LIVERMORE'S PERMUTATION TYPOGRAPH

by JOS LEGRAND

Benjamin Livermore is one of the most forgotten pioneer inventors in American typewriter literature, starting with the famous "Record of Typewriters" in the *Phonographic World* of 1891-1892. It was the even more famous "50th Anniversary Historical Number" of *Typewriter Topics* that in 1923 brought Livermore into the light with two meager lines about his invention: "Also in 1863, Benjamin Livermore, of Hartford, Vermont, contributed a machine to the list of typewriter inventions. Its novelty was character signs, used singly or in combinations to form letters." An illustration accompanied the text. And so he was on the scene, but except for Dupont/Sénéchal, Martin and Adler, no authors found him interesting enough to list him in the American pre-production inventors' guild.

But, in contradiction to the *Topics* text, Benjamin Livermore came from Hartland, not Hartford. A slight difference, although not for the people in Windsor County, Vermont. Hartland is at a nine mile stone's throw from Hartford. Originally it was called Hertford. In 1782 it was renamed Hartland to avoid a confusion with Hartford. It was

"difficult for strangers to distinguish which of said towns might be meant ... and many other inconveniences do attend the having two towns so near of one name in the state." In fact he came from Foundryville, a part of the town where a foundry was located.

The Livermores came to Hartland in 1797, Joseph Livermore and his father. In 1818 Benjamin, son of Joseph, was born. Nine brothers and sisters he had, himself being the third child. Hartland was a village in those days, as it is today with her 3223 inhabitants now. It is situated on the New Hampshire side of Vermont, not more than two miles from the Connecticut River.

Foundryville, Hartland, Vt.

Emily was Benjamin's third sister. She married a certain Nathan Frederick English, who lived in Hartland after an expedition in the shoe machinery business in Milford, Massachusetts which he undertook together with Benjamin Livermore, his brother-in-law. Livermore married Almira, Frederick's eldest sister. The two men went to Milford in 1847 or '48, and set up a system in which teams of men were hired, who were working at home, stiching, pegging, sewing or lasting. There was a lot of resistance to English's system. Fred English got malaria there, returned to his home state, and stayed ill for two or three years. Back in Hartland, English specialized in making machinery and was interested in making daguerreotypes. "They all lived very close to each other and in some cases shared inventions" (the *Hartland News*, citing the *Woodstock Standard* in 1905). Nine patents by Fred English and/or Benjamin Livermore are listed in the Vermont Historical Records Survey. One of Fred's ten children was Analdo, who invented machinery too, but also designed the Simplex typewriter. It is not difficult to guess where he got his inspiration.

According to Howland Atwood, Analdo English and his brother Ernest Benjamin told him that Livermore once lived on the Max Crosby place just before entering Hartland Four Corners. The house was the former Judge Elihu Luce House at Byron Ruggles Place between Foundryville and Four Corners Village.

Maybe it was there that he invented his typewriter. He called it a Mechanical Typographer. The machine was patented as a "device for hand-printing." The patent was filed on July 21st, 1863. A hand-printing machine it is. It is the first portable typewriter ever, although the patent text speaks of a "new and Improved Hand-Printing Device." "The object of this invention is to obtain a portable device which may be held in the hand." There are surviving photographs of Benjamin Livermore holding his machine in his hand. Mrs. A. A. Sturtevant recollected: "it was so small that he worked it with the fingers of the hand with which he held it." A pamphlet from those days speaks of a "Pocket Writing Machine." And indeed, he could put his machine into his pocket. He could even write with the machine then, and the word "pocket typewriter" should therefore be taken literally: "He usually carried it in his pocket and could print it there, placing his hand in such a position that his fingers rested on the keys. After taking down the conversation of those he met, he placed it under his pillow at night to catch any stray thoughts, as he termed it," Eunice Cobley Lyman, Livermore's great-grandniece, wrote according to the *Woodstock Standard*.

