A few years ago a large manufacturing plant was to be rebuilt. The owners first employed a firm of economists to make a study of their methods of manufacturing and to devise a more economical method. This done, the engineer and architect drew up plans under the supervision of the economists. Many things were designed different from the ordinary standards and even a lighting engineer was employed. The result was that operating costs were cut nearly 25%, while the cost of building was reduced 10%. All waste room was cut out, and few later alterations had to be made.

This was in contrast to a large saw mill that was destroyed by fire and rebuilt last year on the same general plan as before. All the finished product has to be carried the entire length of the mill to be placed in the storage yard.

These examples illustrate how many engineers overlook the service feature of their structures, and how money is thus wasted in building and in operation. Both the old and the young man engaged in designing will do well to consider these important things.

MUSKOKA RIVER STORAGE.

THE sixth annual report of the Hydro-Electric Power Commission contains some information on the watershed of the north branch of the Muskoka River, lying in the districts of Muskoka, Parry Sound, and Nipissing, and comprising an area of about 560 sq. mi. above Port Sydney.

The report, which has just been issued, is for the year 1913. One of the important chapters it contains is that devoted to the hydraulic investigations that have been carried out during the year. The data on stream flow and storage possibilities of various rivers in the province are steadily accumulating, and represent the acquirement of hitherto unavailable knowledge that is most important in the development of the water powers of Ontario. F. A. Gaby, B.A.Sc., is chief engineer to the commission, while H. G. Acres, B.A.Sc., and T. H. Hogg, B.A.Sc., are hydraulic engineer and assistant hydraulic engineer respectively. The following data relates to their work up to October 31st, 1913, on one of the many rivers under investigation, and outlines a projected scheme of improvement whereby storage and complete regulation of flow may be effected:

General Conditions.—Until recently, the paramount industry in the territory mentioned above has been lumbering, and for many years the north branch has been used for the transportation of saw-logs. Under ordinary conditions, log-driving seriously hampers power development, but a peculiar feature of the situation as regards the Muskoka River is that injury is now being caused not through the activity of the lumbermen, but through the cessation of their operations in the upper watershed. This is due to the nature and location of the lake areas.

In the lower portion of the watershed is a group of four large lakes, all but one practically on the same level. In the upper watershed is a large number of small lakes, which have in the past been controlled by lumbermen's dams. When lumbering operations were at their height, large quantities of water were held in these upper lakes, and they were flushed out more or less in succession in bringing drives down the main river and out of tributary streams. The water thus liberated discharged into the group of larger lakes above mentioned, and through their capacity for storage they reduced and equalized the various flood peaks, and discharged them more gradually into the lower river. As the lumbering industry waned, the quantity of water stored in the upper lakes was reduced, and the dams began to suffer from lack of maintenance, the result being that an increasing proportion of the spring run-off discharged naturally into the lower basin, and drained off in the early part of the summer.

The result has been that, while power has been developed upon the river on the basis of a minimum flow which existed 10 years ago, the minimum flow during the last three or four years has dropped as low as 120 sec.-ft. at High Falls, or less than half the flow which was ordinarily supposed to obtain 10 years previous. A large part of the capital invested has on this account become unproductive, and long and frequent periods of inadequate service have caused much trouble and inconvenience, as well as a serious loss of revenue.

The object of the investigation is to determine to what extent artificial storage can be used to improve present conditions.

The oldest established industry in the Muskoka River watershed is lumbering, but owing to the fact that practically all the pine has been cut, the waters of the north branch are now very little used for driving purposes, and in two or three years' time, the use of the waters for this purpose will practically cease.

The navigation interests are confined almost exclusively to the handling of local tourist traffic and through tourist traffic to the Lake of Bays. Open navigation exists between Huntsville and Peninsula Lake, and connection with Mary Lake is made by means of a lock.

Several passenger steamers are kept in commission during the tourist season. The largest boat on the Huntsville-Portage route is 125 ft. long, 22 ft. beam and has a maximum draft of about 7 ft. The largest boat on the Mary Lake route has a maximum draft of 6 ft., and has a length and beam specially adjusted for the dimensions of the lock.

As to the commercial use which may in future be made of these waters for navigation purposes, it would seem that the limit of their utility would be the bearing of a tourist traffic not very greatly in excess of that now existing. This opinion may be justified on the following grounds:

(1) That the cutting out of the pine timber has destroyed any lake commerce that has previously existed in connection with the lumber industry.

(2) That the desertion of farms in the townships bordering on these lakes indicates that they will be used less in the future, in connection with the commercial needs of agriculture, than they have been in the past.

(3) That the continual opening up of new tourist districts by the railways will tend to check any abnormal expansion of the tourist traffic out of Huntsville.

It will be assumed, therefore, that the requirements of navigation will be adequately met by providing for the permanent accommodation of boats similar to those now operating.

The minimum depth of channel between Huntsville and the Portage will, therefore, be 8 ft., and 7 ft. between Fairy Lake and Port Sydney.

Power.—In the year 1892, the town of Bracebridge put its No. 1 hydraulic plant in operation in the Muskoka River, a 16-ft. head being developed for lighting load