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NEW MERIDIAN CIRCLE.

Although telescopes of great size have for some time been manufactured in this country, all large observatory instruments of precision have heretofore been imported from Europe. Three years ago the firm of Fauth & Co., of Washington, D. C., was established and commenced the manufacture of large instruments of precision, and such was their success that they now stand in the front rank of their profession. Our engraving illustrates the large meridian circle made by this firm for Princeton College. A glance at it will show the instrument is very compact and solid; the convenience of the observer has been studiously considered, without interfering with the accuracy of the instrument.

The principal feature of this instrument lies, of course, in the accuracy of its graduated circles, which have a diameter of 25 inches. They are divided into 5 minute spaces, and are read off by means of four micrometer microscopes, which instead of being fixed to the pier, can be moved any desired angular distance. This is especially useful in examining the graduation. The instrument throughout has the latest improvements. Objective and eyepieces can be interchanged; the bright field illumination can be changed instantly into the dark field with bright wires, the level, which indicates seconds of arc, can be read by means of a mirror. The piers upon which the telescope rests are cast hollow, in one piece, and the counterpoises are arranged within, as shown in the engraving. In use, however, the piers are covered with mahogany and lined with felt to prevent sudden changes of temperature affecting the instrument. For the purpose of reversing the telescope a reversing apparatus running on a railway is provided, which is not shown in cut, and it takes less than a minute to reverse the ponderous instrument, and it can be done with perfect ease.

We intend in coming issues to illustrate other instruments of precision made by the same firm. Messrs. Fauth & Co. manufacture all the instruments used by the United States Coast and Geodetic Survey. Among other matters of interest we expect to furnish our readers with a description of the graduating engine on which the circles of these instruments are divided with such marvelous accuracy.

To Attain Long Life.

He who strives after a long and pleasant term of life must seek to attain continual equanimity, and carefully to avoid everything which too violently taxes his feelings. Nothing more quickly consumes the vigor of life than the violence of the emotions of the mind. We know that anxiety and care can destroy the healthiest body; we know that fright and fear, yes, excess of joy, become deadly. They who are naturally cool and of a quiet turn of mind, upon whom nothing can make too powerful an impression, who are not wont to be excited either by great sorrow or great joy, have the best chance of living long and happy after their manner. Preserve, therefore, under all circumstances, counsels *The Sanitarian*, a composure of mind which no happiness, no misfortune, can too much disturb. Love nothing too violently; hate nothing too passionately; fear nothing too strongly.

American Institute Exhibition.

For forty-eight years the American Institute of New York has opened its doors and invited American inventors and manufacturers to exhibit their productions, and again this year it renews its invitation to all. To such as wish to reach the capitalist and consumer, they must admit that New York is the place. For details apply to the General Superintendent, by mail or otherwise.

Huxley on Industrial Education.

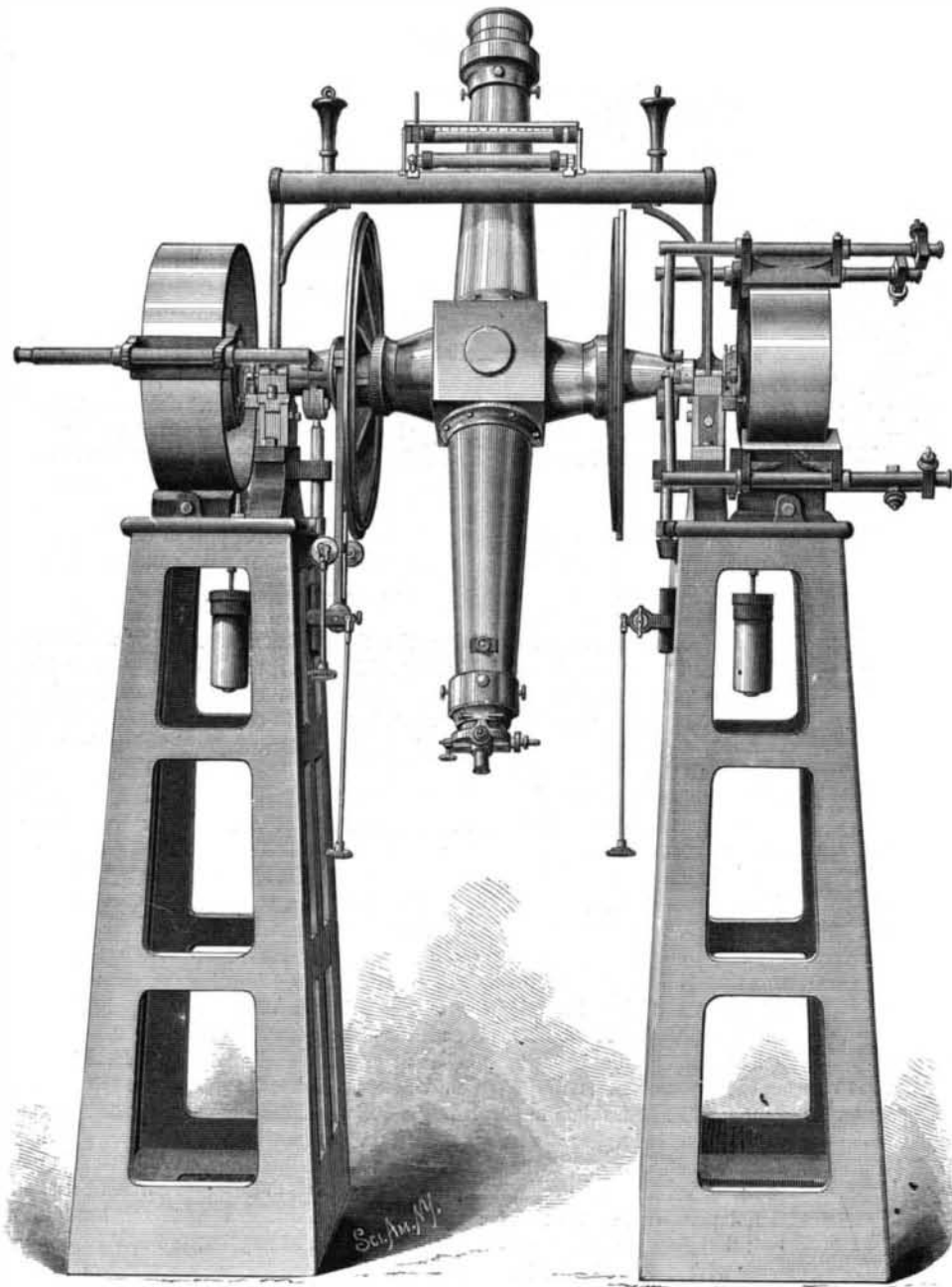
If a lad in an elementary school showed signs of special capacity, I would try to provide him with the means of continuing his education after his daily working life had begun. If in the evening classes he developed special capabilities in the direction of science or of drawing, I would try to secure him an apprenticeship to some trade in which those powers would have applicability. Or, if he chose to become a teacher, he should have the chance of so doing. Finally, to the lad of genius, the one in a million, I would make accessible the highest and most complete training the country could afford. Whatever that might cost, depend upon it the investment would be a good one. I weigh my words when I say that, if the nation could purchase a potential Watt or Davy or Faraday, at the cost of a hundred thousand pounds

