errors likely to arise from typographical or other inaccuracies in registering the computations. "The arrangements," said the inventor, "are of such a nature that, if executed, there cannot exist the possibility of error in any printed copy of tables computed by this machine." Nor was the high character thus given to it by its contriver in any way undeserved, as was afterwards sufficiently proved by its practical operation.

In one respect this machine was found to exceed its anticipated powers, and to go even beyond the mathematical genius of its inventor. A certain problem in the game of chess had puzzled Mr. Babbage for years, without his being able to arrive at a satisfactory solution. He committed the elements of the problem to the machine, and tested its working powers. The difficulty of years vanished by the aid of the mechanical contrivance. It was almost a triumph of matter over mind, but at least the iron was made to instruct the genius which had given it shape.

The chairman of the Astronomical Society, in presenting the society's gold medal to Mr. Babbage in 1824, made the following observations with reference to Mr. Babbage's machine:—"In other cases, mechanical devices have substituted machines for simpler tools or for bodily labours. The artist has been furnished with command of powers beyond human strength, joined with precision surpassing any ordinary attainment of dexterity. He is enabled to perform singly the work of a multitude, with the accuracy of a select few, by mechanism which takes the place of manual labour, or assists its efforts. But the invention to which I am adverting comes in place of *mental* exertion. It substitutes mechanical performance for an intellectual process; and that performance is effected with celerity and exactness unattainable in ordinary methods, even by incessant practice and undiverted attention. Mr. Babbage's invention puts an engine in the place of the computer: the question is set to the instrument, or the instrument to the question; and, by simply giving it motion, the solution is wrought, and a string of answers exhibited. Nor is this

all, for the machine may be rendered capable of recording its answers, and even multiplying copies of it."

Mr. Babbage's letter to Sir Humphrey Davy having attracted much attention, the Government of that day determined to ask the opinion of the Royal Society on the subject. A committee was appointed to investigate the matter, and among its members were the most eminent scientific men of the time—Davy, Herschel, Baily, Young, Brunel, and others. They reported that—"It appears to this committee that Mr. Babbage has displayed great talent and ingenuity in the construction of his machine for computation, which the committee think fully adequate to the attainment of the object proposed by the inventor, and they consider Mr. Babbage as highly deserving of public encouragement in his arduous undertaking."

Acting on this report, the Government determined to make a grant of £1,500 to Mr. Babbage to enable him to carry out his invention. The machine which Mr. Babbage had at this time constructed was nothing more than a model of a more perfect and elaborate one which he designed to make. He now set about the execution of the work, and for some years laboured steadily at it. The amount of work it involved was truly enormous. The drawings for its several parts were alone the study and labour of a very long period; then the best material and the best workmen had to be found to carry the drawings into effect. It was found necessary to educate workmen for the purpose, and to invent entirely new tools for the work.

Money was again advanced by the Treasury from time to time, until £6,000 had been thus expended. Then the House of Commons and the public began to expect results. The Royal Society were requested by the Government to institute inquiries as to how the work proceeded, and they reported that "the progress made in the machine was as great as could be expected, considering the numerous difficulties to be overcome." The committee, also, "had no hesitation in giving it as their opinion that the engine was likely to fulfil the expectations entertained of it by its inventor." The Government were satisfied, and more

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