J. C. ZACHOS.

TYPE WRITERS AND PHONOTYPIC NOTATION.

No. 175,892. Patented April 11, 1876.

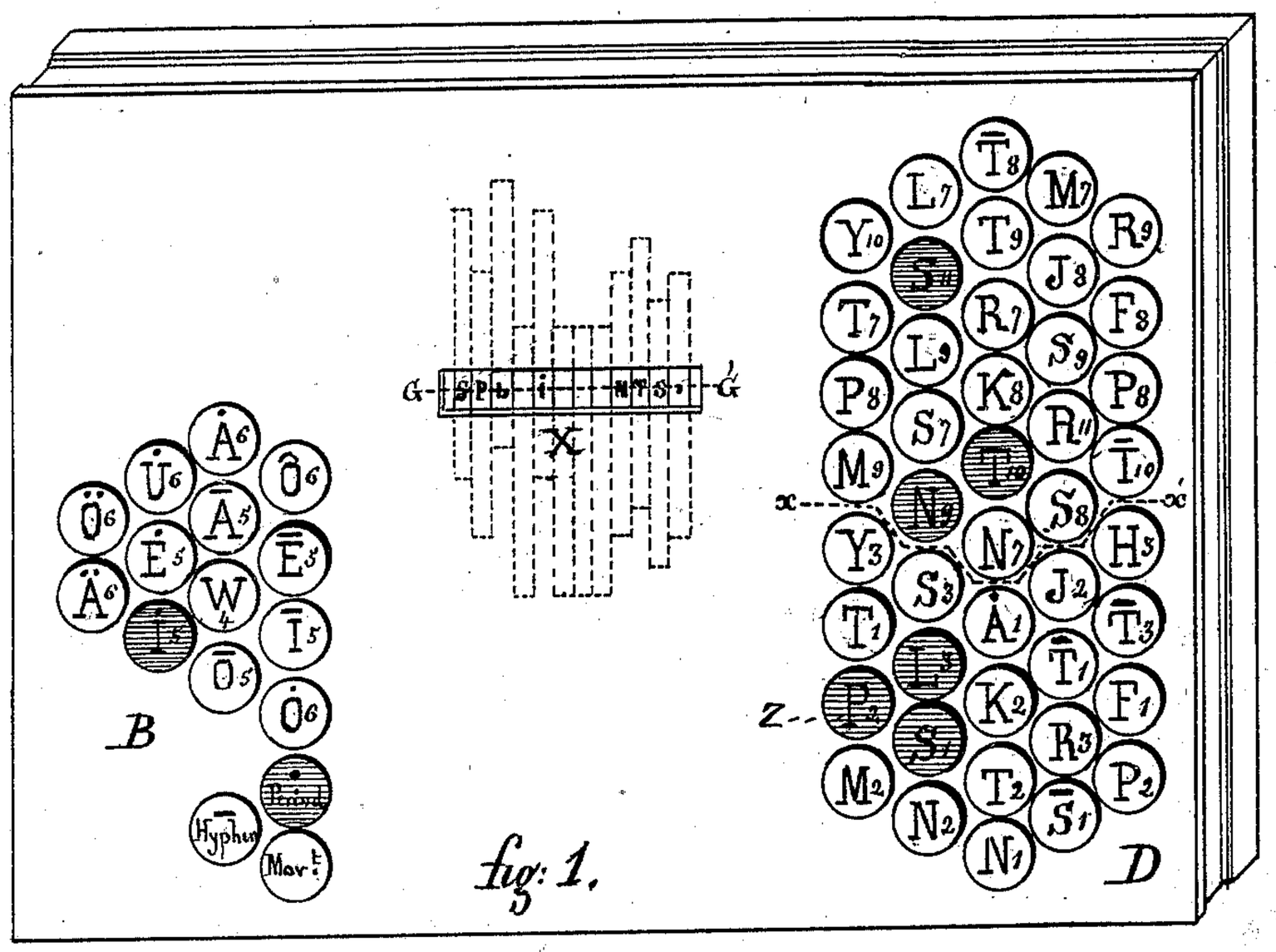


fig: 1.

