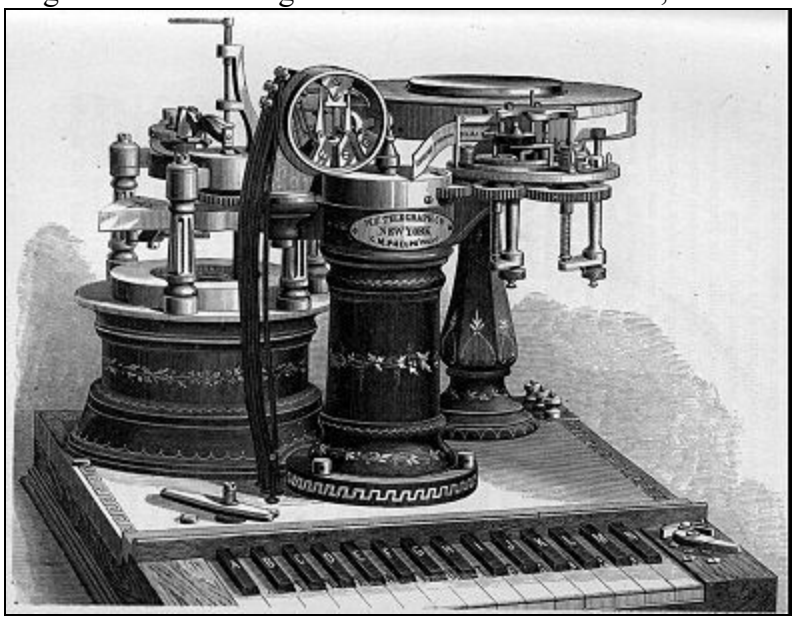
In 1875 Phelps introduced the last in his series of large, fast, printing telegraph machines used on major lines. Drawing upon his experience with the House, Hughes, and The Combination, Phelps built what was noted as his most significant achievement in printing telegraphy :

The Phelps Electro-Motor Telegraph

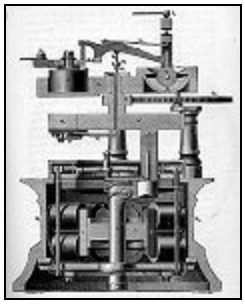
Ten years in development, this printer design was based around an arrangement of his new electro-motor/governor and was able to achieve speeds of up to 60 wpm. It was driven by Phelps', precision, electro-magnetic motor. Designed for hard commercial use, it was found only on important high traffic circuits. It operated at full speed on Western Union's New York to Chicago wire without requiring a repeater. This printer was on display at the U.S. Centennial Exhibition in Philadelphia in 1876. It was judged by scientists of the likes of Sir William Thompson and Joseph Henry. It received their highest award for " Excellence and Superiority" over other apparatus. James D. Reid, another respected telegraph authority in the 19th century stated:



"[it] may be regarded as a specimen of the highest efforts of the human intellect".

" The best apparatus of this character is that invented by Mr. G.M. Phelps, and is in use upon the lines of the Western Union Telegraph. "
....Thomas A. Edison, 1879

Click here for a larger view (89K) of printer:



Phelps' Electro-Motor
Click here for a description
and a larger view (77K) of the motor

An example of one of Phelps' printing telegraphs from The Smithsonian Collection. This printer represents Phelps' U. S. Patent 161,151 - March 23, 1875. Printers of this design were used in the reporting of gold, stock, produce, and petroleum quotations. They were also used for reporting commercial news and sporting event results.

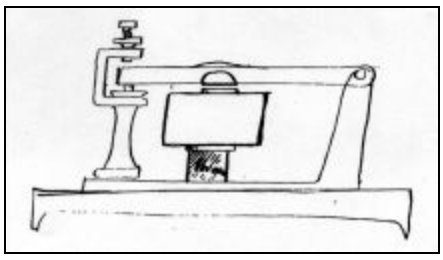
The photo above courtesy of The Smithsonian Institution

Click here for a larger view

During this same period Phelps was also involved with significant developments in conventional Morse systems. In early 1872 Western Union adopted Joseph Stearn's patents for duplex telegraphy. This prompted Thomas Edison to approach Western Union's president William Orton about possible interest in other systems. Western Union, concerned about controlling this technology, arranged with Edison to come up with possible competing designs. Alternative duplex equipment designs by Edison were given to Phelps to be built for experimentation.

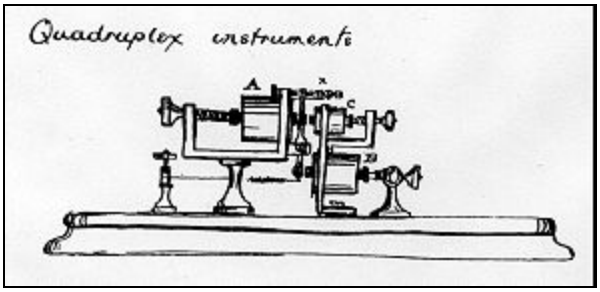
In 1874 Western Union and Edison came to an initial agreement on Edison's new Quadruplex system. The Quadruplex, Edison's most significant telegraph invention, would allow four simultaneous transmissions on a single conductor and would save Western Union considerable money. Edison gave his equipment specifications to Western Union to be constructed by George Phelps. His initial specifications called for some of the following to be built:

6 Small relays
6 Single sending sounders
6 Reversing sounders
6 Differential polarized relays
24 Keys
6 Switches
6 Bridge rheostats



It is interesting to note Edison's language in his specifications. He directs usage of some of Phelps' instruments as "using ordinary Phelps sounders" or "using ordinary Phelps binding posts". He also draws by hand a sketch of

a modified Phelps sounder*. A business relationship existed between the two inventors with Edison's association with Western Union. Phelps at this time was 54, Edison was 27. On one internal correspondence memo, Edison makes reference of Phelps as "Mr. P".



Edison submitted several orders for instruments to be made by Phelps at Western Union's factory. This series of Quadruplex Drawings*, in Edison's handwriting, was received by Phelps on July 13, 1874. Edison used the instruments built by Phelps to conduct his Quadruplex experiments on Western Union's lines. Phelps also built Edison's Quadruplex patent models.

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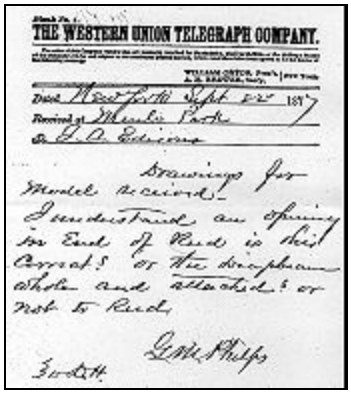
Click here to view copies of this seven page sequence of Edison's Quadruplex drawings (350K)

After the completion of tests, Western Union quickly utilized the Quadruplex on various circuits. Major litigation took place for the patent rights, but by 1877 Edison and Western Union came to an agreement. At the time of this agreement, Edison also agreed to give Western Union sole rights in the U.S. for all inventions that could be used on telegraph land lines. This would involve Phelps in building more of Edison's experimental/patent models. The first following this agreement was Edison's Sextuplex, a system using a combination of his Quadruplex and acoustic techniques to achieve six simultaneous transmissions on a line. This arrangement with Edison would continue right into the telephone era and Phelps would build some of Edison's early telephone patent models.



Shown here are two examples of documents* that show correspondence between Phelps and Edison during the telephone era.
Click here for a description and larger view

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