

writer, and print-reading machine. These fundamental inventions take so long to come to fruition, because we provide no effective support for their development, that our 17-year patents expire long before they can reward the earlier inventors through royalties from abundant use. Some helps will be suggested for these especially, as well as for other kinds of inventions.

[6] Finally, the encouragement of invention seems to demand urgently improvement of the quality and number of inventors, men who are both trained in engineering, chemistry, or technology, and also, quite another matter, men who have a liking and a developed, trained gift for invention, originality, creativeness. Our technic rivalry with the Communist world, and the demands of fundamental invention, especially point up this need. And examination of the training of our engineers, the scheduling of their lives, which still often defers inventing till middle age, if ever, and comparison of the successes of different types of inventors, indicates things gravely wrong and remediable, for the cultivation of this type of man so essential to our survival as a nation and an advancing culture.

[7] Military as well as civil inventions will be considered, although with inventions exclusively military patents are seldom used and never important. Our reasons are that the military category has risen to be about half the total (cf. chart 3), and because it is impossible to separate military from civil invention in any study of how the invention business is organized and might be improved, what forces play upon it, and what social results it has, including the evoking of further inventions. Military and civil inventing are constantly pursued in the same commercial or university laboratories by the same staff, as they turn from one project to another, and whether separated or not the inventors are trained in the same schools, illumined by the same sciences, enwrapped in the same civilization; and the inventions they turn out are constantly shifting between civil and military uses. Consider aviation, for instance, or atomic physics and energy, or medicines, insecticides, and food preservation (by radiation, e.g.) needed and invented by the army, but equally applicable for civilians, or navigation devices, sonar now turned against fish, tank engines, bulldozers, metallurgy, chemistry, the aerosol bomb the army developed to rid quarters of mosquitoes, now used as a boudoir spray, and an infinitude of civil arts turned to military use and vice versa,² (§ 436). The two fields are largely inseparable in scientific reality, and to be distinguished only in formal and temporary discussion (§ 104.5).

[8] Always our outlook will be that of the social scientist serving the statesman, not that of the inventor, patent lawyer, industrialist, or historian, who have authored most of the discussions of invention and patents. In those professions the big question anent patents and invention is apt to be either technologic or Who gets the reward? But to the economist or other social scientist and to the statesman, the big question is: By what social arrangements can the most additional wealth be created, for our country and to some extent for the world?

[9] Throughout our book we have sought to *quantify* things, as science ever demands, to furnish *statistics* wherever possible, and in many cases where impossible, one would have thought, impossible to find, or to contrive statistics, by sound interence, reasoning from one quantity to another. Naturally, any such statistics will be highly