

Edison in train telegraphy, an offer which was gleefully accepted. Edison had now developed a sturdy physique and uncommon powers of endurance which characterised his life in after years. He abandoned newspaper selling, and devoted as much as 18 hours a day to telegraphy. In four months the stationmaster found that his young pupil was a most efficient telegraphist, and had also become skilled in the electric science of telegraphy. Then for six years Edison followed the calling of a telegraphist. His first important position was that of a night operator on the Grand Trunk railway at Stratford Junction, Ontario, Canada. Edison was then only 16 years of age. His first invention was to cover up the fact that he had snatched sleep during the long still hours of the night, for he spent the greater part of the day in research work. He was required to send a telegraph signal to the train dispatcher's office each hour as proof that he was awake. Edison fastened a notched wheel to a clock, which at each hour automatically sent the necessary signal. The trick was eventually unmasked, and Edison was severely reprimanded.

As an operator Edison was described as having no superiors and very few equals. Robert Underwood Johnson, afterwards Ambassador to Italy, states that when a youthful telegraph operator he used to listen-in to lightning-like rapidity of the telegraphy of a certain operator at Indianapolis named Edison. Edison was also a lightning reader, and possessed the faculty of absorbing everything he read. He was always experimenting with batteries and inventing devices for making the work of telegraphy less arduous. One night he accidentally upset a jar of sulphuric acid which leaked into the manager's office below and ruined the desk and carpet. Next day he was dismissed. Edison soon got another position, and continued experimenting, so that with his work as a telegraph operator and experimenting, his activity totalled 18 to 20 hours a day. He would use all his spare money in books, apparatus, and chemicals.

Edison eventually invented and patented a vote-recorder, which he took to a committee at Washington, but, although the thing worked admirably, it did not suit the House of Representatives.

Next, he invented a stock exchange ticker, and instituted a stock-ticker service with 40 subscribers. It must be explained that the stock-ticker system comprises a central sending apparatus to which the receiving apparatus in each subscriber's office is connected by telegraph wires. The quotations of stocks and shares are sent from the central apparatus simultaneously to all subscribers. The system was in operation when the writer was in New York about 30 years ago. A paper tape runs out of the receiving apparatus, on which is automatically type-written the stock quotations. The

writer saw the system applied to a ringside description of a boxing contest in New York at night-time, long before broadcasting was thought of.

Edison endeavoured to sell his ticker in New York, but he was unsuccessful. He followed this with an alphabet dial for direct telegraphy from one business house to another. It was a complete success, and he decided to make his living by inventing.

Edison went to New York and landed there without sufficient cash to buy his breakfast. He met an out-of-work friend who gave him a dollar, and young Edison had a hearty meal. He managed to obtain permission to sleep that night in the battery room of the Gold-Indicator. The gold indicator was a kind of electrical indicator conveying the news to several stockbrokers' offices containing the transactions in gold in the Wall Street Gold Exchange. There were some three hundred subscribers. On the third day the mechanism of the machinery went wrong. The manager was feverishly excited, and the superintendent of the apparatus also got "rattled." Edison quietly stepped up to the instrument and saw that a contact spring had snapped and fallen between two gear wheels. He undertook to put the machine right, and in a few minutes it was ready to continue operation. Edison was then offered the job of manager of the whole plant, which he promptly accepted. He introduced several improvements into the system. The young inventor was then only 22 years of age.

Edison next went into partnership with Franklin L. Pope, a young telegraph engineer, and they were subsequently joined by J. N. Ashley, publisher of "The Telegrapher," as electrical engineers. A "gold printer" for recording stock exchange quotations was invented by Pope and Edison. They also installed private telegraph lines for brokers and merchants. They sold their business, and Edison applied himself successfully to developing several inventions for stock tickers for which patents were granted. These resulted in the perfection of the Edison Universal printer which created a good demand. He sold this invention for what to him was a staggering sum—40 thousand dollars (£8000).

His energies were next directed toward starting a factory in Newark, New Jersey, for making stock exchange tickers and parts. He employed 50 men, and soon added a night shift. Edison was his own foreman and was practically on duty the whole 24 hours. This amazing man would snatch only half an hour's sleep upon a work-bench three or four times during the twenty-four hours. Up to 1902, Edison stated, his average day's work had been 19½ hours, but after that, he confessed, he had slackened down to only 18 hours a day!

