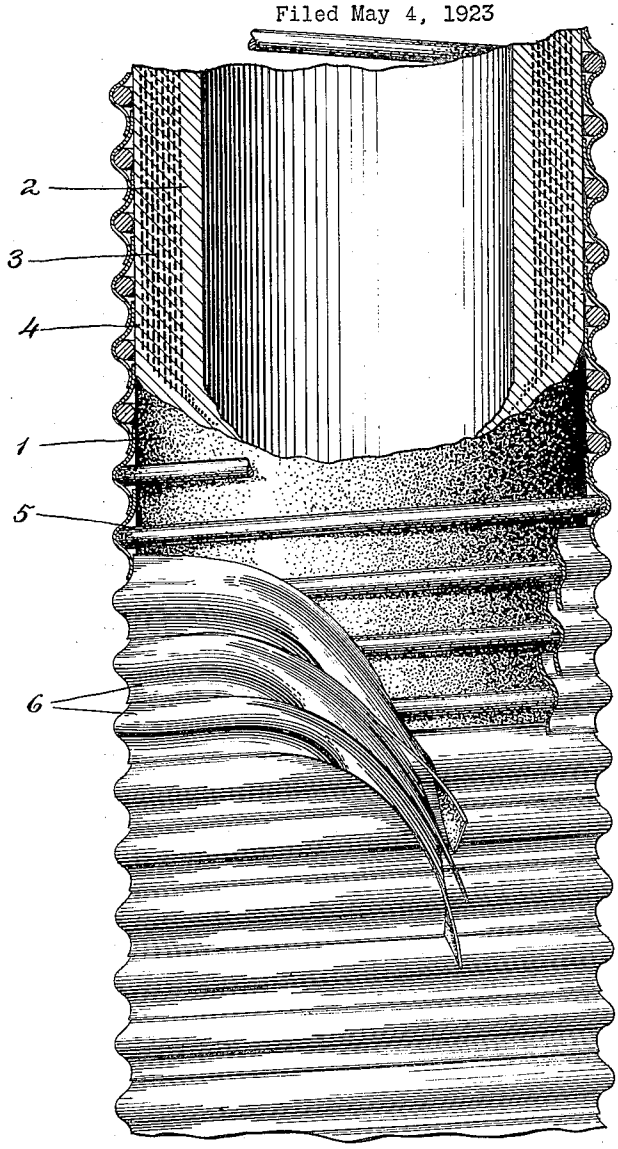
Dec. 18, 1923. 1,478,083

R. B. WHITMARSH

WIRE WOUND HOSE

Filed May 4, 1923



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UNITED STATES PATENT OFFICE.

ROBERT B. WHITMARSH, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO THE B. F. GOODRICH COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

WIRE-WOUND HOSE.

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To all whom it may concern:

Be it known that I, ROBERT B. WHITMARSH, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a certain new and useful Wire-Wound Hose, of which the following is a specification.

This invention relates to hose provided with a reinforcement consisting of rings or windings of strip material or the like, such as an external, helical winding of steel wire, and its object is to provide a reinforced, highly durable and efficient hose structure and method of making the same at a relatively low cost.

In a preferred mode of practicing my invention, steel wire of circular cross-section is helically wound with open-spaced turns over that portion of the hose which it is desired to reinforce and protect against chafing or other destructive influences, and over the wire there is then laid, parallel with its convolutions, a winding of cloth tape, preferably coated with adhesive such as unvulcanized rubber, and the tape is rolled down over and between the turns of the wire with the result of anchoring the wire convolutions firmly in place upon the hose and preventing its displacement longitudinally of the hose.

A useful application of the invention is found in connection with hose for rotary oil well drillers which is exposed to considerable abrasion and hence requires an adequate reinforcement, but the invention may also be used on hose for other purposes.

The accompanying drawing is an elevation, partly broken away and in section, showing a wire-wound hose constructed according to my invention.

In the drawing, 1 is a hose of heavy type constructed in the usual manner with a rubber lining 2, a number of plies or windings 3 of rubberized canvas, and an outer covering 4 of rubber, all vulcanized together, the common method of making such hose being to build up the tube of rubber and fabric on a mandrel, wrap it with wet cloths and vulcanize it in open steam.

