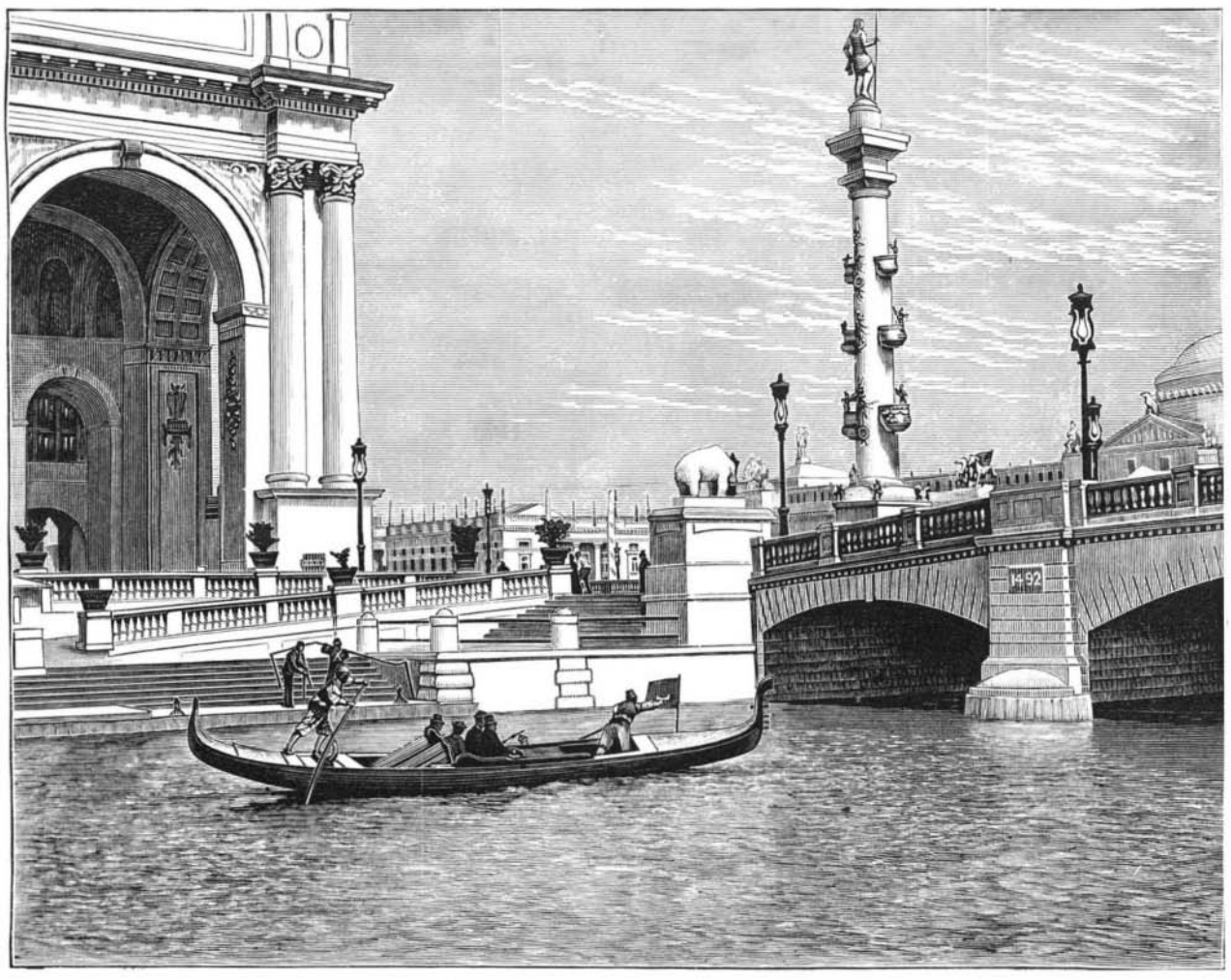
THE WORLD'S COLUMBIAN EXPOSITION—THE NORTH CANAL AND BRIDGE.