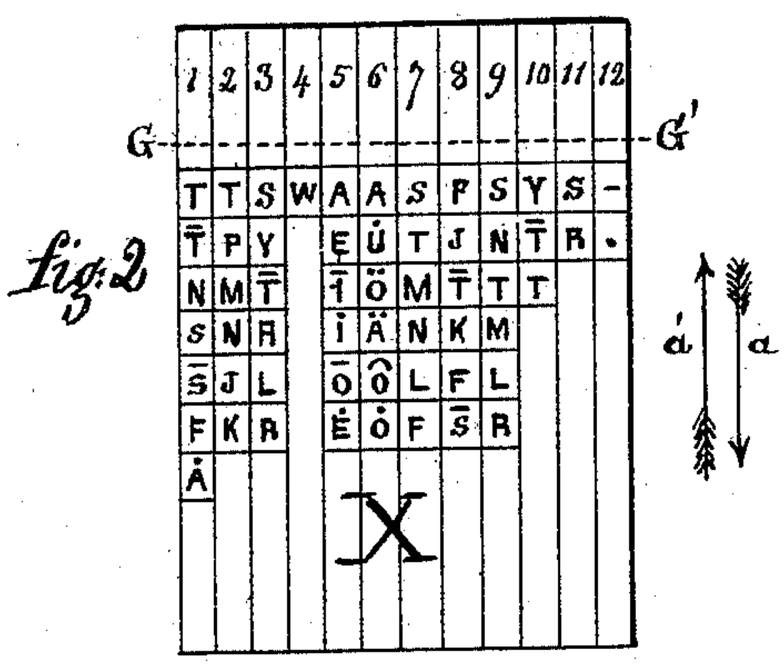


fig: 2

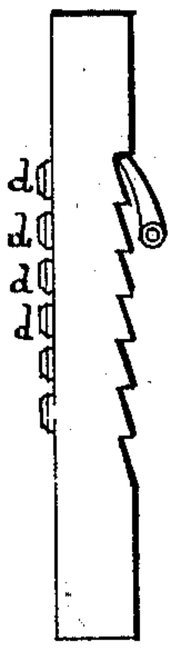


fig: 3.

Consonants = P, T, T̄, S, S̄, F, K, J, M, N, L, R, Y, H,

Vowels = Ā, Ē, Ī, Ō, Ȧ, Ḟ, İ, Ȯ, Ụ, Ä, Ô, Ö, W,

fig: 4

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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN TYPE-WRITERS AND PHONOTYPIC NOTATION.

Specification forming part of Letters Patent No. **175,892**, dated April 11, 1876; application filed December 24, 1875.

*To all whom it may concern:*

Be it known that I, JOHN C. ZACHOS, of the city of New York, N. Y., have invented a Type Reporting-Machine, of which the following is a specification:

The subject of my invention is an instrument or machine for imprinting, as signs of sounds, a new system of short-hand (which I call stenophonotypy) by means of a special scheme of selected types, combined with and connected by suitable mechanism to the keys of two special key-boards, whereby, with comparatively few touches upon said key-boards, a syllable, word, or short phrase is imprinted simultaneously in the aforesaid short-hand, enabling the operator to report speech with greater facility and speed than has hitherto been done by any instrument.

Referring to my drawings, Figure 1 is a top view of my improved reporting-instrument, the inking apparatus, paper-shifting, and printing devices being removed, and not shown, as presenting no novelty, and therefore not required to illustrate my invention.

B is the key-board controlled by the left hand, and D is the key-board controlled by the right hand, of the operator. X is the scheme of types, represented at rest in Fig. 2, and as spelling the word "splints," in Fig. 1.

Fig. 3 is a side view of one of the sliding bars, upon which are mounted the types of my instrument, represented here to explain the operation thereof, as hereafter specified, and Fig. 4 represents my new stenophonotype alphabet.

My stenophonotype alphabet is constructed thus, taking letters and marks as already used to represent sounds, and arranging them in the following order:

*Twenty vowel-sounds and signs.*

Primary: Ā Ē Ī Ō Å Ė İ Ȯ Ů Ä Ö Oi W

Cognates: Â Ê Ä Å ū ụ ụ.

*Twenty-three consonant sounds and signs.*

Primary: P T J K F T̄ S S̄ N M L R Y H.

Cognates: B D ch G V th Z Zh Ng.

So that under a primary sign we have the sign of sound cognate thereof, as Å—Â, P—B, J—ch, T̄—th, N—Ng.

