

UNITED STATES PATENT OFFICE.

FRANK SHUMAN, OF PHILADELPHIA, PENNSYLVANIA.

PROCESS OF TREATING METAL STRUCTURES.

SPECIFICATION forming part of Letters Patent No. 593,440, dated November 9, 1897.

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To all whom it may concern:

Be it known that I, FRANK SHUMAN, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented a certain
5 Improved Process of Treating Metal Structures to Prevent Corrosion, of which the following is a specification.

The object of my invention is to prevent the corrosion of structural ironwork, particularly columns and girders made up of two or
10 more pieces bolted or riveted together.

My invention is adapted for use in structural ironwork for buildings, bridges, piers, &c.

It is a common practice now to paint all
15 structural ironwork, so as to protect it from the air and moisture, but paint is not a permanent coating, and it will not penetrate the cracks and crevices of the structure. Consequently in painting structural work the inside of the column or beam is either painted
20 before being built up or left unpainted.

Structural ironwork has of late been electroplated in single pieces, so as to make a permanent covering for the metal of the structure, but built-up structural work, in which
25 the several pieces are secured together, has not been electroplated. If the work be electroplated in an alkaline solution, the plating will not penetrate into the small crevices of
30 varying sizes necessarily left between the plates and around the rivets, nor will the plating cover all the crevices, so as to make them air and weather tight. Some of the small crevices may be bridged over in an im-
35 perfect manner, and this bridging seals up some of the solution used in plating, which afterward oozes out and destroys the appearance of the work. Work thus plated when
40 exposed to the weather is not protected against water and air entering the cracks, which soon corrodes the interior of the work. If, on the other hand, the usual process of electroplating in single pieces be applied to built-up
45 work, the case becomes much worse. The usual process consists in giving the work first a very thin coating of the plating metal in an alkaline solution, thus protecting the iron against merely chemical deposition in the acid copper-bath, and then putting on the
50 heavy weather-resisting coating in an acid solution, which deposits much quicker and cheaper. If built-up work be subjected to

this process, it will be plated only on the exposed surfaces by the alkaline solution, and when transferred into the acid solution the
55 acid will enter into all of the cracks and corrode the unprotected surfaces inside. The electroplating by the acid solution will proceed rapidly on the outside exposed surfaces, and many of the smaller cracks will be bridged
60 over, thereby confining the acid solution within the cracks of the structure, where corrosion will continue.

By my invention I am enabled to thoroughly coat the structural ironwork, so that
65 neither moisture, air, nor the acid solution of the plating-bath will enter the cracks.

In carrying out my invention I in the first place thoroughly dry the built-up metal-work to be treated and then submerge it into melted
70 paraffin in a tank, in which a high vacuum can be attained. This insures the penetration of the paraffin into the minutest cracks and the thorough filling up of the same. Should there, however, be any large crevices
75 in which the melted paraffin would not be held by capillary attraction until solidified, it will be necessary to close the bottom ends of the same. This can be done in several
80 ways, either by the use of plaster-of-paris, clay, or equivalent material. After the structural work has been submerged and the vacuum kept up for, say, ten minutes the work is removed and allowed to cool. After this the
85 greater portion of the paraffin adhering to the outer surface is scraped off, and the balance is removed, preferably by sand-blast. After the sand-blasting process the work is given a thin coating of copper in an alkaline solution and then lifted out and thoroughly washed.
90 The paraffin showing in any of the larger cracks is dusted with graphite or other conducting powder, so as to assist bridging over the crevices. The structure is then plated in the ordinary acid copper solution, so that a
95 durable coating is deposited on all the exposed surfaces of the structure.

In the place of paraffin other substances may be used—such as rosin, wax, pitch, asphaltum, sulfur, and varnishes or oils capable
100 of drying or oxidizing into a solid; but for general purposes I prefer to use paraffin.

In some instances the work may be simply dipped into paraffin without using the

vacuum-tank. The best results may be obtained by heating the paraffin to a high degree and immersing the structure therein, so as to expand the ironwork.

- 5 While I prefer to use copper as being the most economical and one of the best protectors against weather, still the structure may be plated with other metals, and where it is not wished to plate the structure I may use
10 the first process—that is, the paraffin or its equivalents—and then paint the structure in the ordinary manner, as the structure can be made much more serviceable in this manner than by the ordinary process.
- 15 While my invention is especially adapted for use in connection with built-up structural wrought iron and steel, it will be evident that the invention may be applied to pitted cast-iron structural work, so that the pitted portions of the work will be thoroughly protected
20 from the air and moisture.

I claim as my invention—

1. The process herein described of treating structural metal-work to prevent corrosion,
25 said process consisting in first filling the

cracks or crevices with paraffin or equivalent material, removing the surplus paraffin, coating the work with copper in an alkaline solution, dusting the exposed paraffin with plumbago and finally plating the entire surface in
30 an acid copper solution, substantially as described.

2. The process herein described of treating structural metal-work to prevent corrosion, said process consisting in first filling the crevices or cracks with paraffin or equivalent material, removing the surplus paraffin and preparing the surface of the metal by sand-blast, coating the work with copper in an alkaline solution, dusting the exposed paraffin with
35 plumbago and finally plating the entire surface in an acid copper solution, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of
45 two subscribing witnesses.

FRANK SHUMAN.

Witnesses:

WILL. A. BARR,
JOS. H. KLEIN.