

**MECHANICAL MASTERPIECES OF THE EIGHTEENTH CENTURY.**

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While modern industry compels inventors to guide themselves in their work exclusively on the principle of utility, aiming with the aid of their machines at a saving of time and energy, workmen and engineers of former centuries were allowed sufficient leisure, now and again, to indulge in their imagination, and even to devote a considerable portion of their lifework to designing ingenious and wonderfully intricate mechanisms, that are apt to be looked upon by modern men as mere toys. However, these products of mechanical skill deserve our interest, and not only for curiosity's sake; by such fanciful work their constructors have in fact contributed to a great extent to developing their art, enabling their successors to work sufficiently in the very paths of our present hustling industry.

A striking instance of this assertion is afforded by the work of two Swiss mechanics, Pierre Jaquet-Droz and his son Henri Louis, who in the second half of the eighteenth century laid the foundation of the renowned Swiss watch industry.

This industry, which is at present so highly developed, was at that moment in its earliest stages, and was able only with difficulty to compete with that of the neighboring countries. Methods were in fact rather primitive, nor had the principle of division of work been carried through; the same workman who made the clockworks frequently manufactured and adorned the casings. It was not until the advent of the two Jaquet-Drozes that a revolution was wrought in this state of matters.

Pierre Jaquet-Droz had, as a youth, on account of his remarkable intelligence, been destined by his parents, wealthy farmers at Chaux de Fonds, to be a minister, and was only by chance directed into the career in which he was to become so great a master.

When young Pierre once came home for his holiday his attention was drawn to his sister's work, who according to the fashion of the day had taken up the new industry. Her mechanisms immediately awoke his interest, and what at first had been merely a fancy gradually filled up his thoughts entirely, and induced him to leave theology and devote his life to the construction of watches and other mechanical appliances. He quickly acquired the use of tools, and his first productions already are masterpieces that excite the admiration of his fellow citizens, proving an incomparable inventive genius allied to exceptional manual skill.

It was very fortunate for the young artist that Lord Keith, governor of the country of Neuchâtel (which at that time belonged to Prussia), to whom he was once introduced, should become interested in him, realizing at once his extraordinary gifts. He induced Jaquet-Droz to go to the court of Ferdinand VI. at Madrid, where he met with the most friendly reception. The numerous and most liberally remunerated commands which he there received enabled him in future to work quite freely, and established not only his own fame, but at the same time the renown of the hitherto unheeded watch industry of western Switzerland. After

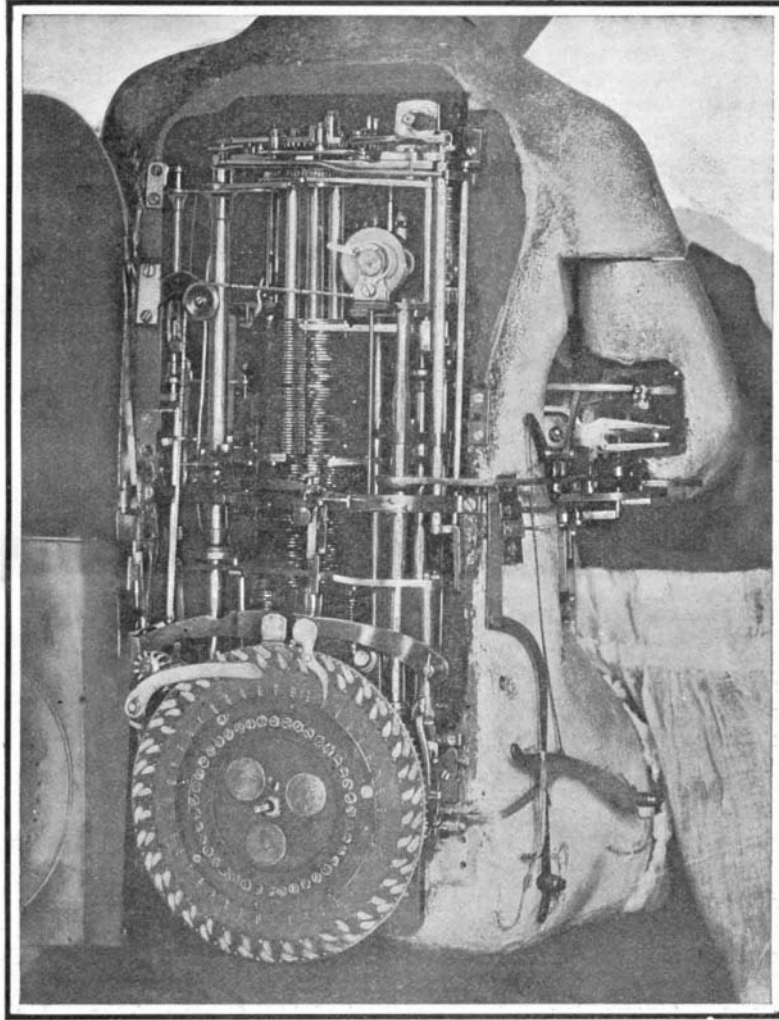


Fig. 2.—The "Writer" With Back Opened, Showing the Complicated Mechanism.



