

(No Model.)

F. J. CLAMER.

METHOD OF PRODUCING COATED METAL ARTICLES.

No. 494,667.

Patented Apr. 4, 1893.

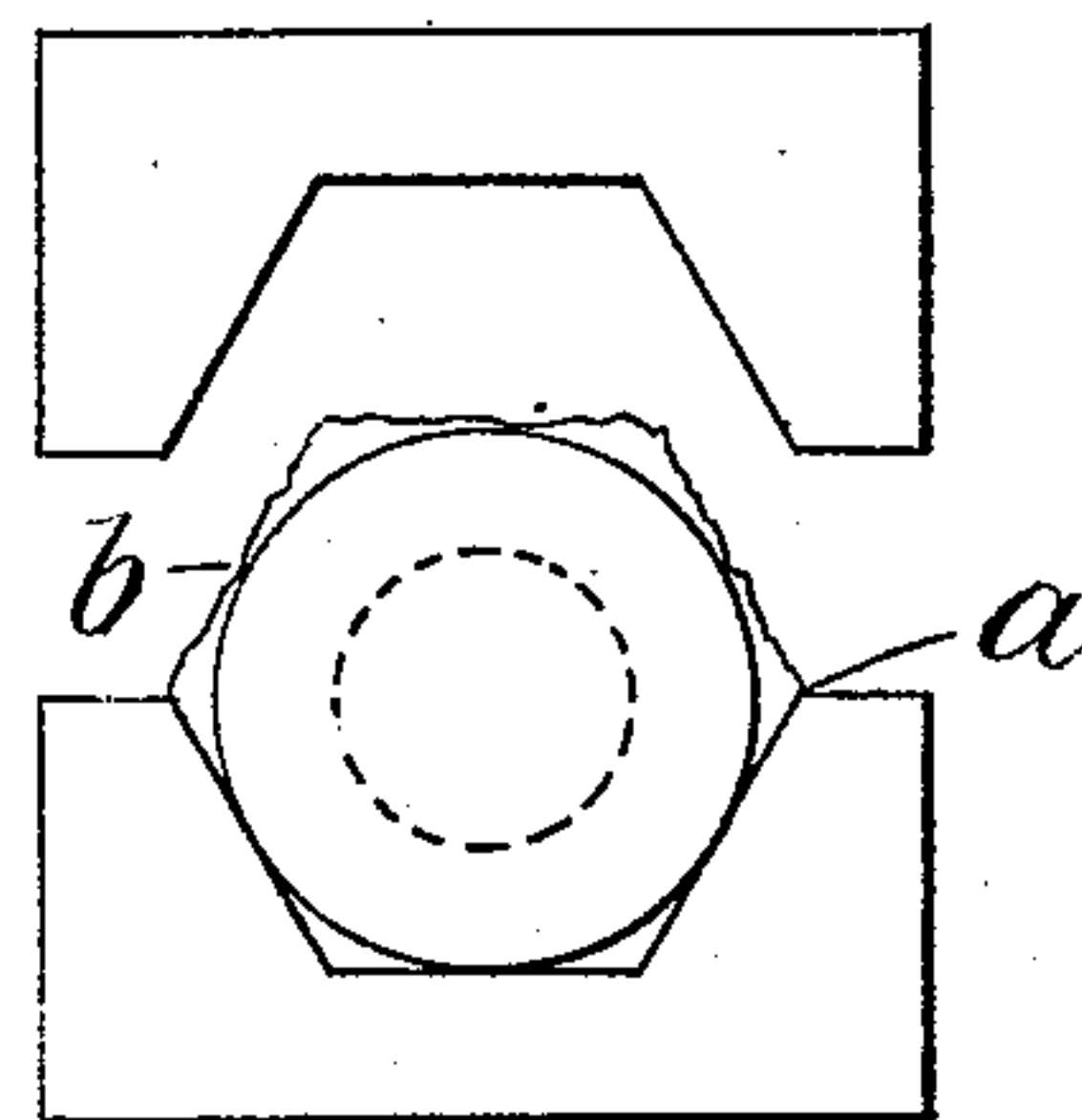
