TOPOGRAPHICAL MAPS.

The United States Geological Survey has been carrying on important work for the last sixteen years, important not only to scientists and engineers, but also to the public as well. This work consists of the preparation of topographical maps of various sections of the United States, from careful observations and surveys, and their subsequent publication and distribution. Already about one-quarter of the United States, exclusive of Alaska, has been mapped in this way, and it is the intention of the Geological Survey to issue maps covering the entire country. The Evening Post recently had an interesting article upon this particular branch of work carried on by the Geological Survey, from which we condense the following: In carrying on government and other engineering and scientific works, such as investigating water supply and irrigation, timber cultivation and transportation routes of all kinds, an accurate knowledge of the topography of the territory under consideration is one of the first essentials; and in arranging for the topographical survey of the country, the government decided that it should result in a series of maps which should be valuable as a basis of further scientific work. The maps are comparable with the military maps of Europe, as they furnish all the details of the country, including roads and watercourses. The maps are 16½×20 inches and are drawn on a scale of 1:62,500, or an inch to the mile. Surveys for the maps are made by the engineers of the Geological Survey under the supervision of the Director at Washington, and in many cases there has been co-operation between the national survey and the various State surveys.

The start is made with a primary triangulation obtained from the Coast and Geodetic Survey, in which certain primary points are located with mathematical accuracy. It is often necessary for the engineers of the Geological Survey to extend the primary triangulation of the coast survey and to do considerable triangulation, both primary and secondary, on their own account, so as to embrace the points needed forthe territory which is being surveyed. After the triangulation is completed, the topographical party takes the field, and a topographer and two assistants occupy themselves with the section of country contained in a single sheet of map. The topographer, who has already located the principal heights in the district, sketches in the contour lines showing the different elevations, while the assistants use, where possible, a horse and buggy to measure the distances. The ponds, lakes, and water supply are carefully marked and the other topographical features are indicated on the field sheets, which are then taken to Washington, and a map drawn on a scale of one and one-half times as large as the printed sheet when issued. In Washington the survey has its own bureau of engraving and printing where the maps are engraved on copper. Changes are constantly being made in these copper sheets, and from them copper-plate maps are obtained; but these maps are not issued, however. They are simply used as copy for the photo-lithographers to make their maps, for the maps which are issued are printed from lithographer's stones. The sheets are printed in three colors, the cultural features, such as roads, cities, towns, and railroads, and also the lettering, being black, the water features blue, and the hill features brown. The contour lines indicate intervals of twenty feet. By an act of Congress these maps are disposed of by sale and they can be purchased at the rate of five cents each, or in quantities of a hundred or more for two cents per sheet. On application to the Director of the Geological Survey, a list of maps now published could be obtained which will enable bicyclists, tourists, or surveyors to purchase these valuable maps. Local atlases may be readily made by purchasing a number of these and binding them. These topographical maps are made parts of a series of geological volumes issued by the Survey.

MEETING OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

The thirty-ninth meeting of the American Society of Mechanical Engineers will be held at Washington, D. C., May 9 to May 12, and the sessions of the society will be held in the Arlington Hotel. The opening session will take place on Tuesday evening, May 9, and an informal reception will be held by the president and officers of the society. This will take place in the Corcoran Gallery of Art. A second session will take place on Wednesday morning, and the reading of a number of professional papers. On Wednesday afternoon there will be held a reception of the society by President McKinley in the Executive Mansion at 3 P. M., and on Thursday morning professional papers will also be read, and in the afternoon an excursion will be made to the navy yard, where the gun factory, trial tank for ship models, ordnance museum, and ships will be visited. In the afternoon there will be a reception tendered to the society by Mrs. George Westinghouse, and after the closing session on Friday morning, papers will be read. In the afternoon an excursion will be made to Mount Vernon, and in the evening a visit will be paid to the Washington Monument, which will be lighted for the occasion, as will also be the Congressional Library, where an admirable opportunity will be given for inspecting the lighting and ventilating machinery and the book conveyors. The meeting promises to be one of unusual interest.

