodate itself to the conditions of use.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A conduit consisting of a series of circumferentially-extending elements of semiflexible material and binding material interwoven therewith, substantially as described.

2. A conduit consisting of a helix of semiflexible material and a binding material interwoven therewith, substantially as described.

3. A conduit consisting of a helix of semiflexible material and a flexible material interwoven therewith, substantially as described.

4. A conduit consisting of a skeleton of semiflexible material and a pliable or flexible material, as cotton, interwoven therewith, substantially as described.

5. A conduit consisting of a series of circumferential woofs of semiflexible material and a series of warps interwoven therewith, substantially as described.

6. A conduit consisting of a helical woof of semiflexible material and a series of warps interwoven therewith, substantially as described.

7. A conduit consisting of a series of circumferentially-extending elements of semiflexible material, a binding material interwoven therewith and an outer covering or sheath, substantially as described.

8. A conduit consisting of a series of circumferentially-extending elements of semiflexible material, a binding material interwoven therewith and a braided covering enclosing the same, substantially as described.

9. As a new article of manufacture, a helical coil of material having sufficient rigidity of structure to prevent collapsing under the usual conditions of use, and binding material interwoven therewith to impart strength in a longitudinal direction to the structure, substantially as described.

10. As a new article of manufacture, a tube-like structure comprising circumferentially-extending elements of material having sufficient rigidity of structure to prevent collapsing under the usual conditions of use, and binding material interwoven therewith to impart strength in a longitudinal direction to the structure, substantially as described.

11. As a new article of manufacture, a helical coil of material having sufficient rigidity of structure to prevent collapsing under the usual conditions of use, and pliable or flexible material interwoven with the convolutions of said helical coil to impart strength to the structure in a longitudinal direction, substantially as described.

12. As a new article of manufacture, a flexible conduit formed of circumferentially-ex-

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tending elements and binding material inter-
woven therewith to impart strength to the
structure in a longitudinal direction, the
whole forming a tube-like structure having
5 sufficient rigidity to prevent collapsing under
the usual conditions of use, substantially as
described.

In witness whereof I have hereunto sub-
scribed my name in the presence of two wit-
nesses.

HARRY G. OSBURN.

Witnesses:

W. CLYDE JONES,
M. R. ROCHFORD.