

The third department may be termed a geodetic and astronomical laboratory, as the work to be done in it, which relates principally to standards of length and time, is of special importance in these sciences.

In order to prepare specimens for the testing machines, a shop has been fitted up with a number of high-class machine tools specially suited for reducing the specimens to the requisite shapes and dimensions with a minimum of hard labor. It is also fitted with the necessary appliances for making ordinary repairs.

The machines in the department for testing materials are the following:

An Emery 50-ton machine built by Wm. Sellers & Co., of Philadelphia, for making tests in tension and compression.

A Riehle 100-ton machine for making tests in tension, compression, shearing, and cross-breaking. It will take in posts twelve feet long and beams up to eighteen feet in length.

An Olsen torsion machine for testing the strength and elasticity of shafting. This machine will twist shafts up to sixteen feet in length and two inches in diameter.

The last machine in this department is a Riehle 2,000 lbs. cement testing machine. The cement testing laboratory is fitted with the usual accessories.

These machines are all of the latest and most improved designs, and, with the exception of the cement machine, there are at present no duplicates of them in existence.

In the power department there are under the division steam two boilers, a Babcock & Wilcox 52 horse-power and a Harrison-Wharton 12 horse-power boiler. The engine is a 50 horse-power Brown automatic cut-off engine, built by the Polson Iron Works Co., Toronto, specially for experimental purposes. It is steam-jacketed and has three alternative exhausts, to the open air, to a jet condenser, and to a Wheeler surface condenser, kindly presented to the school by Mr. F. M. Wheeler, of New York, the inventor. There are also a Blake circulating pump, a Knowles air pump, and a Blake feed pump, the latter of which was a gift from the manufacturers. The engine is arranged so that it may be compounded when there are funds for the purpose. To have built the engine compound in the first place was deemed inadvisable, as the money was urgently needed for other work.

A machine now being constructed by the Riehle Bros., of Philadelphia, for measuring journal friction and testing lubricants, will shortly be placed in position. It is fitted with an ordinary railway car journal and box. The maximum loads occurring in practice can be applied. The maximum speed will be 50 miles an hour. This machine is expected to be an im-

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