Oct. 25, 1927. 1,646,407

R. McK. JONES

TYPEWRITING MACHINE

Filed March 12, 1924 2 Sheets-Sheet 1

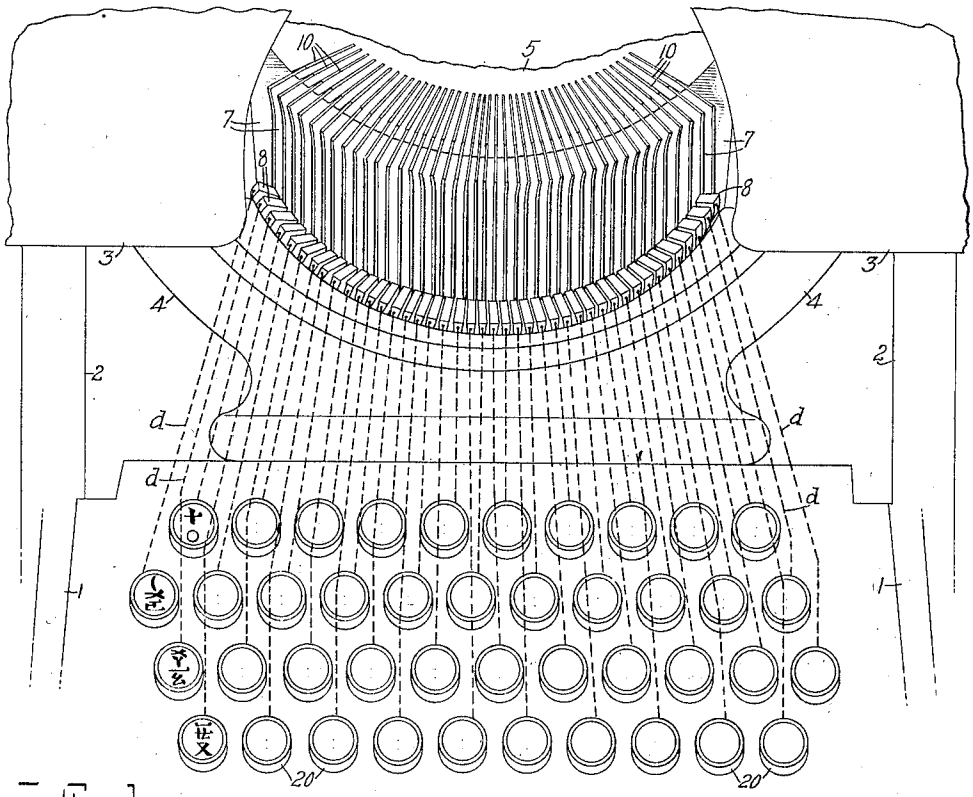


Fig. 1

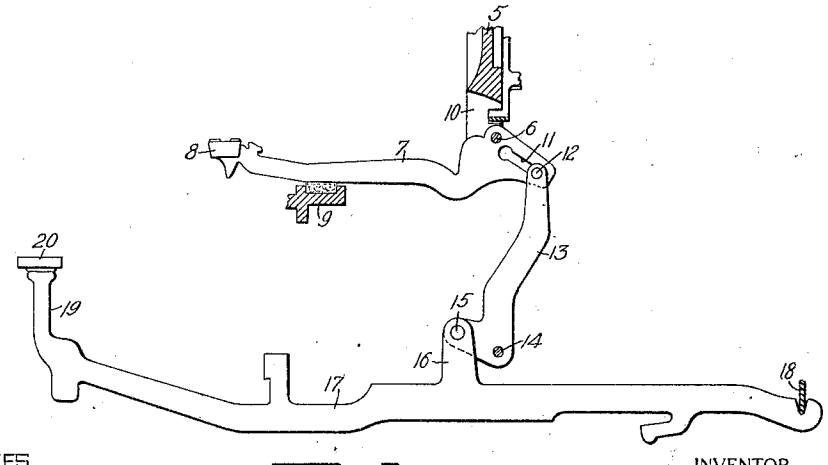


Fig. 2

WITNESSES

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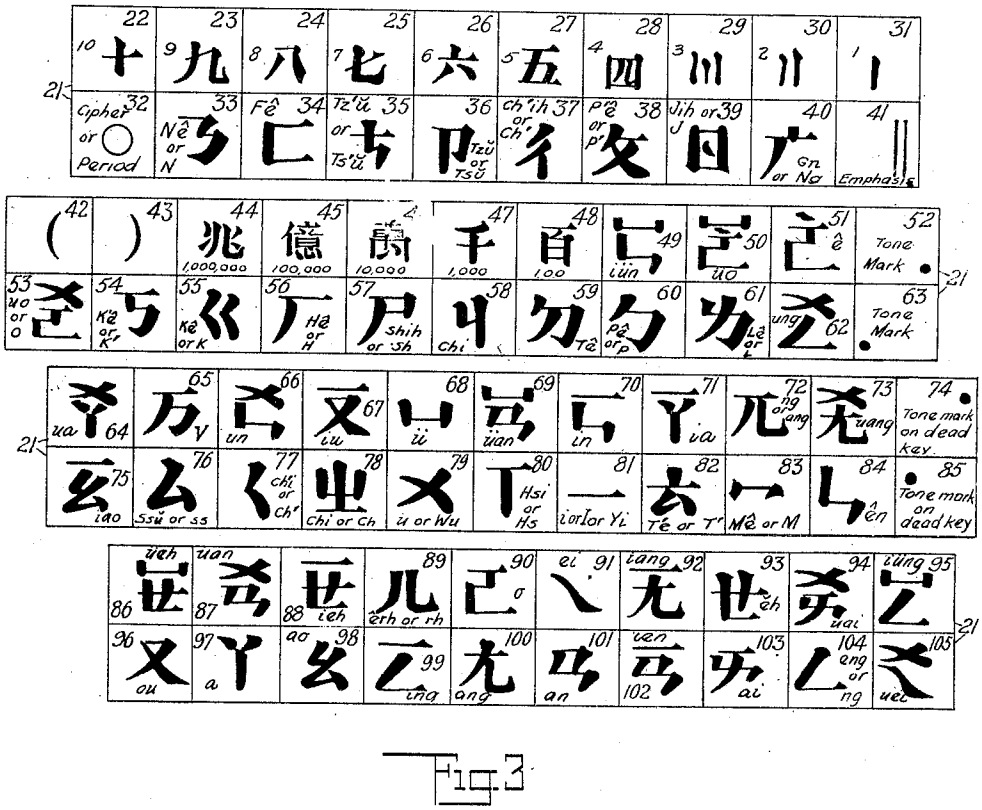


Fig. 3

WITNESSES

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Patented Oct. 25, 1927. 1,646,407

UNITED STATES PATENT OFFICE.

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TYPEWRITING MACHINE.

Application filed March 12, 1924. Serial No. 698,628.

My invention relates to typewriting machines, and has for its object to provide a typewriting machine which is especially adapted for writing the Chinese language according to the new phonetic system recently adopted in China.

To the above and other ends which will hereinafter appear, my invention consists in the features of construction, combinations of devices, and arrangements of parts hereinafter described and particularly pointed out in the claims.

In the accompanying drawings which illustrate the preferred form of my invention, Figure 1 is a fragmentary perspective view of a Remington typewriting machine embodying said invention, the view showing the keyboard and type bar system of the machine.

Figure 2 is a front-to-rear vertical sectional view illustrating one of the type bar actions of the machine.

Figure 3 is a plan view of the keyboard diagrammatically illustrated, this view also corresponding with the type blocks.

Referring generally to my invention, the Chinese Government has officially adopted and is promulgating a new phonetic alphabet known as the "Chu Yin Tzu-mu", or in English, national phonetic alphabet. A formal edict commanding its use by Government officials and requiring the teaching of the system in schools has been published. The purpose of this system which was devised by a council of learned men from all sections of the country is to simplify the ancient complicated system of ideographic characters and promote literacy among the people generally. The new alphabet consists of forty simple forms which have been assigned to represent the elementary sounds as analyzed and settled by the council. Through combinations, means are provided for representing all the known sounds of the language with the assistance of certain signs marking the various tones. It is the principal purpose of my invention to adapt the forms chosen for the new alphabet for use in a typewriting machine. In carrying out this purpose, I have devised