

portant inventions" can hardly be defined and therefore hardly be counted. But their statistics can still be worth something when intelligently prepared and interpreted, with no accuracy claimed. One test was on a group of 19 of the most useful inventions introduced in the quarter-century before 1913, as selected by vote of *Scientific American* readers.³⁴² Average (geometric mean) intervals were found: between the date when the invention was first thought of, and the first working machine or patent, 176 years; thence to the first practical use, 24 years; to commercial success 14 years more; to important use 12 years further; or say 50 years from the first serious work on the invention, to important use from it. As a check on these averages the author took 3 other lists of inventions he had prepared for other purposes. One list,³⁴³ of the 75 most important inventions which became prominent in 1900-30, showed a median lapse of 33 years between the dates of the first working model or patent and the date of commercial success, in place of the 24-year geometric mean above. Another list⁴⁸ covers 209 of the more important nonmilitary inventions introduced with commercial success between 1787 and 1935. Its median interval, between the first serious work and commercial success, for the inventions started before 1900, is 37 years. The arithmetic mean is much longer, 117 years, even after adding 9 centuries to each Ancient date, to close up the relatively stagnant Medieval period. Without considering the ancient starts, two modal points were noticed, at 55 and 35 years. Among the inventions commercialized *after* 1900 the gestation period was much shorter, with a mean of only 9½ years, doubtless largely because of the limitations imposed, since the invention had to be recognized as important for its social effects by 1935, and yet have become commercial not later than 1900. But there may also have been reflected some speeding up of the developmental process, under modern conditions. A fourth list, of marine inventions on which sufficient data could be found, dated 1807-1926,³⁴⁴ gave median intervals between the first plan and commercial success afloat, of 90 years, whence to important use afloat took 9 years. The findings of the four lists confirm each other as closely as one could expect from the nature of the data.

[331] The earliest period we attempted to measure, from the date the invention was first thought of, to its first working machine or patent, is very unreliable, but of significance in that it shows a long period, whether 176 years or any other large number, during which the possibility and utility of the invention have been perceived, so that some exploratory work could be done on it if it seemed feasible for the times, and if there were some social mechanism that could support the fundamental research work.

[332] The more important gestation periods for us to consider come after that first period of conception, being from the first serious attempt at solution, to the first commercial success, 33-50 years, and the following period before important use, 10-12 years, assuming that those terms can be sufficiently defined to be meaningful. Adding these two periods together, we may say roughly 40 years plus 10, total 50. And there are scarce any inventions to be found that came in much quicker.