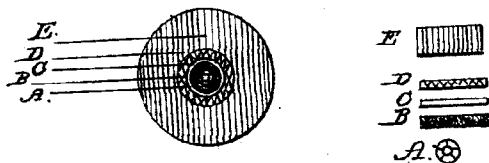


T. W. EVANS.
Telegraph Cable.

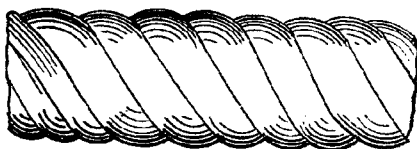
No. 32,186.

Patented April 30, 1861.

Sectional drawing of Cable



Linear drawing of Cable



witnesses

Henry H. Spear
James Lesley Jr

Inventor

T. W. Evans, M.D.

UNITED STATES PATENT OFFICE.

THOMAS W. EVANS, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVED TELEGRAPHIC CABLE.

Specification forming part of Letters Patent No. 32,186, dated April 30, 1861.

To all whom it may concern:

Be it known that I, THOMAS W. EVANS, of Philadelphia, Pennsylvania, have invented an Improved Electric Cable for Submarine or Terrestrial Purposes, of which the following is a specification.

In the electric telegraph cable of which I claim to be the sole inventor, and of which I furnish herewith description, drawings, and model, I claim and desire to secure certain important improvements. By the invention in question I secure certain advantages—namely, first, an electric conductor which shall convey the electric current with increased effect and precision; second, an insulation which shall be a perfect non-conductor, which shall be perfectly free from any confined air, which shall not absorb moisture, nor in any way impair the conductivity of the electric conductor; third, a protecting-envelope, of great strength and of light specific gravity, which shall permit the cable to be safely laid in the deepest sea and in the stormiest weather.

Mode of preparation: To obtain these results I first have copper wire drawn from metal made absolutely and chemically pure by processes similar to those employed in the refining of precious metals. Of this perfectly-pure copper wire I take seven strands, (the number may be varied, if desired,) placing them in parallel lines with each other, and when thus placed together I draw them all together through the apertures of a round-holed draw-plate. By this process of drawing I bring the separate wires in very close juxtaposition, so that in assuming the shape of sections of a prolonged cylinder they present the appearance of a cylindrical whole, a cylinder composed of as many distinct parts as there may be wires employed, as may be seen by reference to the transverse section of the wire conductor, (marked A in the accompanying drawing.) Having put the wires in this position, I pass the electric conductor thus formed through a bath of copper held in solution, and, by means of the ordinary galvanic battery applied to the bath and the wires, I superimpose upon the electric conductor a plated coating of absolutely pure copper. By similar means and the simple substitution of a bath containing gold in solution a plating of pure gold may be deposited instead of the copper coating.

Secondly, to keep the wires thus constantly

pressed together, I take pure Para caoutchouc in sheets, from which I cut narrow ribbons or strips, which I attach together strip after strip, so as to form long lengths. I next stretch these long narrow bands to the degree necessary to destroy their elasticity. When thus prepared I have this "caoutchouc cord," as it may be called, placed upon large bobbins, and from off of these, by the same method used in covering bonnet-wire, I have the cord wound around the entire length of the conductor, prepared as already described, and shown at B.

Thirdly, I next take the conductor thus coated with spun caoutchouc and pass it through a bath of pure gutta-percha in a semi-liquid state, and by having the conductor pass through tubes leading from this bath I superimpose a slight and complete coating of gutta-percha, (represented in the drawings by the white space marked a.)

Fourthly, I next proceed to cover the conductor thus far prepared with a third coating, consisting of caoutchouc, either in its pure state or vulcanized. The caoutchouc may be subjected to the process of vulcanization either before or after it is placed over the coating of gutta-percha; if afterward, the vulcanization I propose to effect will be accomplished by passing the conductor thus prepared through a bath containing sulphate of carbon in solution. Having thus far prepared the electric conductor, I pass the whole by means of tubes through a heated chamber, the temperature of which can be regulated by the admission of more or less heat, as required. By the application of a moderate heat I succeed in softening the gutta-percha sufficiently to solder firmly together the inner and outer coatings of caoutchouc, while at the same time the heat causes the stretched spun caoutchouc of the first coat to contract upon itself in the endeavor to resume its original shape prior to being stretched. The inner gum coating thus increases in volume, pressing and clinging more firmly upon the wire, and, on the other hand, forcing itself into the softened gutta-percha, thus making a solid union of all the coats and securing the total expulsion of air. This third coating is represented in the drawing at D.

Fifthly, having thus prepared the conductor and its insulating-envelope, I then cover the whole with a protecting-envelope composed of Manila, New Zealand, European, or American

hemp, cocoa-fiber, Indian-grass fiber, cotton, flax, or other fibrous materials wrought into rope form after any of the usual methods of manufacturing rope or cordage. The cable being thus prepared, I pass it through an antiseptic solution composed as follows: two gallons linseed-oil, ten pounds white lead, one gallon naphtha, three pounds bichloride of mercury, two ounces of alum, two ounces aloes, one pound copperas, thirty gallons coal-tar, thirty gallons turpentine. This solution may be applied to the fibrous materials in the raw state before being manufactured into rope. The proportions of the ingredients may be varied so as to secure to the cable an increase or diminution of specific gravity. This outer envelope of hemp is represented in the sectional drawing by E. By virtue of the natural contraction, which, in a hemp cable submerged in seawater, is equal to a proportion of three per cent. of the length, the interior wire-conductor, formed of material so ductile as absolutely pure copper, contracts equally to the same extent of its length by gradually conforming to the interstices of the insulation caused by the hempen strands forming the outer cable. When therefore the electric cable thus formed is paid out into a depth of three thousand fathoms (a depth often found in mid-ocean) this reserved margin of tension, represented by three per cent. of contraction in the outer envelope, must be entirely overcome and counterbalanced before the slightest strain can effect the metallic electric conductor.

In these specifications it is to be distinctly understood that I do not lay special claim to the use of copper wire, nor of caoutchouc, nor of gutta-percha, nor of hemp, as these have been all previously employed in the manufacture of electric cables.

What I claim, and desire to secure by Letters Patent, is—

1. The combination of wires arranged together in parallel lines and drawn into the shape of a cylindrical whole, as represented at A, by which the superficial metallic surface exposed is reduced, thus diminishing the capacity of electrical condensation, while the cable is secured against liability to total fracture by being made to consist of distinct strands.

2. The deposition of a plating of pure copper, gold, or other metal upon the conductor in combination with it, as described, thus increasing its conductivity, while, by the slight adhesion between the several integral wires, a total exclusion of air is secured.

3. The employment of caoutchouc in an unelastic state as the first wrapping upon the conductor for the purpose of insulation, substantially as described.

4. The combination of an outer coating of gutta-percha with the unelastic caoutchouc or first wrapping of the conductor, substantially as described.

5. The employment of a third insulating-coating of pure or vulcanized caoutchouc, and so uniting the several parts by heat or otherwise, for the purpose and substantially as described.

6. The employment of a hemp or other fibrous envelope for submarine cables, when the same is treated with an antiseptic solution, substantially as described, in combination with the electrode and insulation, as set forth.

THOS. W. EVANS.

Witnesses:

HENRY W. SPENCER,
JAMES LESLEY, Jr.