

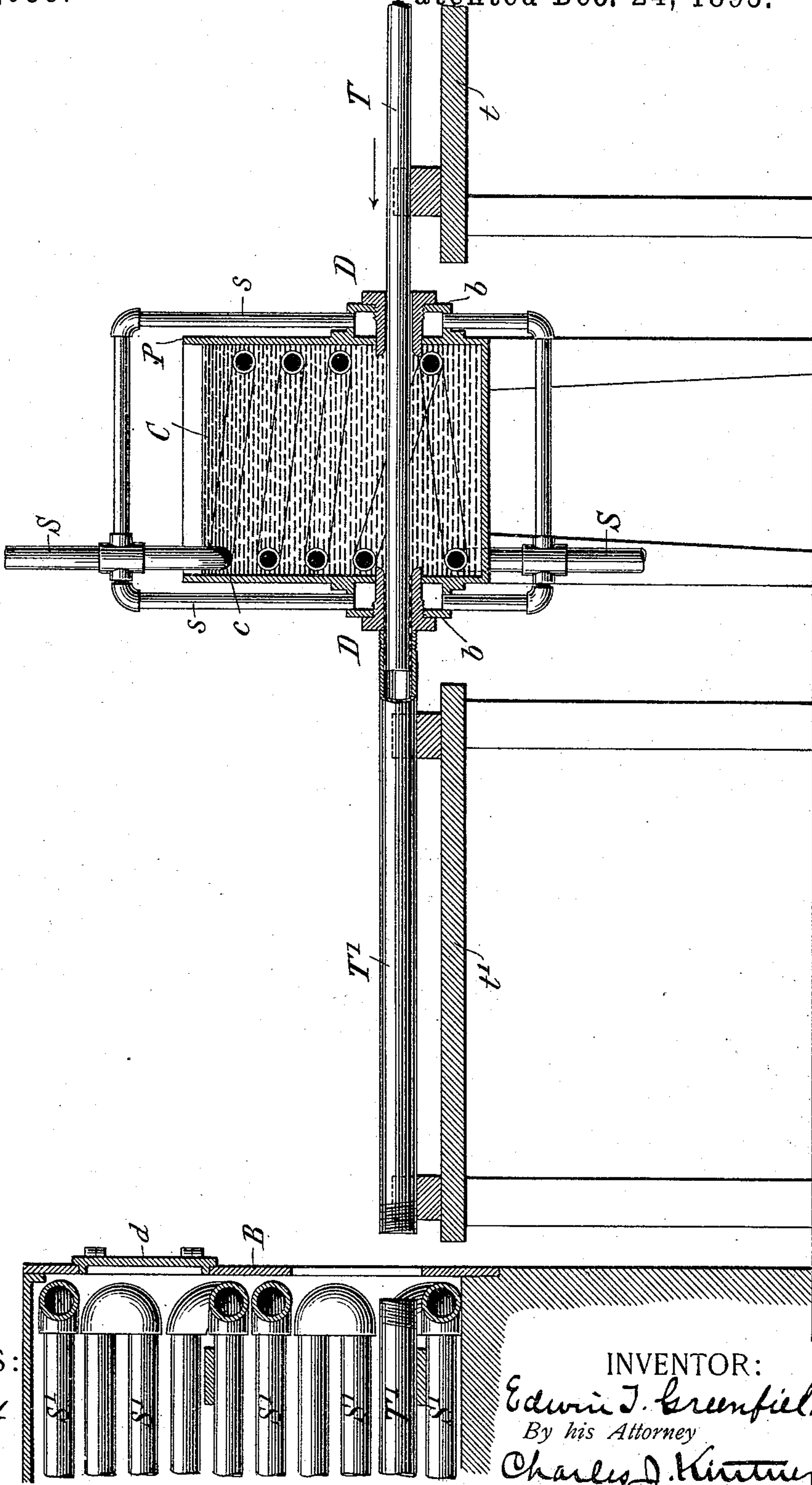
(No Model.)

E. T. GREENFIELD.

# ART OF MAKING ARMORED OR COMPOUND TUBES.

No. 552,059.

Patented Dec. 24, 1895.



WITNESSES:  
C. E. Ashley  
H. W. Lloyd.

INVENTOR:  
Edwin J. Greenfield  
By his Attorney  
Charles J. Kintner



# UNITED STATES PATENT OFFICE.

EDWIN T. GREENFIELD, OF NEW YORK, N. Y.

## ART OF MAKING ARMORED OR COMPOUND TUBES.

SPECIFICATION forming part of Letters Patent No. 552,059, dated December 24, 1895.

Application filed May 16, 1895. Serial No. 549,536. (No model.)

