STAFFEL'S CALCULATING MACHINE.

In the Russian Court, modestly secluded, amidst the glitter of malachite doors and vases, jewellery and silver, there is one work, the produce of high intelligence, and intended to assist in certain intellectual labours. This solitary tribute of mind to minds comes not from Petersburg, nor Mexico [Moscow], nor from Siberia, nor the Ural Mountains; but from Poland. We refer te Staffel's Calculating Machine, No. 148 in the Catalogue.

The inventor of this machine, Mr. Israel Abraham Staffel, a native of Warsaw, was early in life apprenticed to a watchmaker. In applying himself to his trade as an avocation that should gain him his livelihood, he at the same time contracted a predilection for mechanics. His genius conceived the possibility of accomplishing a higher and more scientific aim than the finishing of the movement of a watch. He took to reading the works written on mechanics, both in German and Polish. With this study he combined mathematics; and these two studies – in which, by perseverance and assiduity, he attained a proficiency – begot the desire of inventing a machine, which, after many attempts, he has so successfully accomplished. Various attempts having been made within the last two or three centuries to invent a calculating machine, which attempts, however, were crowned only with partial success, Mr. Staffel started with a courage and self-reliance worthy of the final success that crowned the labour of ten years' undiminished application and study. No obstacle that came into the way and protracted the accomplishment of his favourite idea, could diminish or cool down the ardour with which he was bent on the realisation of this one great idea. *Finis coronat opus;* and at last he attained that great end which repaid him for all the toil, time, labour, and money he had expended.

Mr. Staffel's machine was sent to the exhibition at Warsaw; and the committee, in their report, No. 333, drawn up by Messrs. Adrian Krzyzanowsky, A. Barnard, J. Bayer, Professors of the Academy, expressed their high approbation of the invention, and placed the machine, for its correctness in calculating and its efficiency, above all others that had been previously constructed, those of the eminent Meibnitz [Leibnitz] and Pascal included. The committee awarded to Mr. Staffel the silver medal; and, after expressing their approbation of the usefulness and importance of this invention, they conclude by saying, that Mr. Staffel deserves the highest reward and support.

For this support and appreciation Mr. Staffel did not look in vain. The Prince Paskewitch-Erivansky, Lord-Lieutenant of the kingdom of Poland, having been made acquainted with this important invention, sent for the inventor to produce his machine at the viceregal court, and having by occular demonstration convinced himself of the importance of the invention, enabled Mr. Staffel to present his machine at the Imperial Academy of St. Petersburg, who reported in its favour. Under the same high patronage he was afterwards presented to the Emperor, who was so gratified with his invention that he ordered a sum of 1500 silver roubles to be paid to him as a gratification, out of his private purse.

We subjoin a translation of the Report of the Imperial Academy of Sciences, upon this invention being referred to them as above stated.

"The Academy remembers that Mr. Slominsky [Slonimsky], of Byalostok, presented to it last year a calculating machine, made upon a new and curious system as to the theory of numbers. The Academy did not hesitate to evince its approbation of the invention by awarding to the inventor half the Demidoff prize. Notwithstanding which, it must be confessed, that, however ingenious Mr. Slominsky's calculating apparatus may be, as far as regards theory, there still remains much to be desired relative to its practical application. Thus, for example, in multiplication it only furnishes the product in simple units, and the addition of partial products remains to be made in the usual manner, or by means of another instrument.

"The new machine that Mr. Staffel has just presented to the Academy is not subject to this inconvenience. The four elementary rules of arithmetic, besides the extraction of the square root, are perfectly effected, and with remarkable simplicity.

"Mr. Staffel's machine is not grounded, as that of Mr. Slominsky, upon any particular principle of numbers relative to multiplication, but entirely founded on different mechanical processes, the conception, action, and precision of which, in regard to their execution, sufficiently testify to the talents of Mr. Staffel.

"The inventor has displayed the whole of the machinery before us, in order to enable us to judge correctly in what manner the different mechanical movements are combined. These combinations appear to us as simple as they are ingenious. We, at the same time, convinced ourselves that the machine in question has the great advantage of being formed of very many simple pieces, which perfectly dovetail with each other, and which might be perfected more advantageously *en masse* by means of a machine

than by the hand of a workman. Consequently, the price of Mr. Staffel's machine would decrease as the demand for it increased; but this price would be still too high for the generality of persons, if only a small number of the machine should be required.

"We need not enter into any detail relative to the description of the arithmetical machine of Mr. S., as the inventor himself has shown us a detailed account of it in the Russian and Polish languages [Штафел И. А.: Новая Счетная Машина (Aritmetica Instrumentalis). Изобретения и устройства / Nowa Machina Rachónkowa (Aritmetica Instrumentalis). Pomysłu i utworu, 1845, 71 + 57 + III p. The drawings show that Staffel's machine is a pinwheel calculator]. Mr. S. has also exhibited before the Commissioners a small mechanical machine to execute the two first arithmetical rules in fractions, having for their denominators the numbers 10, 12, and 15. A machine may be constructed for all other denominators. The idea of the apparatus is very ingenious for practical purposes, and may also be examined (*elle pourrait aussi se présenter*).

"In conclusion, the judges think, that, in all its relations, the arithmetical machine of Mr. Staffel merits the praise and approbation of the Academy, and that it will be found very useful when long and difficult calculations, and principally when multiplications and divisions, ought to be made with rapidity and precision. They also think that it will be but right to recommend Mr. Staffel to the particular *notice* and *favour* of his Excellency the Minister of Public Instruction.

      (Signed)   "V. BONNIAKOWSKY.
                   "— JACOBI."

Without perplexing the reader with varieties of mechanical details, we will now give a very general description of this interesting and important machine.

The machine is of the size of an ordinary toilet; the mechanism is 18 inches by 9, and about 4 inches high. The external mechanism represents three rows of ciphers. The first and upper row, containing 13 ciphers, is immoveable; the second and third, containing 7 ciphers each, are movable. To the right is a semicircular ring, containing the words Addition, Subtraction, Multiplication, Division, and Extraction. Underneath is a hand, which serves as a regulator for the operation, pointing *ad libitum* to either of the four rules or the square root, which – ever is to be worked. The advantages which this machine has above others are as follows :–

1. That the four rules and the square root, with fractions, can be worked by means of a curved handle (which in itself is a piece of mechanism), showing the various sums alternately, without being obliged to note down any auxiliary figure, as is the case with all other calculating machines.

2. That all compound rules, as the rule of three, of five, &c., can be worked simply by transposition of the regulator, without shifting any of the figures.

3. That, if by subtraction a larger number is subtracted from a smaller, the sound of a bell is heard, indicating the false proceeding; and when turning the handle a *negative number* shows itself in the upper row, where, instead of the 13 ciphers, the figure 9 will appear in their place, and which, added to the number given, will *prove* the inverted position of the number. The bell will also be heard if, by division, the handle is turned once too many. A retractive move of the handle will then retrieve the error.

4. That the entire mechanism is of a simple construction, the parts acting without springs, its correctness and accuracy secured, and the efficiency of the mechanism guaranteed.

Mr. Staffel exhibits likewise, an apparatus for assaying precious metals and ascertaining their alloy, without subjecting them to a solution by fire or any chemical process. He has invented also a calculating machine for working fractions; and the simplicity of its construction and the correctness of its results must astonish every beholder.