R. COWEN.

Manufacture of Rubber Lined Hose.

No. 226,038 Patented Mar. 30, 1880.

Fig: 1.

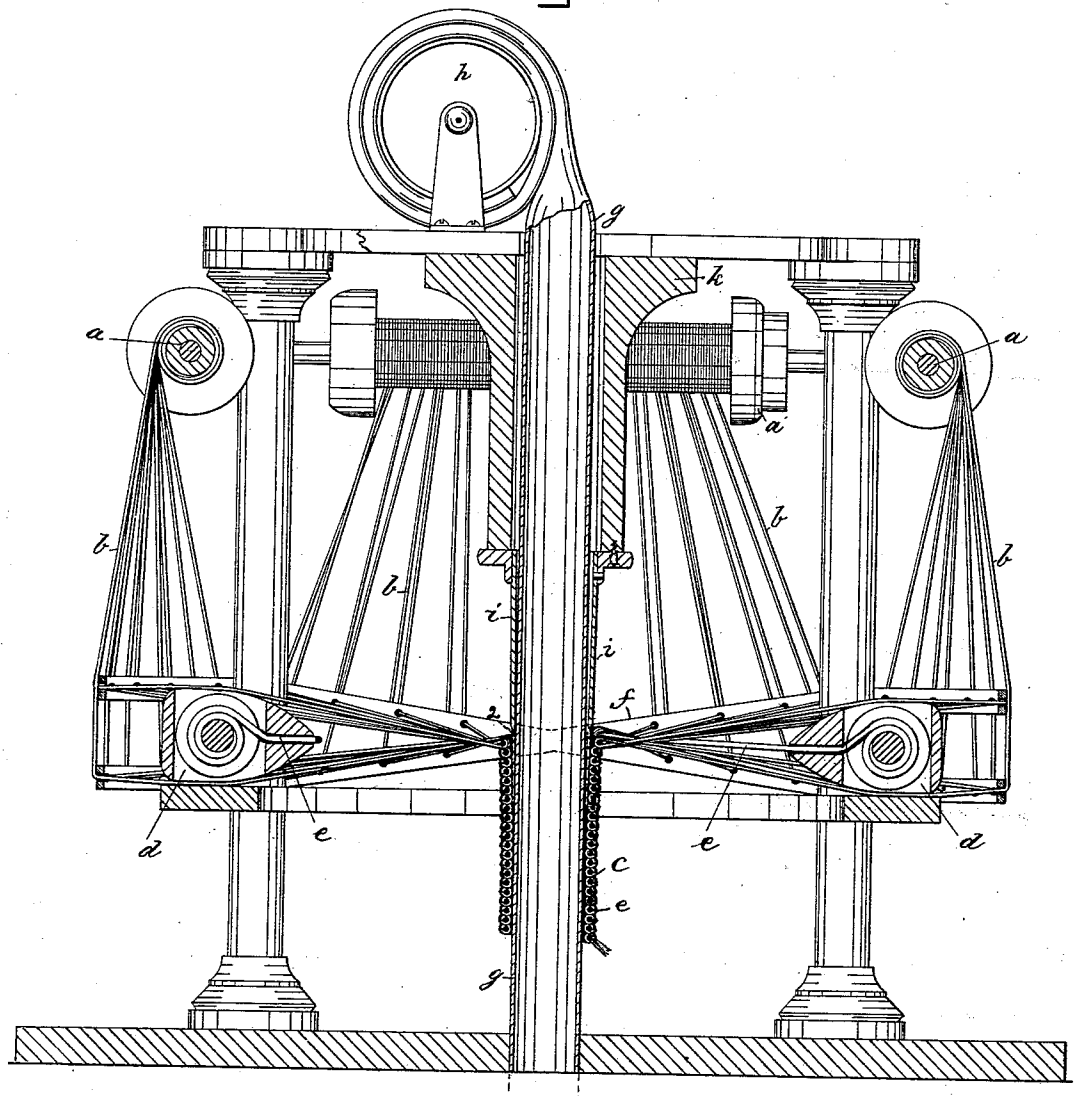
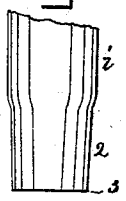


Fig: 2.