The machine is four inches long, two and one-fourth inches broad and one inch deep, according to Livermore in a brochure, and as recollected by the *Hartland News* in 1905. The *Boston Daily Traveller* gives this description: "five inches long, two and a half inches broad, and one and a half inches thick." Other measures are also known, such as 4½ x 2½ x 1, mentioned by Eunice Lyman. Its mechanism is situated in a case made of metal—"polished steel," said the *Traveller*—bent at the end. In it there are two rollers on which the paper is wound

longitudinally. "A strip of paper twenty feet long may be put in and printed over without further attention," according to the *Woodstock Standard* (freely adapted from the *Boston Journal*). Twenty feet, about 6 meters? Livermore doesn't contradict it, but Carol Morey recalled in her notes from January 1939: "He used tissue paper in it in 20" sheets about 2 1/8" wide. It was rolled up on wires and made a roll about as big as a lead pencil."

The paper runs across an inkpad on one side, with the printing point opposite it (placed on

the upper part of the machine). The letters are formed by a "combination-type," as Livermore called it. Six keylevers control six parts of the combination-type. "By means of these six parts the alphabet is formed," says the patent. The form of the letters is derived from capitals or small letters, depending upon their readability. The alphabet shown is a bit idealized, because in reality the letter O is higher than the M or X, or the M wider than the X. According to the *Woodstock Standard*, punctuation marks and the numerals were also thought of. In fact there are sixty-three possibilities. Eunice Lyman, quoted in the Woodstock article, remembered that "The machine was worked by six keys placed at one end of the box and pressed down after the manner of piano keys. He would print with it in the dark. He usually carried it in his pocket and could print it there, placing his hand in such a position that his fingers rested on the keys." However, the keys only work when they are pressed forward, or "inwards" as the patent says.

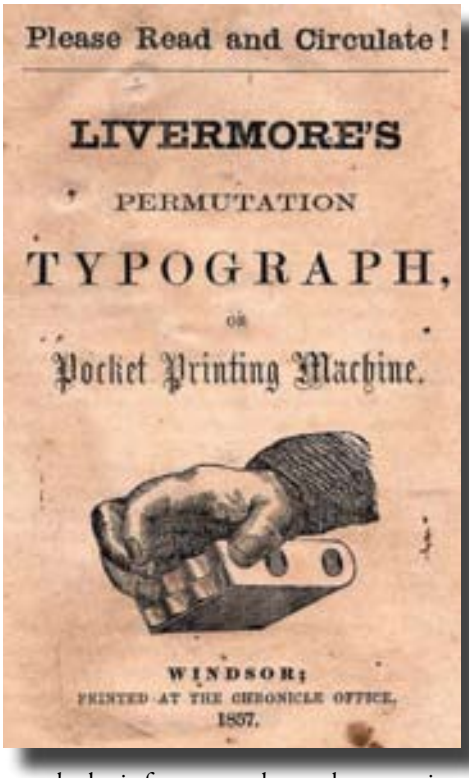
A pamphlet from 1857 with the announcement for an "Interesting and Instructive Exhibition" by Livermore himself has an illustration that gives an idea of how to work with the Permutation Typograph. The same picture appears in a circular distributed earlier that year and printed at the *Vermont Chronicle* office.

The keys could be operated by the middle three fingers, according to the three positions of the keys. But there were several other versions. A description from oral history from the 1930s gives this account: "Three sets of 3 or 9 keys are combined to make different elements." But at least we can be sure of a daguerreotype on which Benjamin Livermore can be seen along with his sister Emily and four of her daughters together with a machine with four positions; two rows with two keys and two keys apart are shown.

