THE ENGINEER OF TO-DAY.

Some one has characterized the past age as one of invention, the present as one of engineering.

We no longer wait for some genius to better or cheapen our way of doing things. Instead of taking observations from the outside and working inward, men now work from principles and build upon them.

It is not long since those who carried on scientific investigation, as a means to practical ends, were looked upon as being affected with almost unpardonable vagaries. But it is no longer so, as the demand for economy of force and materials increased rapidly, the inventive genius could no longer be waited for, and technical education became a necessity.

The development of technology has been most potent and stimulating. It has brought about great changes in the industrial arts. It has multiplied machinery for every kind of work; it has extended highways beyond what, until recently, was thought possible; indeed, it is revolutionizing every field of industry.

The genius may still come to the front and present startling results, but Edisons are few. It is by the sober, steady application of scholars in established principles of physics, that the solutions of great problems are reached. To these we are indebted for the Bessemer Converter, the various uses of compressed air and many of the applications of electricity. Indeed it is useless to attempt to enumerate what has been accomplished by thinkers, educated to think in these lines.

With every new process or invention, new machinery is demanded. The steam engine of Watt has probably increased a thousand fold the industrial occupations of the world, which called for the production of machines to work in iron, wood and stone, in cotton, wool and silk.

The demand for engineers comes from every department of industry.

The civil engineer is called upon to construct public works, such as highways, railroads, water works, etc., the mechanical engineer deals with machines, from the original design of each part, through the detailed manufacture to the complete structure, and to the operation of the machine itself; he must understand the construction and equipment of mills and machine shops; he must know how to determine the capabilities and efficiency of them and of the materials of which they are made; he must be able to design and build machines to meet the emergency of the manufacturer. These are but a few of the things he may be called upon to do.

There are numerous other fields of engineering, such as hydraulic, gas, and electric, but in all, the engineer is distinct from the artisan only by the amount of his knowledge of scientific principles, and his ability to apply these to the complete solution of real problems as they arise.

We see all about us triumphs of engineering skill overcoming natural obstacles, but where is the untrained native talent, that could build an East river bridge, or invent an air-brake, or develope the signal switch system, or any of the thousands of examples of the applications of familiar principles of science to the solution of mechanical problems?

But a knowledge of physics, in the abstract, is not sufficient to bring about these results, it must be united with a practical command of machinery. From this combination follow great results. Then as another has said, "the same affluent good comes forth in the domain of mechanics that abounded in the middle ages when the artist and artisan were one; when Peter Vischer worked at black-smithing, and Michael Angelo cut stone and Benvenuto Cellini hammered silver and gold, each touching the iron, the stone or the silver with a beauty and value that all the ages since have only enhanced."

That engineers should be handicraftsmen, of no mean ability, with a thorough knowledge of machinery, is now generally conceded.

The old institutions, which taught theory only,