OZOTYPE.

A NOVEL METHOD OF CARBON PRINTING.

Although "carbon" is the most beautiful, the simplest, and most permanent of all printing methods, it has not, in this country at least, attained any considerable degree of popularity. For this there are several reasons, all more imaginary than real, with the exception, perhaps, of two. These are the invisibility of the printed image and the fact that the image is reversed, double transfer, simple as it is, seeming to frighten both amateur and professional. But if all that is claimed for this new method is true, both of those objectionable features will be abolished.

In the 1898 exhibition of the Royal Society there were two exhibits that attracted considerable attention and much speculation. They were by Mr. T. Manly, of London, and included prints in various colors, including pigments and aniline colors. In the catalogue they were entered as "Examples of ozotype printing in pigment, being carbon printing without actinometer, transfer or safe edge, and in which the pigmented gelatine does not come in contact with a chromic salt."

Up to March 23, that was all the information we had, but on the evening of that day Mr. Manly brought the subject before the Royal Society, by way of demonstration; and without going fully into it, gave sufficient information to enable anyone to try his hand at it, promising to return to it when certain patent arrangements were completed.

The principle involved is the old, old one discovered by Ponton in 1839, the splitting up, by light, of chromium trioxide into chromium sesquioxide, and the rendering insoluble of soluble organic matter by the action of the nascent oxygen.

In the practical application of this to ozotype, paper is coated with a solution containing a chromate and a manganous salt, and exposed under a negative in the ordinary way, till a distinct image of a brown color is formed. The image is positive and is then washed in water till the unaltered salts are removed, and nothing but the positive image is left. The next step is to immerse the print and a piece of unsensitized carbon tissue in a solution containing acetic acid and hydroquinone or other suitable phenol derivative. They are then withdrawn and squeegeed together, and hung up to dry. When dry, they are placed for half an hour in cold water and then transferred to warm water, and developed as an ordinary carbon print.

A possible explanation of the changes that take place may be as follows: The oxygen liberated by the light from the chromate salt is absorbed by the manganous, which is converted into a manganic; and that oxygen is again liberated by the acetic acid, to be in turn absorbed by the gelatine. This absorbed oxygen, aided by the hydroquinone, renders the gelatine sufficiently insoluble to bear development, and so we have the positive picture, and of any color that we desire.

Until further notice, the following may be taken as an experimental working formula:

SENSITIZING SOLUTION.

Manganous sulphate	14 drams or parts.
Potassium bichromate	7 " "
Water	12 ounces or 100 parts.

This may be applied with a brush to any good plain paper, such as Whatman's, or a paper already coated with gelatine may be employed. If plain paper, then the dried print must be coated with two per cent solution of gelatine, and allowed to dry before immersion in the bath, which may be as follows:

Acetic acid glacial	3 grains.
Hydroquinone	1 "
Water	2 ounces.

The carbon tissue should be immersed in this for about one minute, taking care that no air bubbles are formed, and the print for only a few seconds; and if the tissue be cut just a little smaller than the print, there will be no chance of slipping while squeegeeing.

It will be evident that carbon tissue of any color may be used, and probably tissue colored by aniline, and that as there is a visible image and no sensitized tissue to spoil, there should be a great future before ozotype.

The following hints may be of use to experimenters:

When rough paper is used, printing should be carried a little deeper than with smooth.

For increasing contrasts, increase the acetic acid in the bath. For softness, increase the hydroquinone.

The addition of a small quantity of magnesium sulphate to the bath tends to solubility of the gelatine.

In case of an under-printed proof, immersion in a very weak solution chloride of lime may improve matters. The sensitized paper will keep for months.

A washed print can be developed after nine months, perhaps longer.

The acid bath should be used at a temperature of between 65° and 75° F.

THE DURABILITY OF TYPEWRITER RIBBONS.

