flew in a helicopter model of 1842, first flew a manned airplane in 1939 or 1940, but attained a practical (military) use only in 1944, when the British and German armed services had developed it for air warfare. Its possible uses for propulsion in water, long claimed, remain unattended and probably uncertain.[337]

[328] The *voice-operated writing machine* may be taken as a representative of the many great fundamental inventions that will be realized in the future, are needed now, and could probably be obtained rather shortly; but instead we shall have to go without them for many years more, because neither patents nor any other reward are available to stimulate the inventors and to reimburse their great expenses. This invention was seriously proposed in 1892, reduced to practice by Fessenden in 1907, and brought to write a legible line by Flowers in 1916.[338] Then the great Bell Telephone Laboratories developed something of the sort, the vocoder, and later "Audrey" to recognize carefully spoken digits,[339] all to meet their own needs, but not full writing machines. Still other acoustical devices will, if developed, give a sense of their surroundings to the blind. A Swiss, a Japanese, and an American have been reported in the last decade as working on writing machines,[340] and as usual "close to success" with a typewriter, and later MIT, the Bell Telephone Laboratories, and three others [341] have all been working toward this very difficult device. But the years go by while we do without, and the patents go on expiring. L. C. Smith was said to have backed Flowers, but it could only be for philanthropy. For the voice-operated typewriter he was attempting would necessarily be totally different from the "Elsie Smith." A voice-operated writing machine need not necessarily be a typewriter, but might trace lines infinitely variable but still legible. For many purposes though it will be much better to encode speech into a typed alphabet, which could be read photoelectrically as well as by the eye, as we shall mention anent reading machines (¶ 336). But for any voice-operated writing, and for easiest mechanical reading, we shall need not only the invention of these machines, but a whole new alphabet and conceptions of our pronounciation and spelling. Such difficulties will doubtless defer the invention's use past the 17 years of a patent: and our present system offers hardly any other reward for such delayed inventions, unless they offer hope of serving war, telephony, or some other well-provided-for industry.

[329] We have spoken (¶ 216) anent custom-barred inventions, of how all novelties that interfere with established standardizations, and above all with our world-wide-standardized and ownerless customs of speech and writing, which no one in the English-speaking countries claims any authority over—how all such inventions are almost prohibited and normally unthought of. Yet progress and inventions here could be worth many billions, since *Language* (and thereby communication and cooperation, learning and thought) is a supreme trait of Man, and Reading, Writing, and Talking form our most important industry.

B. Statistical Evidence

[330] Our four discussed fundamental inventions can serve for illumination, but only Statistics can bring proof in social science. But statistics are very hard to apply to invention, as we have explained in ¶ 52,3 and elsewhere,[49] chiefly for the reason that "im-