The Fair grounds contain many picturesque bits in which the buildings, statuary and the water of the lagoons and canals form happy combinations. We present herewith a view of the bridge which affords a passageway between the Electricity building and the Manufactures building. This bridge begins just beyond the luminous fountain at the end of the lagoon, and is the main thoroughfare to the great Manufactures building. The body of water in front, over which the sharp-prowed gondola swiftly skims, is the North Canal that empties into the main basin, which is at right angles to it. At the right of the picture the dome of the beautiful Agricultural building will be noticed. The large column directly over the bridge is one of the six rostral pillars which are placed at intervals around the main basin. The pillar is ornamented with the prows of galleys and is surmounted by a statue of Neptune. The balustrade which runs along the Manufactures building from north to south is decorated by a number of large plants. The magnificent flight of steps afford a landing place for the launches and gondolas. Balustrade, bridge, column and statuary are all covered with the dazzling white staff which has given the Exposition the name of the "White City." As will be seen by the illustration, each arched entrance to the Manufactures building is covered by a small dome which is painted by an American artist. These little domes, which were introduced for decorative purposes, deserve careful study, as they are painted by the most eminent men in the profession. Blashfield, Reinhart, Beckwith, Shirlaw, Cox, Simmons, Reid, Weir, Melchers, F. D. Millet and Earle, each have specimens of their work upon the domes. The subjects, with one exception, are treated in the classical style, and represent the arts of peace and war. It seems almost impossible that this huge building would seat 300,000 persons. The architect of the Manufactures building was Mr. Geo. B. Post, of New York, its length is 1,687 feet, and it is 787 feet wide. It is said to be the largest roofed building ever erected. In the construction of this mammoth edifice 17,000,000 feet of lumber, 12,000,000 pounds of steel, 2,000,000 pounds of iron and five car loads of nails were employed. The glass for the roof filled forty cars. The roof is 212 feet 9 inches high.



THE WORLD'S COLUMBIAN EXPOSITION—THE NORTH CANAL AND BRIDGE.

Aluminum Flashlight.

Professor Glasenapp emphatically advocates the use of aluminum in place of magnesium for the production of flashlight. He states that aluminum, if employed in the form of bronze powder, is equal to magnesium as a source of light in taking photographs by flashlight, and that it is much cheaper then the latter. The following mixture is recommended by the author:

Aluminum powder	21, 7 parts by weight.
Sulphide of antimony	13, 8 " "
Potassium chlorate	64, 5 " "

In preparing this mixture the same precautions are to be taken as in the case of magnesium flashlight. As the rapidity of combustion of the above mixture, one seventeenth of a second has been found out. Two grammes of the mixture were burnt in a small heap, 2 cm. long and 1 cm. wide. With regard to the chemical intensity the author has found, by exposing gelatine plates beneath a Warnerke actinometer to the light of the above mixture and to that of other mixtures prepared with magnesium, that by employing equal quantities of metal the aluminum light is superior to the magnesium light, though not very considerably. The speed of combustion is slower (about one-fifth of a second) if the following mixture is used:

Aluminum powder	30 parts by weight.
Potassium chlorate	70 " "

Electroplating with Copper.

In no branch of the electroplaters' art has there been so much progress made in recent years as in that of copper plating. With improved solutions and methods, copper plating is becoming a more important industry every day, and the following notes on some new applications and methods may prove of interest to your readers:

The application of copper electrically deposited to protect and ornament architectural iron work is, perhaps, the most important use and deserves consideration first. This use is now firmly established and a plating department is recognized as a necessary adjunct to all large iron works. There is no paint or other like protection known that will prevent iron exposed to the weather from rusting in time. But when iron is covered with a sufficiently heavy coat of copper it is rust proof. The amount of copper required to do this varies. For rolled sheet steel or iron where the surface is smooth and free from sand holes, from 8 to 10 ounces of copper per square foot of surface will be sufficient. Where rough cast iron work is to be plated, 14 to 16 ounces will be required. These amounts are greater than is generally given in books treating on this subject, but from practical experience the writer has found that to give a protection that will last as long as the structure will stand, and to prevent entirely any appearance of rust, the above amounts are necessary. The first cost of copper protection is, of course, greater than paint; but this is more than compensated by its lasting qualities, and in some instances, where there are difficulties in reaching the work to paint it, as in high towers, lighthouses, etc., its use would seem to be particularly indicated.

