

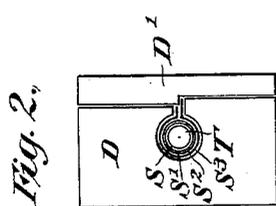
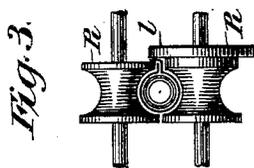
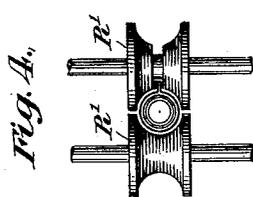
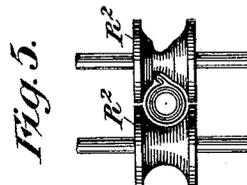
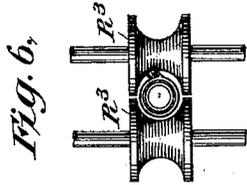
(No Model.)

E. T. GREENFIELD.

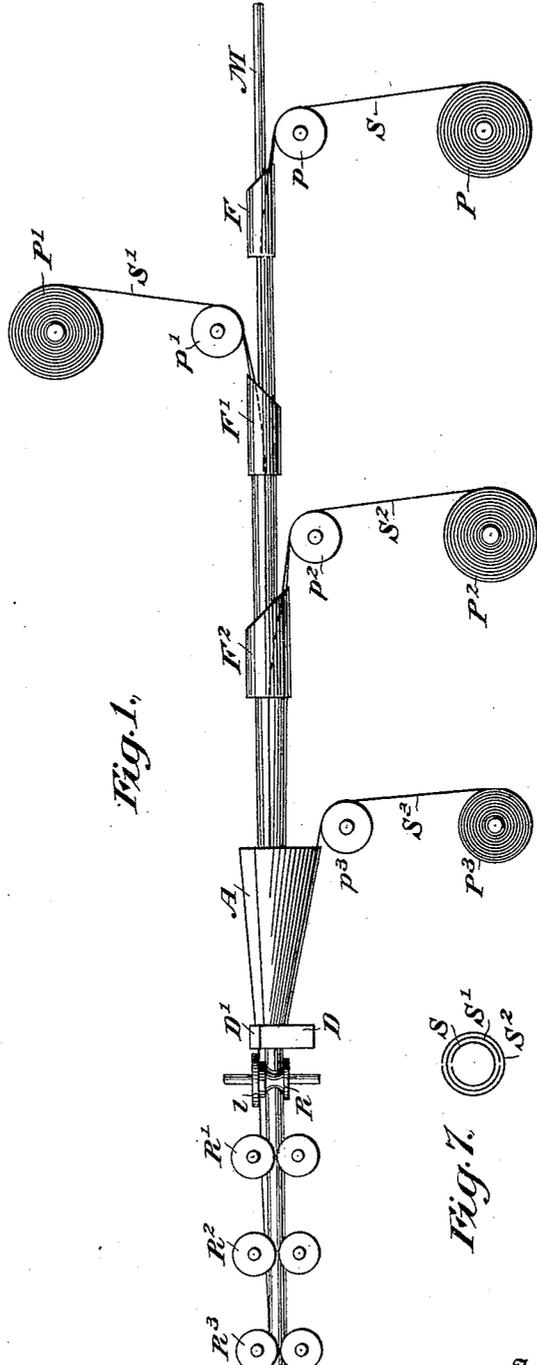
METHOD OF AND APPARATUS FOR MAKING METAL COVERED TUBES.

No. 469,663.

Patented Feb. 23, 1892.



Witnesses
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UNITED STATES PATENT OFFICE.

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METHOD OF AND APPARATUS FOR MAKING METAL-COVERED TUBES.

SPECIFICATION forming part of Letters Patent No. 469,663, dated February 23, 1892.

Application filed August 25, 1891. Serial No. 403,711. (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 and State of New York, have made a new and useful invention in Methods of and Apparatus for Making or Constructing Metal-Covered Tubes, of which the following is a specification.

My invention is directed particularly to a novel method of making a paper tube from strips of paper and simultaneously covering the completed tube with a sheathing of metal having a double lock seam or joint, the method of construction being such that the tube is made and simultaneously covered with a metal covering at one operation.

In a prior application filed by me in the United States Patent Office on the 14th day of July, 1891, Serial No. 399,471, I have described and claimed a novel method of and apparatus for covering tubes with metal by drawing the tube through a forming-die composed of a series of dies united together for folding a double-lap joint around the tube as it is drawn continuously forward. That application is directed, also, to an improved method of and apparatus for making metal tubes in a similar manner. The present application is an improvement upon the aforesaid invention to the extent that by the use of roller-dies, hereinafter described, I am enabled to very materially diminish the friction and simultaneously increase the speed with which the tubing may be drawn through the apparatus. It is also an improvement upon the aforesaid invention to the extent that I simultaneously form and cover it. Although the present application is directed particularly to metal-covered tubes and to the novel method of constructing and covering such tubes, the form of die hereinafter described is equally applicable to the preparation of metal-covered cylindrical bodies, such as curtain-rolls or other analogous solid bodies, the mandrel hereinafter described being replaced in that instance by the solid body to be covered in the same manner as described in the prior application above referred to. In other words, a moving mandrel, which constitutes the part to be covered, assumes the position of the fixed mandrel hereinafter described. In the aforesaid application I have described

a series of fixed dies of different conformation united together in close proximity to a folding or forming shoe in such manner that as the tube and metal covering-strip are drawn forward the latter is ultimately firmly bound about said tube and provided at one side with a double-lock joint or seam.