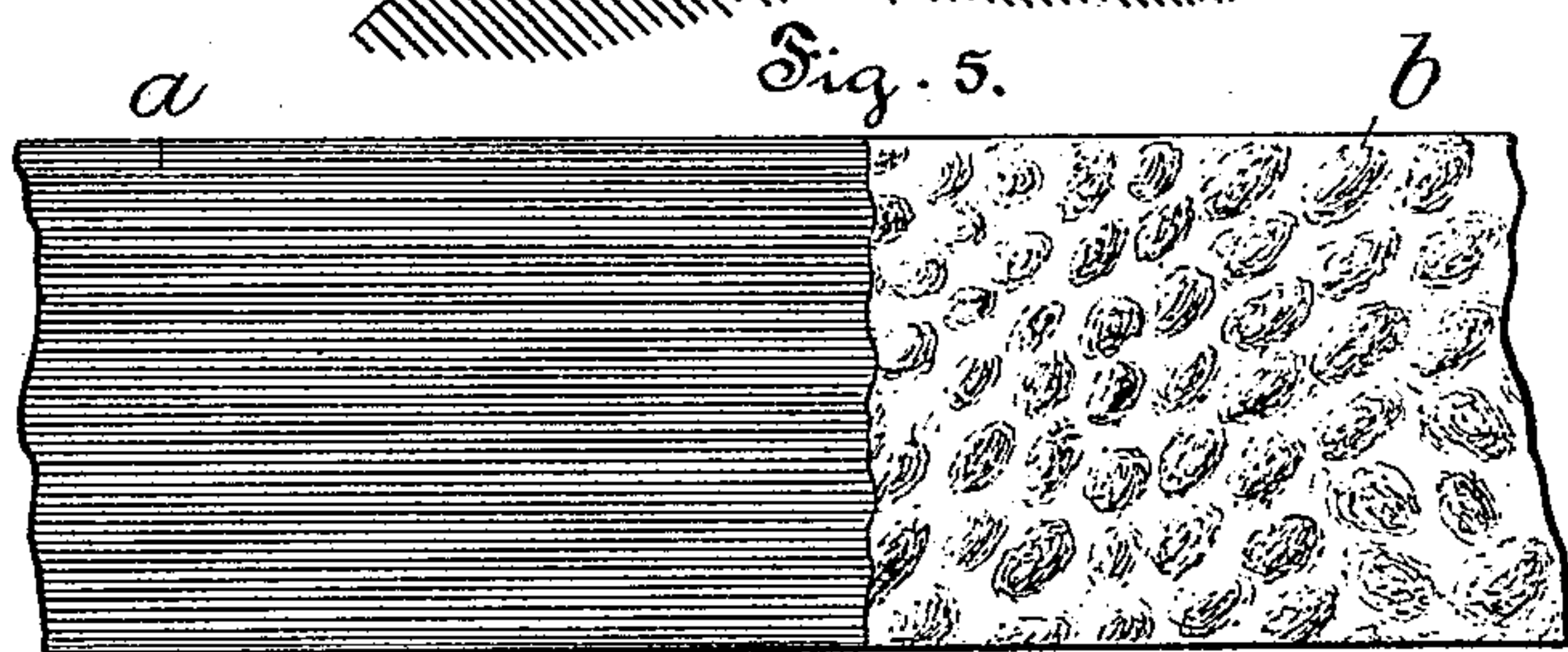
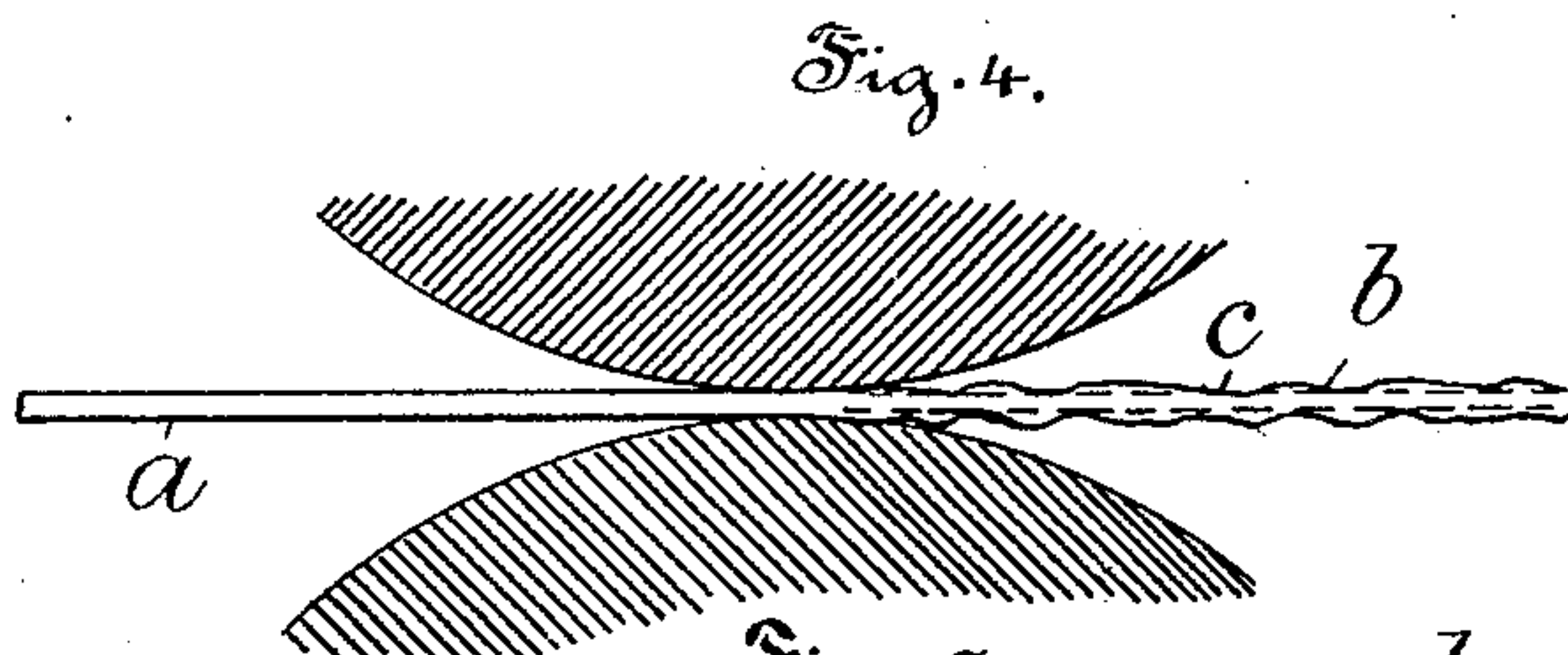