For inside work, where plating is used more for effect than as a protection, zinc, tin, or aluminum is generally added to the bath to give the copper a bronze appearance, and a coat of 2 or 3 ounces to the square foot will suffice. Electro-bronzing has been used extensively for ornamenting inside iron work in recent years, much more so than copper plating has been used to protect outside work, which is comparatively a new use for copper plating. But this use is extending all the time. Architects are quick to see the advantages of an impervious coat of copper on iron work, which overcomes the most objectionable features of iron for architectural use, rusting, and the constant expense of keeping it painted. A notable example of both kinds of plating will be seen in the new Bourse building, about to be erected at a cost of, outside of the land, $1,000,000, in Philadelphia. The outside iron work, such as the window frames, will have a heavy protective coat of copper deposited on them and the inside work will be electro-bronzed.

As I have said, great improvements have been made in the solutions and methods used. In France, where copper plating was first used to protect iron, the copper was not deposited directly on the iron, but on a coating of varnish rendered conducting with plumbago, or powdered copper, applied to the iron surface and allowed to dry. This was done to avoid the difficulties of cleaning the cast iron and the use of two solutions in depositing the copper, as the object, after the varnish was dry and the plumbago applied, was placed directly in the acid solution. This method gives a coating that is not firmly attached, and is liable to be torn off on coming in contact with any hard object. Examples of this system of plating may be seen on the lamp-posts of Paris and on the beautiful fountains of the Place de la Concorde and of the Place Louvois. The method used in this country deposits the copper directly on the iron, and a sheet of steel or iron so plated may be bent or twisted into any shape without the copper becoming detached. To attain this result, the greatest care must be taken in cleaning and keeping clean the iron surface before immersion in the plating solution, in this case a cyanide one, which, when properly made, is run cold and deposits the copper in a bright state. The acid solutions have also undergone improvements, and copper can now be deposited at the rate of 20 to 25 ounces per square foot that is as malleable and almost as smooth as rolled copper. The density of current can also be much increased over what was formerly believed possible. The writer has deposited copper ⅛ inch thick at the rate of 10 pounds per square foot in 24 hours. (The usual rate is about 8 ounces in 24 hours.) This would take only one-twentieth the time usually required for obtaining a shell in electrotyping. Another new application of copper plating is the manufacture, quickly and cheaply, in copper, of all kinds of raised mouldings and of artistic objects in bass-relief. This is done by first preparing thin sheets of copper by electro-deposition on a prepared steel surface, then stripping them off and stamping the design, in relief, on them, and, after stopping off the face, backing them up in the bath with more copper to the required thickness.

Signs are also made by electro-deposition; but this is only a form of electrotyping, although the finished result when nickel or silver plated is very beautiful.

There are other minor applications of this kind that are new, but would take too much space to describe, such as the plating with copper of natural objects, leaves, flowers, etc., attached to brush and mirror backs. The brush or mirror and spray of leaves or whatever may be used, is rendered conducting by a new process, which does not include bisulphide of carbon in its application with its attendant dangers of explosion and fire.

The manufacture of metallic papers by depositing copper on a prepared surface and then pasting paper thereto and stripping the two off together.

The latest and most interesting proposed use of copper plating is the protection of ships' bottoms. By a recently patented method copper can be applied quickly and cheaply in sections, which overlap each other, to the hull of the vessel during construction, or it may be applied to vessels already built.

The above are a few of the new applications of copper plating, and serve to show the progress that has been made in the art. J. D. DARLING.

MR. THOS. H. COX, of Chamberlain, South Dakota, furnishes us with the description of a new artesian well lately drilled at that place. The well is situated 1,342 feet above the sea level, and is about 200 feet from the Missouri River. The well is 8 inches in diameter and is 662 feet deep. The drilling consumed 17¾ days and was proceeding in the usual manner without meeting any obstruction until August 2, when a light flow commenced and the drilling was continued until 4 A. M. the next morning, when the tools were thrown out. The pressure increased until the column of water ejected reached 13 feet 2 inches in height. This is the third artesian well in the city, and will be utilized for power for a flour mill and electric light plant. One of the other wells, 6 inches in diameter and 760 feet deep, exerts a pressure of 117 pounds to the square inch.