*To all whom it may concern:*

Be it known that I, EDWIN T. GREENFIELD, a citizen of the United States, residing at New York, in the county of New York and State of New York, have made a new and useful Improvement in the Art of Making Armored or Compound Tubes, of which the following is a specification.

My invention is directed to a novel method of and apparatus for uniting two tubes together concentrically, and will be fully understood by referring to the accompanying drawing, which is a longitudinal sectional view of one form of apparatus for effecting or carrying out my novel method, said drawing illustrating also the various steps of my method.

Referring now to the drawing in detail, B represents an oven or heating-chamber provided with steam-pipes S' S', cross-bars or supports for sustaining tubes T' therein, and openings for admitting said tubes, d being doors for said openings.

t' represents a table or stand for holding a tube T' in position, and t a second table or stand for supporting in guideways a second tube T of smaller exterior diameter than the inner diameter of the tube T'.

P represents a heating vessel or chamber adapted to hold a supply of liquid material C of an adhesive nature, such as heated asphalt, said chamber being provided with legs, as shown, and steam-chests b b.

DD are detachable screw-threaded guiding-dies secured in the steam-chests and body of the vessel P, their axes being located in alignment with the axes of the two tubes T T'. These dies may be of any desired internal diameter, dependent upon the size of the tube T.

S is a heating-pipe coiled, as shown, around the inner surface of the vessel P and connected to a steam-boiler, (not shown,) s s being branches of said pipe for affording a flow of steam through the steam-chests b b and around the dies D D.

I will now describe the manner of working my improved method or process. A tube T, preferably of paper treated with insulating material under heat, is passed through the dies D D and chamber or vessel P, the latter having been filled, as shown, with liquid asphalt, and steam being allowed to pass through the pipes S S and s s to keep said material hot.

A tube T', preferably of iron or equivalent metal, having been heated in the oven B is then drawn out and held on guideways, as shown, so that its axis is in alignment with the axis of the tube T. The tube T is now forced forward by hand or otherwise, and as it advances the heated liquid asphalt adheres to it in sufficient quantity to form a thin layer or stratum equal to the difference between the exterior diameter of the tube T and the interior diameter of the tube T'. As the right-hand end of this tube enters the right-hand die D a second similar tube is inserted and forced forward, the latter ultimately taking the position of the first tube, which has now been driven into its iron armor and may be removed, after which the compound tube is allowed to slowly cool, so that by so doing the two tubes are caused to firmly adhere to each other.

I do not limit myself to any special material as an adhesive agent, although liquid asphalt is preferred. My method includes therefore any adhesive mixture or compound which will unite two tubes concentrically in the manner named, and the tubes may be of any kind of material, although preference is had for metal or iron and prepared paper, the compound tube when so prepared being especially serviceable as an electrical conduit.

I claim also in the present application generically means for practicing my improved method, as it is obvious many devices might be constructed for effecting such method and still fall within the terms of my generic structure.

I make no claim in the present application to a compound tube when constructed as hereinbefore described, as this feature constitutes the subject-matter of a separate application filed of even date herewith and bearing Serial No. 549,535.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. A method of forming a compound tube, consisting in coating a surface of one of two tubes with a binding agent which will unite the two together when inserted the one within the other and then forcing the one within the other.

2. A method of forming a compound tube



consisting in coating one surface of one of said tubes with a liquid binding agent, then inserting one of said tubes within the other and finally causing or allowing the binding agent to set or harden.

3. A method of forming a compound tube, composed of two concentric tubes, consisting in heating one of said tubes, coating one surface of the other with a liquid binding agent, then inserting one tube within the other and finally cooling or allowing the binding agent to unite the two.

4. A method of forming an armored tube consisting in heating the armor, then coating the outer surface of the inner tube with a liquid binding agent or medium, then telescoping the two tubes, and finally causing the binding agent to set so as to bind the two tubes together.

5. A method of forming an armored tube consisting in heating the armor, coating the outer surface of the inner tube with a heated binding agent, as liquid asphalt, inserting the latter tube within the armor tube and finally cooling the liquid binding agent until it binds the two tubes firmly together.

6. A method of making an armored tube consisting in coating the exterior surface of a tubular lining with a binding agent and then causing said lining to adhere to the inner wall of a tubular surrounding armor.

7. An apparatus for uniting tubes concentrically, consisting of a vessel or chamber containing a liquid binding agent or medium; means for heating one of the tubes and means for guiding the other tube through the liquid into the first named tube.

8. An apparatus for uniting two tubes together concentrically consisting of means for heating one tube, means for coating the other with a binding agent or medium and additional means for holding and guiding the tubes so that one may be inserted within the other after the binding agent is placed upon one surface of one of said tubes.

In testimony whereof I have hereunto subscribed my name this 14th day of May, 1895.

EDWIN T. GREENFIELD.

Witnesses:

C. J. KINTNER,  
M. E. DALEY.