a keyboard arrangement and connected set of types that comprise, first, all of the forty phonetic symbols separately; second, compound characters to the number of twenty-one, combining medials and finals in one character; third, Chinese numerals to the number of fifteen; fourth, tone marks on two dead keys; fifth, one character indicating the cipher and also used for a punctuation sign; sixth, a sign for indicating emphasis; and seventh, the opening and closing parenthesis signs making a total of eighty-four characters adapted to the usual standard single shift machine.

The arrangement or layout of the keyboard is based upon the frequency of use of the characters, single or combined, as ascertained by me, resulting from a detailed analysis of Chinese written matter, modified here and there as seemed necessary from consideration of the size and shape of characters in relation to their positions in the type basket. The characters are placed in the keyboard with regard, as far as mechanical constructions permit, to the principle of bringing the most frequently used characters beneath the most agile and supple fingers of the hands and also in a manner calculated to promote most rapid operation and to be readily memorized. As the most rapid and easily accomplished operation of the keys of a standard modern typewriter, such as the Remington, is downward from the upper banks to or towards the lowest bank of keys, I have so arranged my keyboard that the initial characters are carried in the upper part of the keyboard. Those that are used most frequently are placed in the lower-case central positions on the second and third banks of keys, and the less frequently used ones upon the top bank. The characters representing the finals, and also the most commonly used compound characters with which the great majority of all the phonetic expressions terminate, are, on the other hand, placed in the lowest bank of keys, so that the almost invariable action of the typist's fingers will be a rapid sweeping motion of one or both hands from the upper rows or banks to lower ones. The lower part of the keyboard is also arranged so that the central lower-case positions are retained for the characters most frequently used. The

results achieved by this scientific arrangement may be graphically illustrated by straight lines terminating in arrow heads connecting the symbols on the keyboard diagram. If, however, these lines were applied to Figure 3 herein, the clearness would be lessened and therefore it has seemed advisable to omit them.