Witnesses.

A. E. Whitney.

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Inventor.

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UNITED STATES PATENT OFFICE.

ROBERT COWEN, OF CAMBRIDGEPORT, MASSACHUSETTS.

MANUFACTURE OF RUBBER-LINED HOSE.

SPECIFICATION forming part of Letters Patent No. 226,038, dated March 30, 1880.

Application filed February 9, 1880.

To all whom it may concern:

Be it known that I, ROBERT COWEN, of Cambridgeport, county of Middlesex, State of Massachusetts, have invented an Improvement in the Manufacture of Rubber-Lined Hose, of which the following description, in connection with the accompanying drawings, is a specification.

My invention relates to a new method of producing rubber-lined textile hydraulic hose, whereby the textile part of the hose is formed outside of but not directly on or in contact with the lining, the covering as it is formed being delivered upon and fitted about the lining closely and uniformly, without danger of straining, breaking, or compressing the lining or disturbing its uniformity of size and diameter, and also in certain mechanism employed in the manufacture of such hose, whereby the fabric is first formed over and upon and gaged to size according to the size of a mandrel, after which it is delivered from the said gaging-mandrel directly upon the lining-tube.

I desire it to be understood that I make no specific claim for the apparatus herein shown for making the textile part of the hose, as it is well known and in common use, and instead of the apparatus shown I may employ any other well-known equivalent apparatus to either weave, braid, or knit the textile covering.

The rubber tube, which is to constitute the lining of the finished hose, is led into and through a hollow former, (shown as a mandrel,) on which is formed the textile tube, which passes off from the hollow former upon and unites closely with the rubber tube just as the latter emerges from the interior of the hollow former. This former is herein shown as a rigid tube of metal, but may be of hard rubber or other suitable material, preferably tapering slightly both on its inner and outer surface. Where the fabric is formed upon it, it is of sufficient diameter and thickness to determine the interior diameter of the fabric and to serve as a mandrel in forming the textile tube about it, and from this point it tapers to an edge as thin as practicable, where the fabric being drawn from its outer surface comes into contact with the lining emerging from it. This former tapers on the outside for the purpose of facilitating the delivery of the textile tube upon the rubber tube, and tapers upon the inside, that there may be as little friction as possible between the rubber tube or lining and the hollow former; but I do not mean to limit my invention to a former that tapers, for it is obvious that I might employ a mandrel of uniform cylindrical shape, the metal being quite thin; but such a mandrel I do not prefer.

In this manner I am enabled to make the textile cover or tube close and compact, and of the proper internal diameter, without at the same time binding the rubber tube, and also to deliver it upon the rubber tube without breaking the latter or causing it to collapse, and without disturbing its uniformity of size and diameter, as would be the case were the textile covering formed directly upon the tube itself, the latter acting as a mandrel, as has been done.

Figure 1 represents, in vertical section, sufficient of a machine or apparatus to produce a lined hose in accordance with my invention, and Fig. 2 a view of the former or forming device separate.

In the drawings, *a* represents beams or rollers, of any desired number, to hold the threads *b*, which, as herein shown, constitute the warp-threads to be interlocked or united into a tubular fabric or textile cover *c*, by the weft-threads *e*, carried by the shuttles *d*, these parts being in construction and operation all as commonly made, and not of my invention.

In the drawings I have shown a peculiar-shaped perforated ring, *f*, which I desire it to be understood is not, in practice, a part of my apparatus, and it is herein employed only to keep the warp-threads separated and crossed, as they will be in practice when the shuttles are traveling through the sheds of the warps.

I have omitted from the said drawings the warp-shedding mechanism, as it will be of any usual construction—as, for instance, in United States Patent No. 189,353.

The india-rubber tube *g*, to be covered with the textile tube or cover, will preferably be of vulcanized india-rubber or equivalents therefor, coated upon its outside with any suitable cement—as, for instance, one composed of in-

dia-rubber dissolved in naphtha, such cement being well known; but an unvulcanized lining may be used.