5 is an external reinforcing wire of circular cross-section, wound helically with open-spaced turns upon the hose 1 and having its ends secured in any suitable manner (not shown). If such a wire winding is left bare or exposed it will in certain services, such as above mentioned, tend to creep unevenly and open up wide spaces, exposing the hose to injury between the turns. In order to overcome this objection, I provide a wrapping of tape 6, such as straight-cut, rubber-frictioned, woven fabric or "friction tape" of stout texture and of a width preferably about one and one-half times the pitch spacing of the wire coils, so that each succeeding convolution of the tape may overlap the margin of the next preceding convolution.

When this tape wrapping is in place, it is tightly rolled down with a suitable tool over and between the convolutions of the wire 5, so as to obtain the maximum contact with said wire and with the surface of the hose 1 between the wire turns. The narrowness of the cloth strip or tape used for the outer winding facilitates the rolling down of said wrapping between the wire turns and contributes to the permanent retention of its deeply-corrugated form. While a bias or other cloth wrapping of a width sufficient to take in the full length, or a plurality of turns, of the wire reinforcement might be employed, such a covering would be much more difficult to bring into permanent contact with the surface of the hose between the wire turns and hence would be less desirable than the tape.

The wire-wound, cloth-wrapped hose is now ready for use without vulcanizing or other form of further treatment of the rubberized wrapping.

While I do not wholly exclude the use of a final vulcanizing step, it is one of the advantages of my invention in its preferred form that no such final vulcanization is required. Wire-wound hose has heretofore been made with the wire embedded within the vulcanized hose wall, but this involves an expensive method of manufacture as compared with my present invention. Hose has also been used with an exposed winding of steel wire of a half-round section, but this again is somewhat expensive and of restricted application on account of the special form of wire required, and while the creeping tendency is thus reduced, it is not entirely overcome. As compared with this expedient, my invention permits the use of ordinary round-section wire and entirely eliminates the creeping.

I claim:

1. A hose having a reinforcement of wire laid in open-spaced turns and an external cloth wrapping adhesively binding the wire upon the surface of the hose.

2. A hose of vulcanized rubber and fabric construction including an integral, vulcanized-rubber cover, a helical wire reinforcement laid in open-spaced turns on said hose, and an outer wrapping of unvulcanized rubber-frictioned cloth adhering to the wire turns and to the surface of the hose between said turns for holding the wire against shifting longitudinally upon the hose.

3. A hose having a helical wire reinforcement of circular cross-section wound upon its outer surface, and a wrapping of unvulcanized, frictioned cloth overlying the wire and adhesively connected with the surface of the hose between the wire turns.

4. A hose having a helical wire reinforcement found thereon in open-spaced turns, and a helical wrapping of cloth tape overlying the wire and adhesively connected with the surface of the hose between the wire turns.

5. A hose having a helical wire reinforcement wound thereon in open-spaced turns, and a corrugated outer wrapping of cloth tape wound in convolutions parallel to the wire turns and adhesively connected thereto and to the surface of the hose between the wire turns.

6. A hose having an open-spaced, helical winding of wire thereon, and a corrugated winding of adhesive rubber tape wound in overlapping turns parallel with the wire convolutions for holding the latter against longitudinal creeping upon the surface of the hose.

7. A vulcanized rubber and fabric hose including an integral rubber covering an open-spaced, helical wire winding upon the surface of said hose, and an external wrapping of unvulcanized, rubber-frictioned, cloth tape wound in overlapping turns parallel with those of the wire and adhering to the wire and to the surface of the hose between the wire turns.

8. The method of reinforcing hose which comprises applying an external wire reinforcement thereto and securing said reinforcement in place with an external, adhesive cloth wrapping.

9. The method of reinforcing hose which comprises winding a wire helically thereon in open-spaced turns, winding an adhesive cloth tape helically over the wire and the hose, and forcing said tape into contact with the hose between the turns of wire.

10. The method of making wire-wound hose which comprises building up a tube of fabric and rubber, vulcanizing said tube, winding wire helically thereon in open-spaced convolutions, applying an adhesive cloth wrapper over the hose and wire, and rolling said wrapper against the hose between the turns of wire.

11. The method of reinforcing hose of vulcanized rubber and fabric construction which comprises winding wire helically in open-spaced turns upon the vulcanized hose, winding uncured, rubber-frictioned cloth tape over the wire and hose in overlapping turns parallel with the wire turns, and rolling down the said tape upon the surface of the hose between the wire turns.

In witness whereof I have hereunto set my hand this 24th day of April, 1923.

ROBERT B. WHITMARSH.