PURDUE UNIVERSITY, LAFAYETTE, IND.

Purdue University is beautifully located at Lafayette, Ind., a thriving city in direct line of communication between the cities of Indianapolis and Chicago, Toledo and St. Louis, and Louisville and Chicago. Under the wise and energetic management of its president, Dr. James H. Smart, extensive laboratories have been developed for every branch of its scientific work. It is the purpose of the present article, with its accompanying illustrations, to present some features of the laboratories of the schools of mechanical, civil and electrical engineering. These laboratories, by bringing the students into direct contact with machines of many kinds, by giving them an opportunity to study systematically their action, and to test their efficiency, constitute a most important element in the work of their college course.

The technical work of all engineering students during the early part of their course at Purdue is such as will afford practice in working wood and iron. Practice is given in benchwork, turning, pattern making, moulding and casting, forging, and in machine work. The extensive shops of the department of practical mechanics, wherein all of this work is accomplished, are equipped with tools and machines for the accommodation of 150 students at a single time. Later in the course, the laboratory work for each of the several schools becomes more distinct.

ELECTRICAL LABORATORY, PURDUE UNIVERSITY.

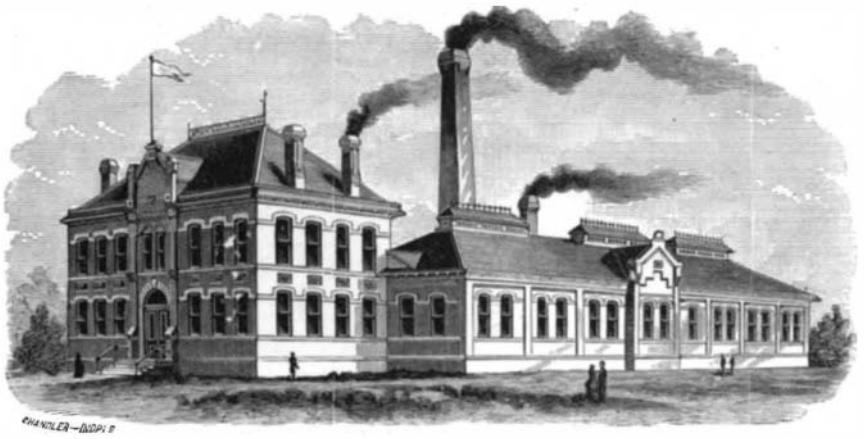
The mechanical engineering laboratory is a handsome room, 50 by 110 feet, and there is a boiler room attached, 25 by 40 feet. The equipment of this building is such as will provide for a large range of experimental work in steam engineering, applied mechanics, and hydraulics. The character of its equipment may be seen by reference to the following enumeration, which includes some of the more important pieces of apparatus which have thus far been put in place.

A 100 horse-power triple-expansion steam engine has been designed and constructed especially for this laboratory. The engine cylinders are 8, 15, and 22 inches in diameter respectively, by 24 inches stroke. The pipe connections are such that any of the cylinders may be worked singly, or they may be worked in combination under any one of six possible arrangements, thus giving, for the purposes of the laboratory, what is equivalent to nine different engines. The steam jackets of the cylinders and of the intermediate receivers may be thrown out of use at will. The crank of the high and of the low pressure cylinder may be set at an angle of 90, 120, and 180 degrees with that of the intermediate cylinder. Connected with the engine are a surface condenser, an independent air pump, tanks on scales in which may be weighed the condensed steam given up by the engine, tanks on scales in which may be weighed the cooling water which passes the condenser, permanent indicator rigs, and the usual gauges and counters.

A 104 horse-power boiler, having its safety valve set at 160 pounds, supplies steam at high pressure for the triple-expansion engine, and for general purposes. Accessory appliances are provided for use in making boiler tests.

A high-speed passenger locomotive, weighing 85,000 pounds, is mounted upon supporting wheels in the laboratory in such a way as to allow its action to be studied and its performance tested while the engine is run at any desired speed or load; the conditions being similar to those of the track. The power of the engine is absorbed by powerful friction brakes of special design, and its tractive force is measured by a suitable dynamometer attached to the draw-bar. The boiler may be fired with coal in the usual way. A powerful steam blower above the engine, but not in pipe connection with it, takes up and carries off whatever may be given out from the locomotive stack. There are problems of great scientific and economic value relative to the performance of the locomotive that cannot well be solved experimentally on the road; it is expected that some of these will be subject to easy management in the laboratory.

There is also for work in steam engineering a specially fitted slide-valve engine for practice in valve setting; a compound Westinghouse engine, and a Pyle high speed engine. Altogether, the laboratory contains fourteen steam engines of different forms.



LABORATORY OF PRACTICAL MECHANICS.

A 12 horse-power gas engine, especially arranged for experimental work, is supplied with natural gas from the same pipe which feeds the fire under the fixed boiler. Means are thus afforded not only for carefully testing the performance of the gas engine, but also for making a direct comparison of its efficiency with that of the steam engine.

For work in applied mechanics there is a 100,000 pound testing machine driven by power, for determining the strength of constructive materials under tensional, compressional and transverse stresses; a 2,000 pound cement tester for determining the relative value of cement and cement mortars; and a good supply of vernier and micrometer calipers, scales and gauges.

For work in hydraulics there is a direct-acting steam pump; two centrifugal pumps; a turbine water wheel; two water motors, and apparatus for measuring the flow of water over weirs, in pipes and through orifices. A steam pump delivers the water supply from a well to a storage tank of 1,000 barrels capacity, and an experimental stand pipe affords means for maintaining any desired range of water pressure.

