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MANUAL TRAINING II. THE MACHINIST'S ART.

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Perhaps the most interesting of all trades or mechanical arts, as some prefer the term, is that of the machinist.

There is a fascination about the cutting and shaping of iron, steel and brass that is irresistible. The stubborn nature of the materials, the permanence of the product, the accuracy and effort called forth and above all the perfection and adaptability of the machines and tools required, all provide elements for the perpetual joy of the worker.

Take for example the modern turning lathe. It is the embodiment of concrete mathematics. It can add, subtract, multiply and divide with unalterable accuracy. It can duplicate angles to the smallest fraction of a degree and can turn work to less than the thousandth part of an inch. The turning lathe has been called the King of Tools. It is the great central figure of our mechanical development. Without it, that greatest of all human productions, that potent civilizer, that real missionary, the steam-engine, were impossible. The triumph of steam is the locomotive, which has solved more problems and brought more blessings than all the philosophies, all the inventions and perhaps all the religions of the preceding ages.

The steam-engine was the stimulus of the 19th century and the most potent physical factor of the Victorian era. Under its broadening influence art, science and literature blossomed and bore good fruit and man outgrew the narrow confines of tribe and nation, grasped his far off brother by the hand and promises in the near future to become a citizen of the world.

Let us now consider briefly how an amateur would set about the production of a steam-engine.

First there is to be chosen the type, which may be stationary, marine or locomotive, simple or compound, trunk, reciprocating or turbine. Next comes the general design, which shows the engine in its finished state with its description and dimensions. Then each separate part must have a drawing in detail, giving accurate measurements of each, with directions regarding material and fin-