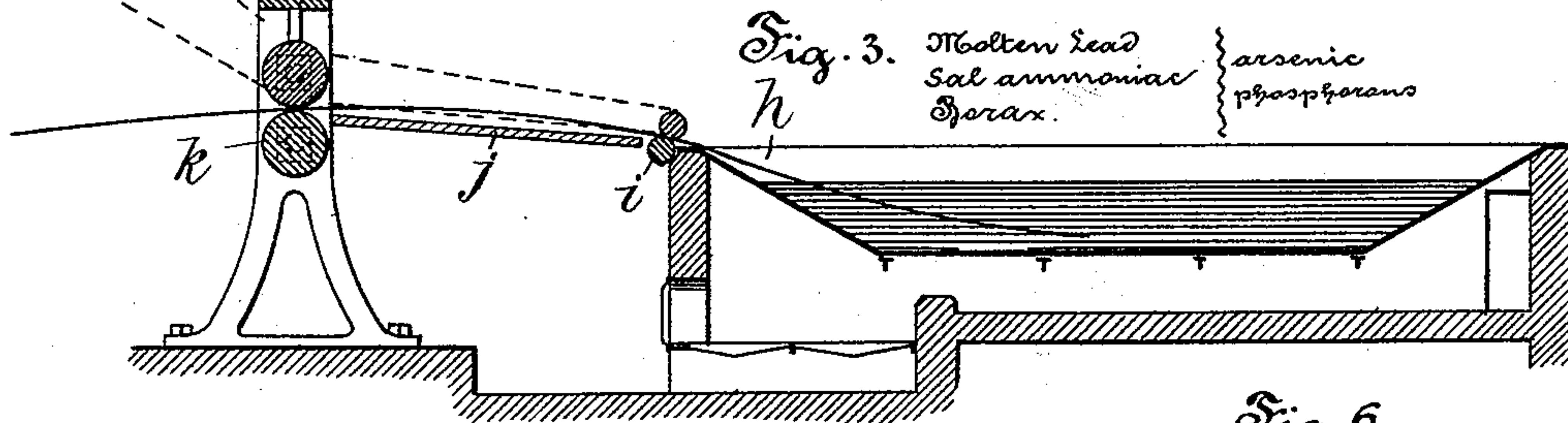
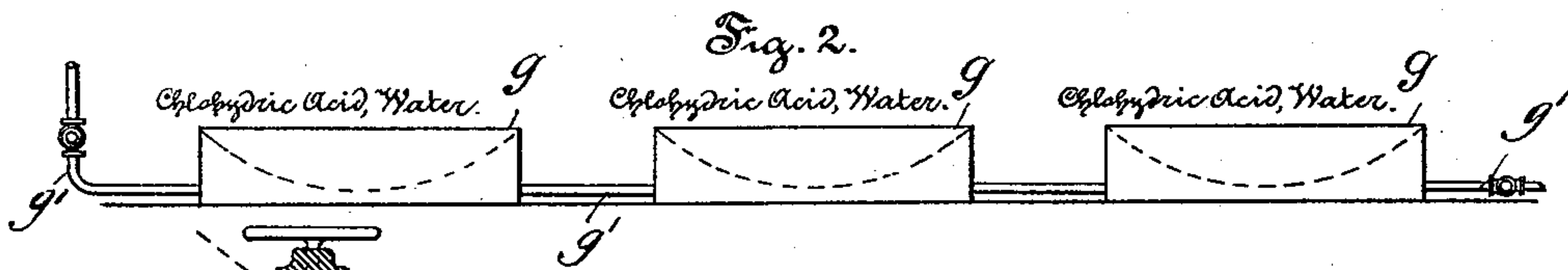