Dephosphorizing Pig Iron—Utilization of Phosphorus.

Professor Wedding, in a paper contributed to a German publication, gives some data on the practical working of Krupp's, or rather Narjes', process for dephosphorizing pig iron. The originator of the process is Mr. Narjes, an engineer connected with Herr Krupp's works at Essen, who, on the 16th and 17th of March, 1877, worked the first heat on a large scale, four tons of pig, holding 0.7 per cent of phosphorus, being reduced to metal running 0.134 per cent, while the percentage of carbon sank only from 3.10 to 3.03 per cent. A patent was applied for and granted on the 2d of July, while Bell's provisional specification was drawn up on the 11th of April.

Narjes' process consists in dephosphorizing and refining the pig without affecting the carbon percentage materially, by oxides of iron and manganese partly used as fettling and partly by additions. The practice at Essen is said to be simple; the pig is melted in a 13 foot cupola with coke in one hour and a half, and then tapped into a furnace similar to the Pernot, heated by the regenerative system. The flat hearth is covered with a layer of almost one foot of iron melted at a very high temperature. Before every heat from 1,500 to 1,700 lb. of ore, also heated until sintered, are added. Another point which has not yet been settled is whether it will be possible, by adding a silicious pig, to fit the refined metal for the Bessemer process, for which, as at present constituted, it is not suitable, as the dephosphorizing process eliminates the silicon simultaneously.

As proposed to the above, the Boston *Journal of Commerce* adds that Mr. Sidney G. Thomas, one of the inventors of another famous dephosphorizing process, not content with having rendered phosphorus—that dreaded impurity of iron and steel—harmless, has gone one step further, and proposes the utilization of the phosphorus which in his process is, as it were, concentrated in the slag. He roasts the cinder obtained in blowing pig with simultaneous additions of lime and oxide of iron, in a reverberatory furnace, in order to convert the protoxides of iron and manganese into insoluble peroxides. After calcination the slag is ground fine, and is treated with cold hydrochloric or sulphuric acid, diluted, or with a cold solution of sulphurous acid, which dissolves the phosphoric acid. With the latter solvent the phosphate will be almost at once precipitated on heating, while the sulphurous acid, which is driven off, may be recovered by condensation. The solution in hydrochloric or sulphuric acid may be completely evaporated, forming a concentrated product which, when the former acid has been used, contains chloride of lime. These, or any other methods practiced for the manufacture of phosphates, may be



FAUTH & CO'S MERIDIAN CIRCLE.

down, he would be dirt-cheap at the money. It is a mere commonplace and every day piece of knowledge that what these three men did has produced untold millions of wealth in the narrowest economical sense of the word.—*The Sanitarian*.

Photographic Patterns.

One of the silk manufacturing firms of Lyons, France, are introducing the production of photographic impressions on stuffs. They sent to a recent meeting of the Photographic Society several pieces of silk with a variety of photographic pictures printed thereon, including, among others, a number of large medallions representing pictures of the old masters. The length of the specimens thus exhibited is stated as being no less than 131 feet. The process by which they are produced is not given, but it is believed, says the *Commercial Bulletin*, that the prints are made with salts of silver.

made use of. As few have an idea of the enormous quantities of phosphorus which are annually wasted in the manufacture of iron, it may be interesting to cite the fact that the phosphorus contained in the iron produced in the Cleveland district of England alone amounts to 30,000 tons. The recovery of phosphorus is not a novel idea, but it is possible that the concentration of phosphoric acid in the slag (7 to 15 per cent) may render it practically attainable.

Carbon Photo Printing.

Mr. F. Gutekunst, 712 Arch street, Philadelphia, has organized a complete establishment for the printing of photographs by the carbon process, that is, in printer's ink that never fades. We have received some specimens of the work done, which are unsurpassed for excellence and reflect credit on the printer. For book illustration and portraiture this method of printing yields the finest results.