Recently the Department of State desired to know the permanency of the ink and typewriter ribbons for a machine which was to be used for copying the records of the Department of State, and the work was done in the chemical laboratories of the Agricultural Department. The report makes it conclusive that the impression made by the machines from the kinds of ribbons submitted is indestructible. An analysis was made of the ink with a view of determining the nature of the pigments and dyes contained therein, together with the proportion of the oil which forms the basis of the ink. The following results were obtained:

	Per cent.
The volatile matter (water, essential oils for perfuming, etc.)	3·71
Oil	74·51
Blue dye (giving the reactions of methylene blue)	0·93
Prussian blue	13·11
Lampblack (or other form of finely divided carbon)	8·19
Total	100·45

On combustion the ink yielded 9·23 per cent of ash, consisting mainly of ferric oxide, which was nearly equivalent to the percentage of Prussian blue indicated above. The ribbon was placed in a typewriter, and samples of the writing were made on three grades of paper. Portions of these were submitted for seven days to the action of the following reagents: Petroleum ether, alcohol, water, strong chlorine water, a mixture of ether and alcohol, three per cent oxalic acid, ten per cent citric acid, ten per cent hydrochloric acid, ten per cent tartaric acid, and four per cent sodium hydrate. There were no visible signs of action, except that in the case of the chlorine water and sodium hydrate the writing was turned brown, in consequence of the methylene blue and a part of the Prussian blue. It was found that several of the reagents decolorized the ordinary nut gall and iron ink, but in spite of this partial bleaching, the typewriting was readily distinct and readily legible. The carbon of the ink is practically indestructible by reagents which will not destroy the paper, and the oil which forms the basis of the ink carries the finely divided carbon so far into the paper, even when the latter is glazed, that any attempt at erasure necessitates such abrasion of the surface of the paper as is readily detected by a lens, if not with the naked eye.

Prussian blue is a fairly permanent pigment, but yielded more easily to chemical reagents than did the carbon. The blue dye in the sample submitted, which was probably methylene blue, is soluble in alcohol and water, but is protected by the oil which forms so large a percentage of the ink. The only improvement indicated by the tests is the increase of the percentage of the carbon and the decrease of the percentage of Prussian blue. It is undoubtedly true that an ink made of these ingredients in the proportions indicated above will meet every requirement in regard to permanency. It was not thought necessary to extend the analysis to include such minor ingredients as wax, resin, soap, etc., which are added to inks to improve their printing qualities.

THE TUGRIN FOG DISPELLER.

The Monthly Weather Review, published by the Weather Bureau, recently had an account of the Tugrin fog dispeller, which consists of an outlook pipe 8 feet long, the internal diameter being 3 inches. There is a wide flange at the mouth placed so as to be convenient to the navigating officer. A tube enters the pipe from below, and a blower sends a powerful stream of warm air through the tube and the pipe straight ahead, blowing a hole through the fog as it were, which is rolled back in every direction. The moisture is said to condense and flow in rain drops. The navigating officer is enabled to see through the densest fog for several hundred feet. If this blower operates satisfactorily in a horizontal position, it might also do the same in a vertical one, and the region around the blower should, therefore, be well wet by the rain drops that are thus formed out of the fog. It might be an expensive operation, but it would be worth trying on the coast of California, where it is desired to utilize fog.

THE ROWLAND TELEGRAPH SYSTEM.

Prof. Henry A. Rowland gave an exhibition of the workings of his new multiplex telegraphy printer at the meeting of the Johns Hopkins Scientific Association on April 27. The new instrument can be manipulated by anyone who can use the typewriter arrangement by which the messages are sent. The printer will send sixteen messages simultaneously, but eight is the best practical working limit. Prof. Rowland explained the principle of his machine. By shunting off some of the waves of the current, certain letters are stamped on the paper; by shunting off certain other waves, certain other letters are printed. The shunting of the current acts faster than the instrument can work, so that a number of letters can be struck off during one revolution of the instrument. The limit to the number of messages which may be sent at the same time has not been reached.