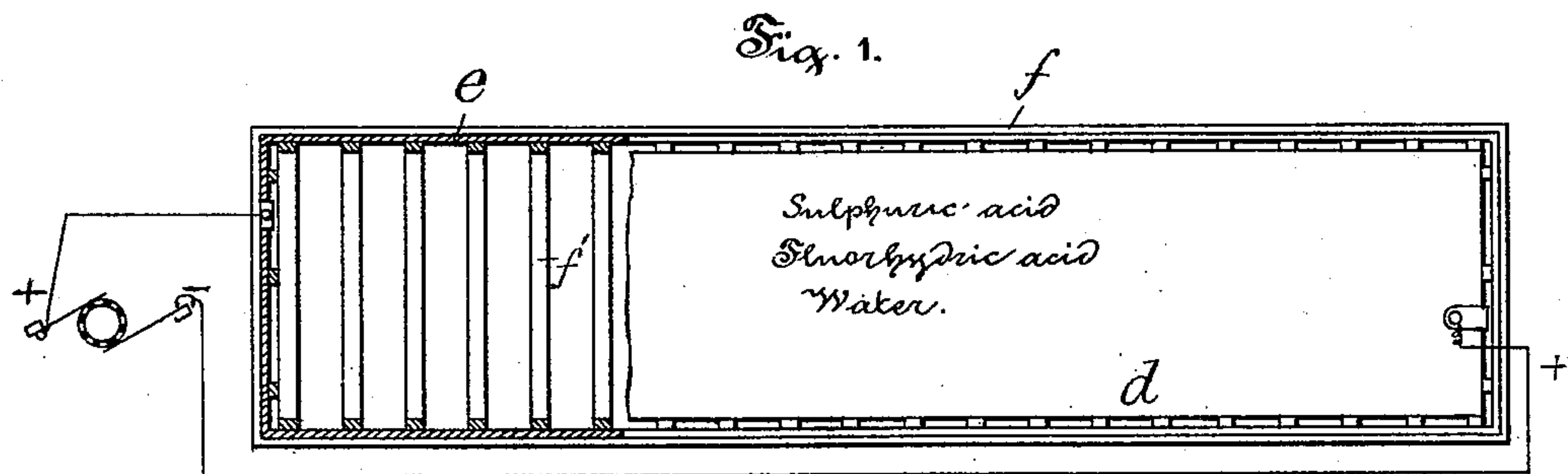
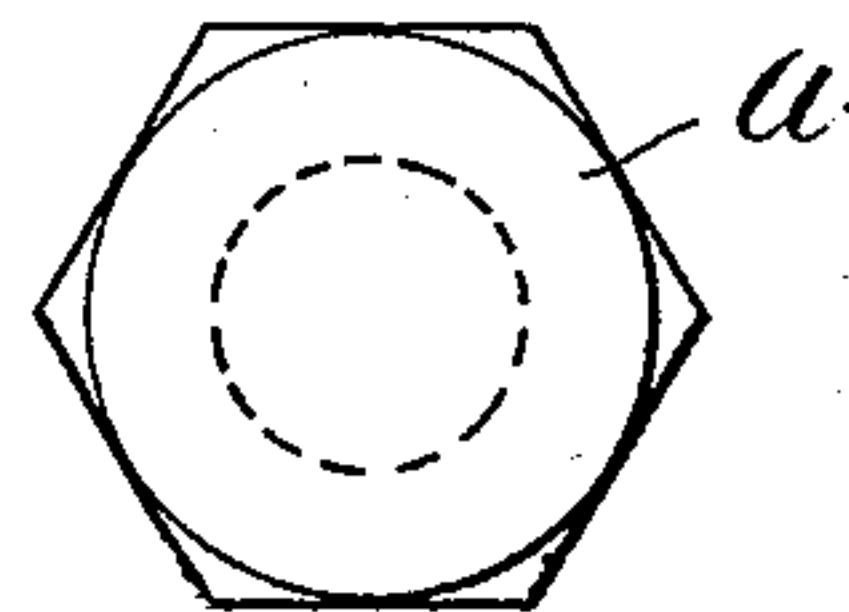