That picture probably dates from summer 1853. And so it takes a middle position in the development of the prototypes of Livermore's Permutation Typograph, as the 1857 pamphlet informs us: the invention is the result of seven years' study. His great-grandniece stated: "Benjamin Livermore while studying shorthand invented typewritters, 1850 and soon after comenced work on them. The first ones resembled the typewritters of the present day, but not being satisfied, he kept making improvements until at last built what he nemed 'Permetation Typewritter' or a pocket writeing machine." So the whole process of invention lasted about thirteen years, closing with two patents. In the same year as the US patent was granted, Livermore also filed a patent in England. According to Rootsweb.com there was a machine in the Patent Office: "one is in a case not far from the door in the Main Hall of the Patent Office in Washington DC." That site mentions an earlier invention of a typewriter before the Permutation Typograph also, but no information could be found at the moment. It cannot be ruled out that the text comes from the same source, Mrs. Lyman.

In the fall of 1857, shortly before Livermore announced that he would give "a representation of the machine," he edited a brochure. He was looking for investors. The press was already informed in the first half of 1857, and not only the *Vermont Christian Messenger*, but the *Philadelphia Evening Bulletin* and others also published about it, such as the *Phrenological Journal* from New York. The brochure gives an interesting insight into Livermore's mode of thinking. The machine is invented for "various classes of persons" and for "the circumstances where pen or pencil cannot be used," as one of the testimonials declared. We have to think of travelers or tourists taking notes while riding in a car or carriage; "the physician can note his cases," Livermore stated, "while on his way from one patient to another. The public lecturer can note any important thoughts as they occur to his mind, at any time or place, and preserve them for future use. The student can write his themes while on his rambles, or in unoccupied moments, without being confined to his study; and take notes in the lecture or recitation room. The reporter can take his notes in a crowded audience, where he cannot secure conveniences to write with pen or pencil; in the street, in the dark, among the jostling crowd."

Benjamin Livermore saw his invention not so much as a mechanized writing process but as a "new mode of writing." Nor was it thought of as a means for the blind to communicate, as


Please Read and Circulate!

LIVERMORE'S

PERMUTATION

TYPOGRAPH,

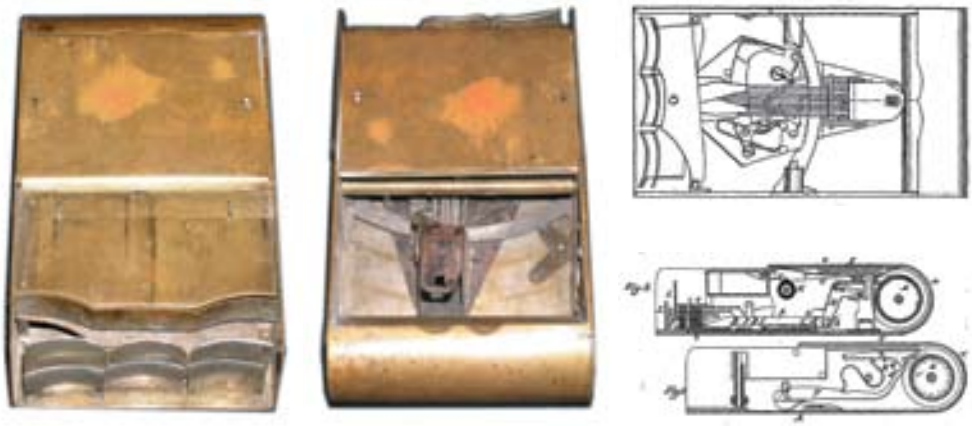
OR

Pocket Printing Machine.

WINDSOR:
PRINTED AT THE CHRONICLE OFFICE.
1857.

was the basis for some other early typewriter inventions. It was a Professor Jackman from Norwich University who called Livermore's attention to this in a letter: "You have surely presented a method by which thoughts may be recorded when travelling and in the dark. In his bed, at dead of night, a man may record his waking thoughts. But you have conferred the greatest blessing on the blind." Morey's notes from 1939 also made such a remark: "It was a machine that the blind could write with." Jackman's letter has been entered into the long, impressive list of testimonials. Livermore knew how to win people's hearts. A lot of professors, reverends and postmen pass by when reading the list. Even a commissioner of patents belongs to it.

