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With the Editor

Meccano Aids Scientific Research

All my readers are aware of the many remarkable purposes for which Meccano has been employed by engineers, inventors and scientists. Formerly an engineer or an inventor who wished to try out a new idea in miniature form before launching on full-scale operations was obliged to make, or have made for him, special parts in wood or metal. This was a laborious and costly process, and quite often the completed parts proved in the end to be useless on account of some flaw in the scheme. In such cases these specially-made parts had to be thrown away because they were of no use for any other purpose. Meccano has altered all this by providing ready-made parts with which almost any mechanical movement can be reproduced, and which remain available for further experiments if a scheme turns out to be unsound.

The remarkable Meccano mechanism described on page 442 of this issue is a striking example of the manner in which Meccano can assist the scientist. Some time ago Professor Hartree of Manchester University determined to try to reproduce the movements of the Differential Analyser, a wonderful machine designed by Dr. V. Bush, a well-known American electrical engineer. This machine automatically solves complex mathematical problems with uncanny speed and accuracy, and Professor Hartree's purpose was to investigate its working and to demonstrate its uses. Meccano had provided him with many happy hours when he was a boy, and had been of great assistance to him on many more recent occasions. Naturally, therefore, he used Meccano parts for the building of this new machine, and the result surpassed his expectations, for the mechanism he constructed was capable of carrying out similar work to that done by the original machine.

The Differential Analyser constructed by Professor Hartree illustrates one of the most valuable features of the Meccano system, namely, its infinite elasticity. The original American machine is built up of a number of units, each playing its own part in the intricate process of solving the difficult mathematical problems with which it is designed to cope; and its range can be extended almost indefinitely by the addition of further units. The elasticity of Meccano has made it possible for the model to be built up and extended step by step to adapt it to new problems. The results that Professor Hartree has already achieved with the model in his research work are sufficient in themselves to justify the claim that it represents the most remarkable scientific application of Meccano parts that has yet been made.

Dr. V. Bush of the Massachusetts Institute of Technology, Cambridge, U.S.A., watching the operation of the Differential Analyser, a wonderful machine he has designed for speedily solving intricate mathematical problems. A working reproduction of this machine in Meccano is described in the article on page 442 of this issue.

Are Thinking Machines Possible?

The triumph of the Bush Differential Analyser and of its Meccano counterpart seems to me to mark an important stage in the development of machines. This development originated in attempts to replace muscular effort by mechanical power. During many centuries steady progress was made in this direction by means of power developed by harnessing wind and water, and then came an enormous stride forward with the introduction of the steam engine. More recent developments in the form of electricity and of internal combustion engines have carried the wave of progress still further, and to-day machinery is employed in transport and industry to such an extent that we have begun to look forward to the time when practically all the world's work will be done mechanically.

Machines have even invaded the office, and to-day they play an important part in occupations that until recently were thought to be beyond their range. The first of the invaders was the typewriter, which has been adopted on a world-wide scale and has completely transformed office work. The typewriter was followed by duplicators that produce copies of original documents at high speed, and by tabulating and accounting machines that may be described as super-clerks, for they add, subtract, multiply and divide figures supplied to them, and even sort these out in such a manner as to produce any desired result in the most convenient form. They carry out their complicated tasks in a much shorter time than would be required by human clerks, and are so accurately constructed that they are practically free from error.

I sometimes wonder if there is any limit to the powers of machinery. The machines I have just mentioned are specially adapted for the repeated performance of certain operations. This is true also of the Differential Analyser, but it seems to me that this machine is capable of something that approaches actual "thinking," along the lines laid down for it by its designer. Thinking machines play an important part in fantastic stories of the future, and writers have even imagined contrivances that could interpret the thoughts of their controllers and pass these on to beings of a different type in a form that is intelligible to them. Many of the strangest things of fiction have already become realities, and it would be rash to prophesy the impossibility of producing machines capable of processes equivalent to a mechanical type of thinking. Truly creative thinking of course will always remain beyond the power of any machine.