If from this table of sound-signs we select for use only those called primary, to represent all elementary sounds in recording speech, these primary signs would make what I call a stenophonotype alphabet, and the text produced by the exclusive use of these signs would be a stenophonotype text. The principle of this alphabet is that it represents all the sounds by a minimum of signs, and each sign, if it represents more than one sound, is confined to its cognates or similar sounds, with only one alternate in each case, except that of W; hence, the text resulting has a key in these principles by which it can easily be read by the light of the context, and a little practice in phonetic reading. This reduction in the number of signs used is very important in reducing the number of types and keys to a compass within the practical limits of a reporting-machine. Its novelty consists in the fact that while there are several phonotypic and phonographic alphabets that have similar signs for similar sounds, this is the first, of which I have any knowledge, that on a regular principle adopts the same sign for all similar sounds, and thus makes a new form of legible text. Any form of signs may be selected on the same principle. The particular signs adopted in my system are taken preferably and marked, as I think, conveniently with diacritic marks for the purpose of discriminating in sounds. I have, therefore, adopted the following alphabet of signs to be used in my phonotype reporter:

Vowel-signs, (13): Ā Ē Ī Ō Å Ė İ Ȯ Ů Ä Ȯ Ö W.

Consonant-signs, (14): P T T̄ S S̄ F K J N M L R Y H.

These twenty-seven signs represent all the elementary sounds of English, (commonly reckoned as forty-one). Each sign represents one sound, or two sounds, if these have the affinity or resemblance that makes them cognates. The W, through these resemblances, is made to represent four sounds. It is found by experience that the context and a little practice soon make the resulting text readily legible.

The novelty of the stenophonotypes consists not in the fact that they are signs to repre-

sent sounds in speech, nor in the fact that they are selected from the English alphabet, and suitably marked, but that they are selected as signs of sounds on a special principle, which qualifies them to represent all the elementary sounds of English with the fewest signs, and to be used for a type-writing instrument.

X represents my scheme of stenophonotypes, or the order and arrangement of types in my reporting instrument.

This scheme is invariable, definite, and special, both as respects the arrangement, classification, and order of the groups 1, 2, 3, 4, 5, 6, &c., and as regards the kind and number of stenophonotypes composing each group, but the order in which said types is arranged in each group is not material, and may be changed.

The groups 1, 2, and 3 are composed of consonant-sounds, which are to imprint before the vowel-sounds. The groups 4, 5, and 6 are vowel-sounds, including the W, which is sometimes a consonant. The groups 7, 8, 9, 10, and 11 are consonant-sounds, which imprint after the vowel-sounds; and the last group 12 is composed of the hyphen for connecting syllables, and of the period for indicating ends of sentences.

It would be out of place to enumerate here all the reasons which have guided me both in the selection of the kind and number of types in each group, or in the arrangement of the groups among themselves. It suffices to say that after careful study I have found the scheme I here present to be the best adapted for the requirements of a reporting instrument.

Each group of type is mounted upon a sliding bar, which is represented in side view by Fig. 3, where the letters *d d d*, &c., indicate the types.

The twelve sliding bars 1 2 3 4 5, &c., Fig. 2, upon which are mounted the types, have a free motion in the direction of the arrows *a a'*, so that any one type from the group on the bar may be brought to a point on the line of printing G G', by sliding the bar in the direction of the arrow *a'*, in order that by sliding one or several of the bars simultaneously until the proper types are on the line G G' to form a syllable, a word, or a phrase, the said syllable, word, or phrase may be imprinted by one pressure on the types which are on said line G G', as illustrated in Fig. 1, where the bars are moved so as to spell the word "splints."

The sliding bars 1 2 3 4 5, &c., are connected by suitable mechanism with the keys of the key-boards B and D, in such a manner that when a key of said key-boards is depressed or acted upon one of the bars will be made to slide forward in the direction of the arrow *a'* until the type of the group, mounted upon the said bar, which corresponds to the letter or sign marked upon the key acted upon, is brought in position on the line of print G G', each key thus being connected with a corresponding letter or sign on one of the twelve bars 1 2 3 4 5, &c.

In Fig. 1 the keys acted upon or depressed are shaded to indicate that they are depressed, and the bars 1, 2, 3, 5, 9, 10, 11, and 12 have been pushed forward by said action of the keys, so as to place in line the letters S P L I N T S on the printing-line G G', ready to imprint the word "splints."