My invention will be fully understood by referring to the accompanying drawings, in which—

Figure 1 represents a side elevational view of the entire apparatus, showing a tube in the act of being constructed and simultaneously covered with a coating or sheathing of metal. Figs. 2 to 6, inclusive, are detail views of the different portions of the folding or forming dies. Fig. 7 is a cross-sectional view of the tube without the exterior metal covering, showing how the strips of paper as they are formed into a cylindrical tube are caused to break joints.

Referring now to the drawings in detail, F, F', and F² represent hollow cylindrical forming-shoes adapted to give to the several strips of paper S, S', and S² a curvilinear shape about the forming-mandrel M, which is attached to a fixed support (not shown) and extends to a point between the rolls R³ R³, where the tube receives its final shape or conformation. The strips of paper S, S', and S² are of varying width, the strip S' being slightly wider than S, and S² in turn slightly wider than S', so that when their edges are folded together about the mandrel M as they are drawn forward from the rolls P, P', and P² over the guiding-rolls p, p', and p² their edges will just abut and each succeeding strip will break joints with the one last formed as the several strips are drawn through the shoes F and F².

P³ represents a similar roll of thin metal, such as brass, having a width sufficient to surround the completed tube and be formed with extended lips as it passes through the die D D', as shown in Fig. 2, the forming-shoe A giving to it the necessary curvature and the die D D' turning up the lips, as shown. The first set of die-rolls R R have their axes at right angles to the body of the die D D', and the ledge l upon the near roll R gives to the extended lip the angular turn shown in Fig. 3. The next pair of die-rolls R' R' have their axes located at right angles to the axes of the

rolls R R, as do the succeeding pairs of rolls R² R² R³ R³, and the conformation of these rolls is such that as the tube is drawn forward the lips are folded under each other and are ultimately compressed into the position shown in Fig. 6, which illustrates in cross-section the completed tube T as it passes out of the machine, the edges of the metal strip being folded together in the nature of a locked seam extending throughout the length of the tube and parallel with the axis thereof.

I do not limit myself to the specific mechanism herein shown and described for simultaneously making a tube and covering it with metal, as I believe it is broadly new with me to make a tube of paper by drawing strips of such material through a machine which gives to them a tubular conformation and in simultaneously covering the tube thus constructed with a metal sheathing or coating, and my claims hereinafter made are directed, broadly, in this particular to such a feature.

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

1. The described method of making a metal-covered tube, consisting in drawing two or more strips of paper continuously forward, giving to the strips as they are thus drawn forward a tubular conformation the one about the other, and simultaneously incasing the tube thus completed in a metal casing having a locked seam extending parallel with the axis of the tube.

2. The described method of making metal-covered tubes, consisting in continuously drawing two or more strips of paper in the same direction and causing them to be bound together in tubular form, so that they break joints at the union of their edges, and simultaneously covering the tube thus completed with a metal casing or sheath having a locked seam extending parallel with the axis of the tube.

3. The described method of constructing metal-covered tubing, consisting in continuously drawing two or more strips of paper in the direction of their length and successively causing them to assume a cylindrical or tubular form and covering the tube thus formed at the same time with a metal sheath or cas-

ing having a locked seam extending parallel with the axis of the tube, substantially as described.

4. The described apparatus for constructing and simultaneously covering a tube with metal, consisting of two or more guide-shoes adapted to give to the material a tubular form, in combination with a fixed die and a series of die-rolls for giving to the exterior metal coating of the tube a lock joint or seam, all of said die-rolls being located exterior to the tube while it is being formed.

5. One or more forming-shoes, a fixed die, and one or more pairs of die-rolls located wholly outside of the tube while it is being formed, substantially as described.

6. In an apparatus for making metal tubes or coating tubes with metal, a compound draw-die consisting of a fixed die adapted to give to the edges of the tube a pair of projecting lips, in combination with a series of pairs of die-rolls located wholly outside of the tube while it is being formed, each pair of said rolls being adapted to give to the lips a different conformation looking to the completion of the tube, substantially as described.

7. In an apparatus for making metal tubes or covering tubes with metal, a forming-shoe adapted to give to the strip of metal a tubular conformation, a fixed die adapted to turn up the edges of the tube, and two or more sets of rolls located wholly outside of the tube while it is being formed and having varying conformation for folding the aforesaid lips into a lock seam or joint, substantially as described.

8. In an apparatus for making metal tubes or covering tubes with metal, a forming-shoe, a mandrel, a fixed die adapted to give to a strip of metal a pair of projecting lips, two pairs of die-rolls adapted in succession to turn down the longer lip over the shorter, and two additional pairs of die-rolls adapted to complete the tube, all of said pairs of die-rolls being located wholly outside of the tube while it is being formed, substantially as described.

EDWIN T. GREENFIELD.

Witnesses:

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