Fig. 7.—Jeweled Watch Made by Jaquet-Droz, Jr.

returning to his country, Jaquet-Droz there spent many years of a highly productive life. In his son Henri Louis, the education of whom he from the very beginning guided on his own principles, he found an equally gifted assistant, while Leschot, Maillet, Jean Pierre Droz, and others, became skilled disciples, who propagated the art of their masters not only in their own little country, but all over the world. Jaquet-Droz, Jr., in conjunction with Maillet, founded a watch factory at London, and to the joint work of these men we are indebted not only for a large number of masterpieces that are even now admired universally, but also for an unexpected development in the watch industry of French Switzerland.

The Society for the History of the Canton of Neuchâtel has just prepared an interesting exhibition of productions of the two Jaquet-Drozes, and through the courtesy of C. Perregaux, director of the Technicum of Locle, the writer is enabled here to illustrate and describe the most famous.

These are three automatons, which may be said to be the most perfect "artificial men" ever produced by human skill, and which during the lifetime of their authors and after their death until the present moment have been wandering throughout Europe and America, being admired both at the courts of princes and in the homes of poor and rich. They were purchased a short time ago by a Berlin collector, but the canton of Neuchâtel is trying to gain them back, in order to preserve for the country these historical treasures.

The most ancient as regards the time of its production is the "Writer," represented in Fig. 1, a child of about four years of age, who, sitting at his little table, patiently waits with the pen in his hand until the clockwork is started. He then sets to work, and after looking at the sheet of paper before him, lifts his hand and moves it toward the inkstand, in which he dips the pen. The little fellow then throws off an excess of ink and slowly and calmly, like an industrious child, begins writing on the paper the prescribed sentence. His handwriting is careful, conscientiously distinguishing between hair strokes and ground strokes, always observing the proper intervals between letters and words, and generally showing the sober and determined character of the handwriting usual at the time in the country of Neuchâtel. In order, for instance, to write a *t*, the writer begins tracing the letter at the top, and after slightly lifting his hand half-way, swiftly traces the transversal dash, and continues writing the original ground stroke.

How complicated a mechanism is required for insuring these effects will be inferred from Fig. 2, in which the automaton is illustrated with its back opened. In the first place a vertical disk will be noticed having at its circumference as many notches as there are letters and signs. Behind this will be seen whole columns of cam-wheels, each of a special shape, placed one above another, and altogether forming a sort of spinal column for the automaton.

Whenever the little writer is to write a given letter, a pawl is introduced into the corresponding notch of



Fig. 6.—The Spinet Player in Her Original Costume.



Fig. 1.—The "Writer" Automaton.



Fig. 5.—The "Spinet Player" Modernized.

the disk, thus lifting the wheel column and transmitting to the hand, by the aid of a complicated lever system and Cardan joints arranged in the elbow, the requisite movements for tracing the letter in question. The mechanism comprises five centers of motion connected together by chains.

According to tradition, Pierre Jaquet-Droz controlled his automaton from a distance without touching it in any way. By his voice he stopped the little writer in his work, or directed him to write the name of some of those present. To produce this effect he is said to



Fig. 8.—Portrait and Autograph of Pierre Jaquet-Droz.

have used a magnet hidden below his clothes. This legend as well as many others which surround the personality of the artist will hardly bear criticism. In Fig. 3 is reproduced a sample writing from the year 1896 (the automaton then was in the possession of Henri Martin, a Dresden mechanic) and in Fig. 4 a sample from the year 1906, shortly after the little fellow returned to his country. In the "Draftsman," the mechanism is likewise arranged in the body itself, as in the case of the "Writer." The broad chest thus entailed also required a large head, which accounts for the somewhat bulky appearance of the two automatons. With the paper in position and a pencil in hand, the "Draftsman" at first traces a few dashes and then swiftly marks the shadows, and a dog appears on the paper. The little artist knowingly examines his work, and after blowing away the dust and putting in a few last touches, stops a moment and then quickly signs: "Mon Toutou" (My pet dog). The motions of the automaton are quite natural, and the outlines of his drawing extremely sharp. The automaton when desired willingly draws certain crowned heads now belonging to history; for example, a portrait of Louis XV., of Louis XVI., and of Marie Antoinette. To the latter drawing attaches a little anecdote: Jaquet-Droz, Jr., with the assistance of his friend Leschot, when demonstrating before the Queen of France, the mechanical artist obviously chose as *piece de resistance* the portrait of the Queen herself. Unfortunately, however, Leschot, in handling the automaton, made a mistake, and in the place of Marie Antoinette there appeared on the paper "Mon Toutou." This mistake naturally produced some uneasy feeling in those present.