Fig. 7.

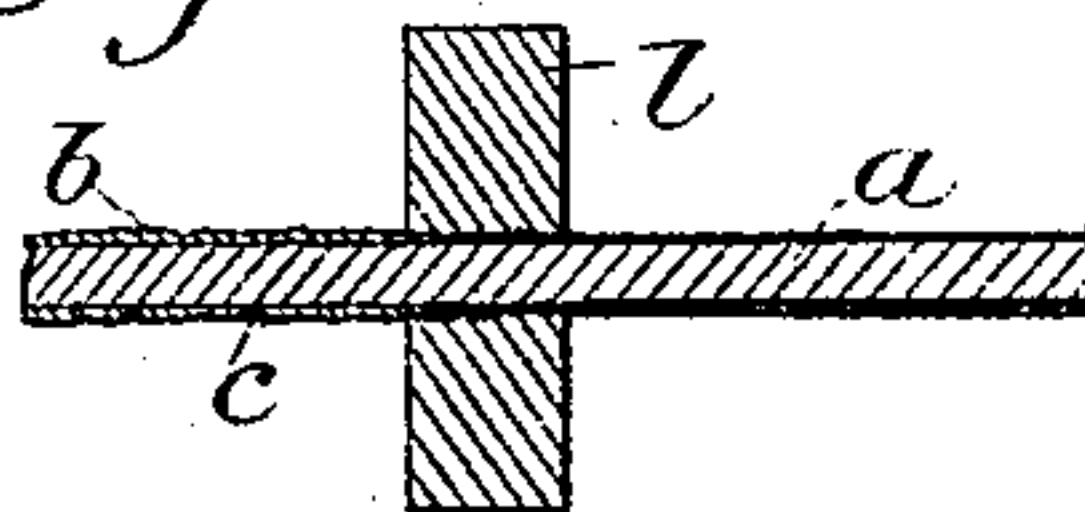


Witnesses:

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Richard C. Maxwell.

Fig. 8.



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att'y.

UNITED STATES PATENT OFFICE.

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METHOD OF PRODUCING COATED METAL ARTICLES.

SPECIFICATION forming part of Letters Patent No. 494,667, dated April 4, 1893.

Application filed March 29, 1892. Serial No. 426,866. (No specimens.)

To all whom it may concern:

Be it known that I, FRANCIS J. CLAMER, a citizen of the United States, residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in the Method of Producing Coated Metal Articles, of which the following is a specification.

My invention has relation more particularly to articles made of iron or steel, such as plates, bolts, wire and other articles of hardware and coated with lead, or analogous material.

The principal object of my invention is to provide an economical, expeditious and efficient method for producing a rust-proof or non-oxidizable coated metal article, that is, a metal article completely, smoothly and permanently coated with lead or analogous material and adapted for various uses or purposes.

My invention consists in the production of a coated metal article, of the method of applying a molten metallic coating as lead or analogous material thereto and of then converting the applied coating to a fibrous and imporous state or condition by rolling, drawing, pressing, forging or hammering the article, substantially in the manner hereinafter described and claimed.

The nature, scope and general characteristic features of my invention will be more fully understood from the following description taken in connection with the accompanying drawings forming part hereof; and in which

Figure 1, is a top or plan view of an electrolytic cell in which rust and oxide may be removed from articles to be coated. Fig. 2, is a side elevation of several tanks employed as heated baths for cleansing and washing the article. Fig. 3, is a sectional elevation of an externally heated vat or kettle in which a coating of molten lead or similar metallic material may be applied to the cleansed article and also showing means for converting the molten coating into a fibrous or dense state under pressure. Fig. 4, is a diagrammatic view, illustrating the effect produced by the application of pressure to the article having the coating of lead or analogous metallic material applied thereto. Fig. 5, is a top or plan

view of the coated article illustrated in Fig. 4. Figs. 6 and 7 are views, illustrating the effect produced by forging the coating of lead or analogous metallic material after application to the metal article; and Fig. 8, is a diagrammatic view illustrating the effect produced by the application of pressure to a wire having a coating of crystalline lead or analogous material.

In a metallic article coated with lead or similar metallic material and embodying features of my invention, the coating is dense or fibrous and the same completely and uniformly covers the article, as is shown at *a*, in Figs. 4, 5, 6, 7 and 8 in contradistinction to an article in which the coating is crystalline, as is indicated at *b*, and consequently porous as at *c*. An article made by my process is impervious to or protected from the corrosive action of the atmosphere and of various liquids and gases, because the continuous, imporous coating protects it from the same, whereas an article provided with a crystalline coating is readily oxidized and subject to corrosion under similar circumstances as stated, because liquids and gases are afforded free access to the same by reason of the existence of the pores or uncoated portions *c*. Moreover, an article made by my process presents a metallic luster, while an article having a porous surface or a crystalline coating applied thereto presents a dull unsightly appearance as well as a rough and irregular surface; and moreover, there is no affinity between the coating and the article to which the same is applied so that the coating does not permeate into and become part of the metal article but remains on the surface as a heterogeneous mass or deposit while according to my invention a strong affinity between the coating and applied metal article is created in the manner hereinafter described and thus through such affinity the coating becomes a part of the applied metal base or article thereby rendering the finished or coated metal article dense and absolutely rust-proof or non-corrosive under the influence of the atmosphere and gases or liquids.