The tube *g* may be wound upon a reel, *h*, from which it will be led into and through the tubular former *i*, depending from a rigid part, *k*, of the machine, and the said tube *g* will fill the interior of the said former at its lower or delivery end.

The former *i* at 2, where the warp and weft are locked and tightened upon it to give solidity to the textile covering *c*, and where the internal diameter of the said cover *c* is determined, is made as thin as possible consistent with the strain it is to bear, and tapers from such part 2 to its lower end, 3, where it occupies the least annular space between the interior of cover *c* and the exterior of tube *g*, and thus the cover *c*, completed and gaged as to internal diameter, may be fed from the end of the former as the rubber tube *g* emerges or is fed therefrom, and be applied about the said india-rubber tube, which it will fit snugly.

I aim to and in practice I make the former *i* of such length between the part 2 and its delivery end that the tension or strain of the warp and weft continue to affect the cover *c*—but to a very slight degree—until the textile cover actually comes in contact with the india-rubber tube; but the change in the interior diameter of the textile cover *c* is so little at a point opposite the delivery end of the former that the decrease in the internal diameter of the cover is only sufficient to compensate or make up for the very thin end of the former, to insure thereby a close fit between the interior of the cover and the exterior of the tube *g*, but without contracting or displacing the tube or causing it to collapse. The rubber tube and cover *c* so applied may then be treated and united together—as, for instance, as described in English Patent No. 1,861, July 3, 1857.

While applying the cover *c* to the tube *g* the latter will be kept inflated in any usual way sufficiently to insure the contact of the exterior of the said tube with the interior of the former at its delivery end.

If the india-rubber tube *g* is not vulcanized, it will be powdered or coated or rolled in an apron in any usual way, to prevent the said tube adhering, one part to another. The ends of the tube and cover having been once united, the lined fabric will be acted upon by any suitable and usual take-up, which will draw the same from the hollow former and out of the machine.

I have herein described and shown the former as a tube, upon the outside of which the textile tube was made and gaged to size, and this is the form I prefer to secure the nearest approximation to size of the outside of the india-rubber tube and the interior of the textile tube; but it will be apparent to one skilled in the art that the textile tube, instead of being formed and gaged about a tube, might be formed within the mouth of a tube or ring, as in United States Patent No. 161,273, wherein the woven tube is gaged at its outside.

To manufacture lined hose under this modification it would be necessary only to add thereto mechanism for leading the india-rubber tube into the end of the ring shown in the said patent while the fabric was being formed, and the fabric tube, coming in contact with the india-rubber tube, would carry the latter with it, as in the process hereinbefore described.

I am aware that it is not new to first weave a cover and then draw an india-rubber tube therein; but such process is difficult, expensive, requires special machinery, and has, in practical operation, many disadvantages, and much difficulty is experienced to insure a proper close fit at all points between the rubber and fabric. Moreover, this process is entirely inapplicable to hose of small diameter, as it is in practice difficult to draw the lining through the cover without breaking the lining.

I am also aware that an india-rubber tube distended on a core has been covered with a textile cover; but in such plan the india-rubber tube is more or less twisted and injured, and is very hard to handle; and, moreover, it is impracticable to use a lining of unvulcanized rubber in making hose by that process, as the strain of the threads breaks and cuts through the gum.

I am also aware that it is not novel to weave a textile tube directly upon a hollow former.

I claim—

1. That improvement in the art or method of manufacturing india-rubber-lined textile hose which consists in forming the textile cover and gaging it substantially as to internal size with the lining within, but not in contact with the cover, and then delivering the said textile cover so formed, substantially as described, directly upon the india-rubber tube.

2. In a machine for the manufacture and lining of hydraulic hose, a hollow former, substantially such as described, to receive within it and guide an india-rubber tube, combined with the mechanism to support and deliver the india-rubber tube, and with mechanism, substantially as set forth, to form upon the said former a textile tube or cover having an internal diameter substantially equal to the external diameter of the india-rubber tube, whereby the textile tube may be separately formed to exact size and be closely fitted to the india-rubber tube, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ROBERT COWEN.

Witnesses:
FREDERICK P. FISH,
N. E. C. WHITNEY.