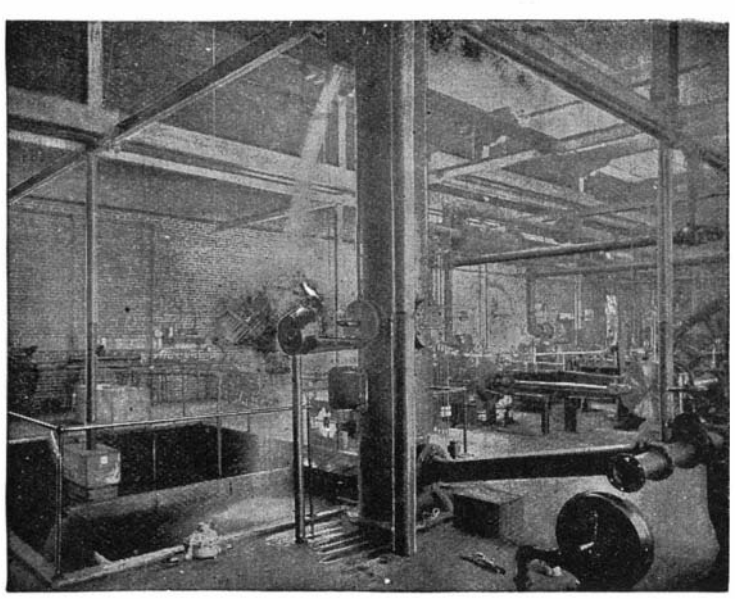
In civil engineering, instruction is offered in railway engineering, bridge engineering, and hydraulic and sanitary engineering. For work in the field, the department is well equipped with instruments of the highest grade. These consist of four complete sets of instruments, by different makers, and include transit, level, chains, tapes, rods, etc. In addition to these, for refined field practice and geodetic work, the department possesses a ten-inch alt-azimuth instrument, made to order for the department by Fauth & Co., of Washington, D. C. For work in river hydraulics, there is a current meter, and other apparatus designed by students in the department. In bridge engineering there are several models of various types of bridge and roof trusses, in wood and iron, and the instruction is made as valuable and practicable as possible, by requiring the student to make complete designs of framed structures, including the calculation of strains, proportioning of members, and making complete detail shop drawings.

The electrical laboratory is in a special building having facilities for exact experimental work. The dynamo room of this laboratory contains a 22 horse-power straight-line steam engine, and the following dynamos and motors: An original French Gramme, a Thomson-Houston arc, a Brush arc, an Edison incandescent, a Slattery alternator, with full line of converters of various sizes and makers; a large Thomson-Houston motor-type generator, a 5 horse-power Perrett motor, a 5 horse-power Thomson-Houston motor, and several smaller motors. A large Brackett cradle dynamometer, a bank of incandescent lamps, resistances for large currents, photometric apparatus, and other testing appliances have been provided. The apparatus is of the latest design and from the best foreign and domestic makers. With the usual commercial testing bridges, ammeters and voltmeters, there are also the finer pieces, such as a Kew magnetometer, two Thomson balances, a Thomson quadrant electrometer, ten of the best mirror galvanometers, standard resistances, electrodynamometers, etc. The pier rooms and other laboratory rooms are well lighted and are pleasant rooms for work.

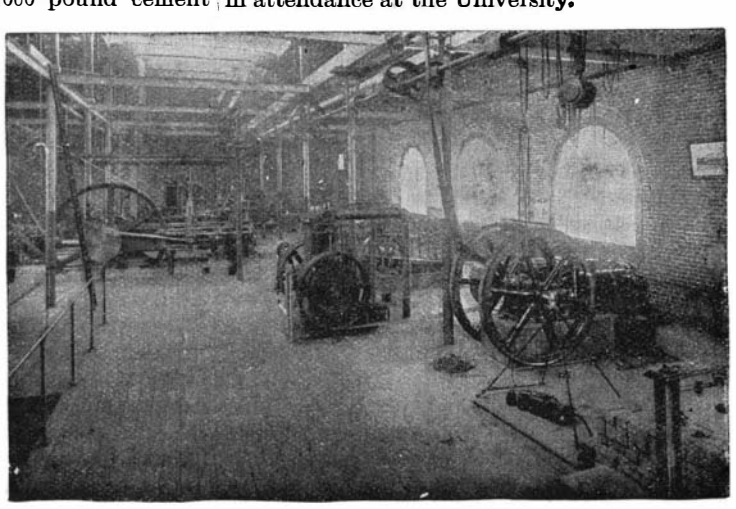
Instruction and practice in mechanical drawing are continuous throughout all engineering courses. In the solution of problems and in the designing of new work the methods of the drawing room are constantly employed.

The engineering chairs at Purdue are filled by W. F. M. Goss, Professor of Experimental Engineering and Director of the Mechanical Engineering Laboratory; J. J. Flather, Professor of Mechanical Engineering; A. E. Phillips, Professor of Civil Engineering; A. P. Carman, Professor of Physics and Applied Electricity; and M. J. Golden, Professor of Practical Mechanics. They are assisted in their work by an efficient corps of instructors and assistants.

There are at present six hundred and forty students in attendance at the University.



ENGINEERING LABORATORY—STAND PIPE AND WEIR TANK.



ENGINEERING LABORATORY—GENERAL VIEW.

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