In practice it has been found after costly experiments that it is exceedingly advantageous that an affinity be created of the bath

of molten lead or analogous material for the metal article. This result is accomplished by the presence of phosphorus in the bath of molten metal. However, the accomplishment of this result may be facilitated by subjecting the article during the washing operation to a bath comprising a solution heavily charged with the salts of soft metals, as chlorides of zinc and tin.

After the article has been covered with a coating of molten lead or analogous metallic material or materials, it is rolled or drawn as illustrated in Figs. 4, and 8 or hammered as illustrated in Fig. 6, or otherwise forged with the result that the coating is converted into a fibrous, dense or imperforate state or condition and the coating is thus distributed uniformly, smoothly, completely and permanently over the entire surface of the metal article.

A practically efficient method of practicing my invention, for the production of lead coated iron roofing plates will now be explained and from such description others skilled in the art of coating metals will be enabled to understand and employ the same in its application to other metals, such as steel, without the exercise of invention. The iron roofing plate *d*, is supported upon wooden ribs *f'*, and is constituted the anode and a metallic lining *e*, the cathode, in an electrolytic vase or cell *f*, containing an acid electrolyte, comprising preferably water acidulated with sulphuric and fluorhydric acids. The ensuing electrolytic action occurring thoroughly cleanses the surfaces of the iron plates and removes all oxide or oxides therefrom. The proportion of acids employed in the electrolytic bath, varies and will depend upon the quality and condition of the iron plates. However, good results have been attained by the employment of five (5%) per cent. by weight, more or less, of sulphuric and fluorhydric acids. After the plate *d*, has been electrolytically cleansed in the manner hereinbefore described, it is washed in a series of tanks *g*, containing preferably water acidulated with fifteen (15%) per cent., more or less, by weight of chlorhydric acid and heated to a temperature of about 110° Fahrenheit by means of steam pipes *g'*, or in any other preferred manner. It may be remarked that the bath comprising a solution heavily

charged with the chlorides of lead and tin or zinc and tin may, if preferred, be contained in one of the tanks *g*, or in another tank similar thereto, and may be applied to the plate by immersing the latter therein. The chemically cleansed and washed plate is then immersed in an externally heated vat or kettle *h*, containing preferably molten lead, sal-ammoniac, phosphorus and arsenic with or without borax or other similar flux, it being understood that the presence of the phosphorus gives rise to an affinity between the plate and the lead so that the latter is absorbed by and combined with the former. The plate is drawn from this vat or kettle *h*, by means of feed rolls *i*, and is covered with a porous crystalline lumpy coating *b*. The plate *d*, is then allowed to traverse the guides *j*, and is delivered between squeeze or pressure rolls *k*, which not only serve to reduce the gage thickness and pliability of the plate, but also to convert the porous crystalline lumpy lead into a smooth and permanent, imperforate, fibrous, imporous and dense state or condition.

In the manufacture of coated wire according to my invention, after the application of the hereinbefore described coating thereto, the wire is passed through a series of conical die-plates of which one *l*, is shown in Fig. 8.

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

The method of coating a metal article with fibrous or imporous lead or analogous material, which consists in cleansing the article by making it the anode in an electrolytic cell containing an electrolyte, such as water, hydrochloric and hydrofluoric acids, then washing and cleansing the article in baths containing water and hydrochloric acid, then immersing the article in a bath of molten lead or analogous material and phosphorus and then subjecting the article to pressure, substantially as and for the purposes described.

In witness whereof I have hereunto set my signature in the presence of two subscribing witnesses.

FRANCIS J. CLAMER.

Witnesses:

THOMAS M. SMITH,
RICHARD C. MAXWELL.