Fig. 2 represents the scheme of types when in a state of rest, to which state it is brought back by suitable mechanism acting upon all the bars after every imprinting of a syllable, word, or phrase by the action of the key marked "movement," which, at the same time that it prints and causes the paper to shift for receiving the next impression, acts upon a release arrangement of any kind.

The key-board B is designed exclusively for the left hand, and its keys govern the movement of the bars 4, 5, and 6, where the groups of types representing vowels are arranged, and also the bar 12, where are located the hyphen and period.

The key-board D is divided by the line *x x'*, all the keys above which correspond to the bars and groups of consonants, which are intended to imprint after the vowels in the order of the scheme, or the bars 7, 8, 9, 10, and 11, and all the keys below the line *x x'* corresponding to the bars 1, 2, and 3, act thereon so as to control the groups of consonants which imprint before the vowels. This broad classification renders the execution upon the key-board D more comprehensive and convenient.

In order to facilitate further the operation of the mind in locating at once a letter in its proper order to imprint by selecting the proper key, when the same letter is repeated on the key-board, the keys may be numbered to correspond to the bar or group to which it relates in the scheme X, as indicated in my drawings; or the keys may be tinted of different colors, and the bars or groups in the scheme tinted to correspond therewith, as I have done in my model.

The assignment of the particular letters to each of the keys, as designated on the keys themselves, is made on a special plan, and for a given purpose, so that the operator can strike as many keys, all at once, as may be necessary to write a syllable, a word, or a phrase, with as few points of contact of the fingers as possible.

I obtain this result not only by placing as much as practicable all the keys within an easy range of the fingers of the operator, but by arranging the letters in clusters of seven keys, placing on the central key of the cluster that letter which, in writing the language by stenophonotypy, is often found associated with six other letters, which six letters I place on the six keys surrounding the central key, so that the central key can be struck, as may be required, at the same time with either of the adjacent keys, by one point of contact. Some-

times, even three letters may be struck with one point of contact, as seen in my drawings, on Fig. 1, where the finger placed at Z depresses the three keys marked S, P, and L, and brings forward the corresponding letters, S P L on the line of print G G′.

In the key-board B, we have the W cluster, or that cluster of which W is the center, which enables us to form the combinations WŌ, WĪ, WĒ, WĀ, WĖ, Wİ.

In the lower part of the key-board D we find the S and the R clusters, which give the combinations SN, SM, SP, SL, SK, ST, SR, and T̄R, S̄R, T̄R, FR, PR.

In the upper section of the key-board D there are ten such clusters S, L, S, T, R, K, T, R, S, and J, producing useful combinations of consonants, which imprint after vowels.

I have described my groups of types as mounted upon sliding bars, but it is evident that the same result may be obtained either by placing said types on the periphery of wheels or sectors vibrating or rotating from a center, or that each type may be on a separate hammer, which may be arranged in groups to correspond to my groups, and made to converge on points of a common line of print, obtaining the same result as my sliding bars without changing the principle of my classification.

The following is a sample of my stenophonotype text:

N T̄ PĒKİNN KOT KRĀTT T̄ HĖFNS NT̄ RT̄ NT̄ RT̄ WŌS T̄ÔT FÖRM NT FOT N TÄRKNS WŌS PŮN T̄ FĀS FT̄ ĒT̄.

As printed by my instrument, the letters would not always be in juxtaposition, as in the above example, owing to the space occupied by those intervening groups, letters of which are not wanted to form a word printed thus—in the example in my drawings—

1 2 3 4 5 6 7 8 9 10 11 12
G — — S P L İ N T S — — — G′,

where the groups 4, 6, 7, and 8 do not print; but as my paper is made to move at right angles to the line G G′, or from bottom to top, each printing, whether it be a syllable, a word, or a phrase, occupies a full line, and therefore no confusion can arise from the disjointment of the letters.

What I claim as my invention is—

1. In a system of phonotype notation the means employed of representing the sounds of the English language, consisting, essentially, of the vowel and consonant characters, and the certain diacritical marks, substantially as herein described and shown, for the purpose set forth.

2. In a type-writing machine, the key-boards B and D, the finger-keys of which are provided with their respective vowel and consonant signs, combined in groups, and relatively arranged, substantially in the manner and for the purpose set forth.

3. In a type-writer, the key-boards B and D, and the slide-bars 1 to 12, combined and arranged to operate substantially as described.

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Witnesses:
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