America's Greatest Inventor

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During 1870-71 Edison opened a couple of more workshops in Newark, N.J. Once, Edison had no fewer than 45 of his inventions being developed in his workshops. He improved the Automatic Telegraph Co.'s system between New York and Washington, and made that system a commercial possibility, the instruments transmitting and recording 1000 words a minute. On a line connecting New York and Philadelphia he made it possible to run 3500 words a minute. Next he made it practicable to send, and print at the receiving end 3000 words a minute in Roman letters, instead of Morse code. Then he invent-



BETTY HILLIARD.

Mezzo-contralto, who appears regularly from 3YA. On November 6 she will present several songs, accompanied by the Studio Octet.
—Steffano Webb, photo.

ed duplex telegraphy, sending two messages simultaneously in the same direction. Then came his quadruplex telegraphy. Edison next patented a new system of call-boxes for district-messenger service and organising a company to exploit it he sold out to the Atlantic and Pacific Telegraph Co.

Striking out in a new direction, Edison invented the apparatus for preparing a stencil for writing duplicates, called a mimeograph, now much used for typewriting stencil work. He assisted Christopher L. Sholes in perfecting a typewriter which was subsequently purchased and issued by the Remington Co.

The telephone, in a crude, unsatisfactory form, was invented and patented in 1876. Edison took it in hand and perfected it. He followed this by inventing the electro-motograph for telegraphy, which he adapted afterwards to his "loudspeaking telephone."

A wonderfully sensitive detector of minute changes in temperature, called the tasimeter, was invented, but not patented, by Edison. In 1877 Edison invented what he regarded to the last as his best invention—the phonograph. Primitive though it was, with its many defects, the first phonograph created a wonderful stir. It was exhibited far

and wide, and brought in large sums for Edison, in royalties. A small book could be written about Edison's invention and work on the phonograph. After several months the craze about the phonograph subsided, and Edison put the invention aside for later consideration. In 1887 he hauled it out of the cupboard, and set about remedying its defects. Up to 1893 he had taken out 65 patents for the phonograph, and up to 1910 his phonograph patents totalled over a hundred. The phonograph now took a new lease of life, and success crowned the inventor's efforts. So deaf was Edison that he could not hear a sound from a phonograph three feet away from the machine. But he merely placed his head against the machine and the sound vibrations immediately became audible. If some very faint sound was to be detected Edison would grip the wood of the machine with his teeth. This wonderful man, handicapped almost hopelessly by deafness, produced an epoch-marking musical and speech-reproducing machine. What a living paradox!

The story of Edison's invention of the familiar household electric globe is a veritable epic. This was achieved in 1879, after over 13 months passed in experiments at a cost of about £9000. To afford some idea of the colossal amount of experimentation carried out by Edison, scores of various materials were tested with a view to obtaining a suitable element for the illuminating filament; then he thought of bamboo or other plant fibre as the most suitable substance for carbonisation into a filament. About 6000 distinct species of plants, mainly bamboo, the search for which cost about £20,000, were tested. Men were sent far abroad, and ultimately a certain species of bamboo was discovered in Japan which when tested came up to requirements, and for upwards of 15 years carbonised bamboo was in general use as the filament for electric lights. Eventually bamboo was supplanted by metal tantalum, and then tungsten—for universal use.

Edison's next success was an improved electric dynamo which was 90 per cent. efficient. In addition to various patents in connection with the electric lighting system, Edison devised the feeder-and-main method.

In 1880, Sarah Bernhardt, the world-famed actress, visited Edison's private workshop, laboratory, and electric lighting plant at Menlo. The "Divine Sarah" said of Edison: "I looked at this man of medium size, with rather a large head, and I thought of Napoleon I. There is certainly a great physical resemblance between these two men, and I am sure that one compartment of their brain would be found identical. Of course I do not compare their genius. The one was 'destructive' and the other 'creative'."

In 1881 Edison sent an exhibit of his lighting inventions to the international exposition at Paris. For this display he was awarded a diploma and received the decoration of an officer of the Legion of Honour.

Edison's difficulty in establishing the general popularity of electric lighting is epitomised in a remark he passed in a newspaper interview in 1923, when he said: "You know it takes from seven to 40 years to put an idea over on the public. Even a self-evident proposition requires about ten years."

In 1884 Edison's first wife died, and in 1886 he married Miss Mina Miller, daughter of Lewis Miller, one of the

YOU CAN'T BUY A BETTER VALVE THAN

Mullard
THE MASTER VALVE