

is being done in these lines by NASA and AEC, and more is sought through the new Panel on Civilian Technology (§ 436) and the new Civilian Industrial Technology Program (§ 567.5). Solo counts medical research as not upbuilding the national economy; but most of it does, through increasing the health and number of workers living.

[105] We have paid special attention to *chemical* invention and patenting, as on chart 2, for various reasons. A good chemist's work is mostly invention, or scientific discovery which soon leads to it. Chemistry has become a great field for patents, contributing 26% of them in ⁸⁹ 1945 and 31% now, says Dirlam. "It is clear that the patent system has come pretty much, as far as its commercial usefulness is concerned, to be the preserve of the chemical and electrical industries." ¹¹⁹ Yet chemistry is also the most suitable field for secret processes, and secret infringement. But there is said to be remarkably little patent infringement in the industry, ¹²⁰ due to intercompany comity, patent pooling, and a policy of competition by finding better chemicals rather than by invading another firm's line. Another influence for less strife and probably less patenting must be the admirable internationally standardized nomenclature for chemicals, enabling ready indexing and hence the discovery of anticipation before patenting. From this clarity of name chemical patents are being worked up for the first trial of modern electric search methods to be applied to patents. ¹²¹

[106] The growth of the pertinent population (§ 85) to 3.62-fold since 1880, which explained at least a corresponding share of the rise of invention, affects patents and all the indices equally, so has been usually ignored. Of all our historigrams, only those of Productivity do not contain this factor.

[107] A disquieting development since around 1950 is an almost complete check to the rise of chemical and physical doctorates and engineering students. To be sure there has been a sharp rise in engineering doctorates, to 1,009 in 1961 ¹²² (chart 3; not combined in the indices); but this by no means meets the needs.

[108] The graphs are as straight and parallel as one could ever expect from the imperfections of the data and the severity of the military and economic crises traversed. The bulge in the Abstracts, during 1895-1920, has a probable explanation (§ 92). We may also observe a slight bending, a check in the rate of growth, occurring in each constituent subtotal sometime between 1900 and 1920, and in most of the basic graphs and in patents. If we divide our overall index of inputs at the year 1905, in the earlier period it rose at a rate of 2.28-folding per decade, and in the latter period at 1.98-fold per decade. What caused this check we can only guess, and not usefully.

[109] In fine, our summary indices of Inventive Inputs and Output (chart 4) seem fairly justified, entail a rapid fall in the proportion of inventions that are patented, and seem to stand well enough all the tests of internal consistency, logical basis, and statistical reasoning, except that their Probable Error is considerable. Our graphs may well climb too high, especially because they probably include a large and growing element of chemistry and physics apart from invention, and probably underrepresent the old-fashioned, unscientific, little organized or published inventing, which would be a larger proportion