The Permutation Typograph is not a stenographic machine. The alphabet used is meant as an alphabet, and printing is always one character at a time. And although one character is composed of several elements, the machine is a typewriter in the literal sense of the word. Read the Letters Patent No.39,296: *"The invention also consists in the employment or use of finger pieces or keys, arranged in a novel way with levers, for the purpose of operating the several parts of the type, and also in a certain means employed for causing the type to transverse or move so that proper spaces may be allowed between the impressions, and the type allowed to adjust itself properly at the termination of each line for the printing of a succeeding one."* It is the combination of elements that must be printed in one movement: *"The keys or finger-pieces L may be readily operated, either singly or two or more at the time, so as to form the several letters"*; after that, the



spacing follows. It is the description of the essentials of a typewriter. "To form any single letter requires but one movement of the hand, and this movement also secures the other required movements of the paper and type, so as to form regular lines, with equal distances from each other," the *Vermont Chronicle* reported on Aug. 13th, 1857.

Livermore's machine has survived. The one pictured here is preserved in the collection of the Vermont Historical Society. Two others have been saved and are in the collection of the Franklin Museum of Nature and the Human Spirit in Windsor. Several experimental models have survived too. The Vermont machine is the final state of the Typograph. It resembles the machine that is pictured on the pamphlet and the circular from 1857. But it doesn't function anymore (the combination type is dismantled and it seems that parts are missing). The Vermont Permutation Typograph is made of brass and steel and measures 4.25" x 2.44" x 1" (10.8 x 6.2 x 2.5 cm). It weighs 7.2 oz (ca. 204 g). The six keylevers are connected with hook-shaped levers, as can be seen in Fig. 2. These levers activate the distinct parts of the combination type. The whole printing mechanism runs along a curved rack, and so the printed lines are curved too. Twenty letters could be written on a line, the *New England Farmer* informed us in the brochure, with sixty lines upon one foot. After a line was ended, there was an automatic return to the starting position simply by gravity. There is one condition: "when the device is in use, [it] being held in an inclined position in the hand of the operator." Spacing was just before printing, but the patent does not give information about how empty spacing was arranged. There is an automatic paper feeding after the termination of each line. Because the type puts the paper against the inkpad, special paper has to be used: "A piece of paper having a mixture of coloring matter and grease rubbed over it," the patent says.

No production was made in spite of all the plans. The *Boston Daily Traveller* prophesied an extensive application on a larger scale, but apparently Livermore got too few orders or none at all. He wanted, if possible, cash in advance. "I employ no agents, all remittances should be sent directly to me," he wrote. According to Livermore a plain machine should have cost 10 dollars, but up to 100 dollars would be no problem "according to outward style and finish." But it could be made larger or smaller, as might be desired."The instrument may be still more reduced in size, if the ladies should want a small and elegant one as travelling companion," the *Boston Journal* thought.

Two pictures of Benjamin Livermore are known to me, and on both of them the typewriter can be seen. We owe these to his brother-in-law Fred English, who experimented with daguerreotypes, and even invented a portable ambrotype himself, which is a kindred photographic process. On the two pictures we see a sturdy man with bristly hair and an open face. The youngsters on the crowded picture are the children of his sister, who is also in the picture. On the other photo Livermore examines his typewriter.

Benjamin Livermore was born August 6th, 1818 and died April 4th, 1871 at the age of 52 years. Almira English, his wife, born as Almira Elizabeth Hodgeman, passed away much earlier, on August 22nd, 1846 at the age of 24 , a year after they were married. Twenty years later he remarried with Julia Goodhue Winship. Livermore's gravestone still exists. No children came, but in a future article I will show that Livermore's inheritance is still alive and kicking.

Thanks to Mrs. Mary Rogstad of the Vermont Historical Society and Mr. Jay Boeri, chairman of the Franklin Museum of Nature and the Human Spirit in Windsor. Special thanks to Mrs. Beverly Lasure, Vice President of the Hartland Historical Society.

Literature

Please Read and Circulate! Livermore's Permutation Typograph, or Pocket Printing Machine, Windsor 1857

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