Progress in Locomotive Testing.

By W. F. M. Goss.

It is now fourteen years since the initial steps were taken to install at Purdue University a locomotive testing plant. Plans which were then formulated were rapidly worked out, and in the fall of 1891, the completed plant was put into operation. It consists of a mounting mechanism, upon which any locomotive can be operated in much the same manner as upon the road, while retaining its fixed position in the laboratory; and of such accessory apparatus as is needful in measuring its power and in determining its efficiency. A locomotive mounted upon the testing plant can be fired as if upon the road and can be run at any speed and under any load, its action being controlled in precisely the same manner as when in actual service, while its fixed position in the laboratory allows the attachment of delicate apparatus, and permits great accuracy in the methods employed in studying its performance.

The practical value of the Purdue plant was at once recognized. It had long been understood that in testing a steam engine, the maintenance of constant conditions was of prime importance, whereas the operation of a locomotive on the road is attended by a great variety of changes in conditions which affect its action. Again, upon the road, so great are the limitations governing the attachment of apparatus that observations had necessarily been of a very elementary sort. Difficulties in testing arising from these and other causes were entirely overcome by the advent of the testing plant. By its use it became possible to apply to the locomotive the same accurate methods in observing the performance of a locomotive which had previously been elaborately developed for testing stationary engines. Mechanical engineers and superintendents of motive power visited the laboratory to witness the operation of the Purdue testing plant, from many parts of our own country, and from several foreign countries. Other plants were soon proposed. In 1896 the Chicago & Northwestern Railway Company equipped its Chicago shops for locomotive testing, and more recently, Columbia University has supplied a locomotive testing plant for its engineering laboratory. Other institutions have plants in contemplation. Meanwhile, the work of the Purdue plant has proceeded

steadily from the beginning. Besides serving in the instruction of hundreds of students, it has supplied the means for conducting a number of important researches, the results of which have been duly published and important problems are now in process of solution under the patronage of the Carnegie Institution. This, while in terms too brief to be entirely complete, gives a fair picture of the present status of locomotive testing from a laboratory point of view.

Just at this time, all who are interested in locomotive design or performance have their faces turned to the Louisiana Purchase Exposition. Engineers have always looked upon a great exposition as serving in many ways to advance the practice of their profession. It has often happened that in addition to the far-reaching influence of their general exhibit, such expositions have given occasion for a considerable amount of highly scientific work. At the Centennial Exposition at Philadelphia, in 1876, a system of steam-boiler testing was developed. The Columbian Exposition at Chicago in 1893 had its engineering congress, and it is of interest to know that the Louisiana Purchase Exposition at St. Louis is to be emphasized by the working out of extensive plans for locomotive testing.

It has been announced that the Pennsylvania Railroad Company is to make a locomotive testing plant the central features of its exhibit at St. Louis, and is to conduct tests upon locomotives throughout the period of the Exposition. To this end, it is now installing in the Transportation Building at the Exposition, an elaborate and most beautifully designed testing plant. The undertaking is being directed by Mr. F. D. Casanave, acting as special agent in charge of the company's exhibit, with whom the various technical departments of the railroad are co-operating. That the work of testing locomotives may be free from all taint of selfishness, and that it may serve as large a purpose as possible, the company has invited the American Society of Mechanical Engineers and the American Railway Master Mechanics' Association to have a part in giving direction to its work. Each of these organizations, in accepting the invitation has appointed a committee of three to represent it, which committees, acting together, constitute what is now known as the Advisory Committee of the Pennsylvania Company for Locomotive Testing. The writer's connection with the work is that of a member of the Advisory Committee.

It has been planned to test twelve locomotives, a number of which will be of foreign manufacture. One is to be a de Glehn balanced compound, which has been ordered by the Pennsylvania Company and will

be imported from France for use on the testing plant. German manufacturers are to send locomotives equipped with superheaters. The coming to this country for the purpose stated of these typical foreign locomotives is a matter of more than ordinary significance. The American locomotives selected for test will represent different types of modern freight and passenger engines.

It is expected that a test will be started each day between eight and nine o'clock in the morning, and will be continued for from two to four hours, depending upon the conditions of running. Any engineer, therefore, interested in locomotive testing may see a test in progress by visiting the Transportation Building during any morning of the Exposition.

It is proposed to have the results obtained from all the tests given publicity by means of bulletins, which will be issued from time to time by the Pennsylvania Company, and which will be sent to the technical press and to individuals under conditions yet to be announced. Bulletin No. 1, describing the organization and the methods has already been issued.