In Fig. 5 we represent the third automaton, the "Spinnet Player," which has the appearance of a girl of about twelve years of

age, who by the way has kept pace with fashion, replacing her old spinnet with a modern harmonium. Her dress has likewise undergone, in the course of a century and a half on her many migrations, a number of transformations which cannot exactly be said to be to her advantage, as will be inferred from a comparison of Fig. 5 with Fig. 6, in which the piano player is represented in her original appearance, with her becoming costume in the style of Louis XV.

As soon as the player is set working, she bends forward, in order better to see the notes, the regular respiration of her breast being plainly seen. Her fingers swiftly slide over the keys, continuing their lively play if the automaton be lifted off the keyboard. The young lady has five melodies at her disposal, and never

*Lebe hoch du schoene  
Stadt Dresden  
et Le Soele*

Fig. 3.—Sample of the Writing Done in 1896.

*Les Andrcides  
viennent recevoir  
leur pays.*

Fig. 4.—Sample of the Writing Done in 1906.

fails to close her performance with a graceful bow.

The inventory of Jaquet-Droz, Jr., in 1786 quotes the "Piano Player" for the amount of 4,800 livres and the "Draftsman" for 7,200 livres. The "Writer" was ceded by Jaquet-Droz, Sr., to his son for the sum of 4,800 livres, it being stated that some modifications were made to the mechanism by the latter.

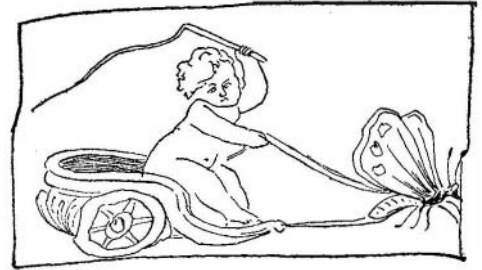
By comparing the present handwriting of the "Writer" and the productions of the "Draftsman" with samples transmitted from former periods, they are seen to have remained unaltered during one and a half centuries; the "Piano Player" likewise still performs the same melodies that delighted her auditors in the eighteenth century. These "artificial men," in the course of their adventurous careers and migrations all over two continents, were witnesses of the violent historical events that took place in the meantime. All these revolutions they have outlasted well-nigh unaltered, and with their antiquated exterior appear to us like the children of bygone ages, of which they, as it were, are bringing us greetings.

**Telegraphy Without Batteries.**

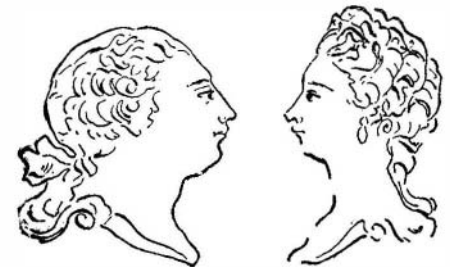
An interesting telegraph apparatus dispensing with

batteries was invented some time ago by a Spanish telegraph official, and has been tested over resistances corresponding to a telegraph line upward of 621 miles in length.

In this apparatus the manual labor of the operator in transmitting Morse signals is employed to generate the currents required for the working of the telegraph circuit. As the currents thus generated by induction are high-tension alternating currents, they readily overcome the resistance of the circuit, traversing considerable distances. The apparatus comprises a lever



Sketch of Cupid drawn by a butterfly.



King George III. and Queen Charlotte, as sketched by the draftsman in their presence in 1774.

Fig. 10.—Drawings Made by the Jaquet-Droz Artist Android.

which is pivoted on a metal support, and which at its rear end carries a soft iron armature in contact with the cores of a pair of high-resistance coils, which are extensions of the poles of a semi-circular magnet.

Whenever by the action of this lever (which serves as Morse key) the armature is removed from the cores, a direct current is produced, while a reverse current is generated each time the armature returns to its position of rest. These currents are thrown in the telegraph circuit.

By means of a special contrivance, the resistance of the receiving apparatus is cut out of the total resistance during the transmission of telegrams, while that of the current generator is eliminated during the receiving.

After each current impulse the circuit is discharged by an earth contact. A relay actuated by a single dry cell in the local circuit is used as a receiver. The lever of this relay accurately repeats any motion of the sending key, as does that of the receiving apparatus, by which the Morse signals are recorded with great accuracy. Each direct-current impulse due to the disconnecting of the armature from the cores will result in the relay lever's striking a stop and remaining in contact with the stop until a reverse current returns it back to its position of rest. As in this telegraph scheme, the connection of the line with the receiver is never discontinued, it could as well be designed for a duplex system, and the inventor is engaged in designing an arrangement suitable for this purpose,



The Writer. The Musician. The Draftsman.

Fig. 9.—The Automatons of Jaquet-Droz Exhibited at the Court of Louis XV.—From an Old Lithograph.