Referring now specifically to the drawing, the main frame of the Remington typewriting machine illustrated in Figure 1 herein, comprises a base 1, posts 2, and a top plate 3 at the forward side of which is disposed a frame plate 4. The type bar support or segment 5 of the machine (Fig. 2) has mounted on it a pivot wire 6 which provides a pivot for a set or series of type bars 7, each carrying a type block 8 having two types. The type bars are disposed in a circular series below the platen (not shown) and normally rest at their type ends on a support or rest 9, being adapted to be swung upward and rearward in co-operative contact with the platen. The type bars are guided in their swinging movements in radially arranged slots 10 cut in the lower portion of the segment 5. The heel portion of each type bar is provided with a cam slot 11 with which engages an actuating pin 12 projecting laterally from the upstanding arm of a bell crank 13 having a stationary pivot 14 and pivotally connected at 15 with a projection 16 upstanding from a key lever 17 and integral therewith. The set of key levers is horizontally disposed, each lever being fulcrumed at its rear at 18 and thence extending forward, terminating in a stem 19 which is provided with a key cap or button 20. There are four rows of caps or keys 20 constituting the keyboard, the stems 19 being of graduated heights so that the rows are in banks or steps as is well understood, the highest bank at the rear. The keyboard is contained within the forward portion of the base frame 1 which is made rectangular in shape for the purpose. When any one of the keys 20 is depressed, it will, through the described train of connections comprising the key lever 17, the connected bell crank 13 and the actuating pin 12, swing the type bar 7 on its pivot 6 and cause one or the other of the types at its free end to co-act with the platen. Normally the platen is in what is termed "lower case" position, and the lower case types of the type bars will print through the usual ribbon (not shown). When the platen is shifted and maintained in shifted position, an actuation of one of the type bars will cause its upper case type to print. The lower case types are the inner types on the blocks or those closer to the pivot wire 6, the upper case types being the outer types.

For purposes of complete illustration, I have shown in Figure 1 the full keyboard of the machine as represented by the key caps or buttons 20, and in a few instances have shown the characters on the tops of the key caps. These characters, it will be understood, correspond throughout with the full set of characters shown in Figure 3, wherein the diagram of each key is designated as 21 and comprises one of the double squares of which the diagram as a whole is composed. Figure 1 further illustrates the full set of type bars of the machine with their type blocks, the keys 20 being shown as connected with their associate type blocks by dotted lines *d*. These lines *d* may be assumed as representing diagrammatically the actual pivotal connections or trains of devices between the keys and the type bars, one of such trains being shown in Figure 2.

Referring now to the keyboard in detail, since it is not convenient to reproduce the Chinese characters on the typed or printed page, I have accordingly identified the different characters by number. The numbers in the double squares 21 in the Fig. 3 diagram correspond with the characters represented on these squares. Thus the square designated as 22 represents the upper case character of the left-hand key of the top row of keys and also the corresponding upper case type which prints when the shift key is depressed. The aforesaid square designated as 22 represents the Chinese numeral representing ten (10). Similarly the squares designated as 23, 24, 25, 26, 27 and 28 respectively represent the following or succeeding upper case characters from left to right which correspond with the Chinese numerals representing nine, eight, seven, six, five and four.

The above are all in the plain style commonly used for literary and ordinary purposes. The three following upper case characters, designated numerically as 29, 30 and 31, represent respectively the Chinese numerals corresponding to three, two and one, in what is called the running hand.

The characters in the lower case position in the top row of keys, which print when the shift key is not used and the platen remains in unshifted position, are as follows, the identifying numbers corresponding with those applied to the second row of squares in Fig. 3, and the phonetic values in all of the following descriptions being expressed according to the well-known system of Sir Thomas Wade:—

32 designates the Chinese cipher which is also used as a punctuation sign, indicating the end of a sentence.

33 is the Chinese phonetic character representing the sound of Nô when standing alone, or the sound of N when combined with other characters.

34 is the initial Chinese phonetic representing sound of Fê.

35 is the initial Chinese phonetic repre-

senting Tz'ŭ or Ts'ŭ (note: the apostrophe marking the interposition of an aspirate sound between consonant and vowel.)

36 is the initial Chinese phonetic representing Tzŭ or Tsŭ.

37 is the initial Chinese phonetic representing Ch'ih, or Ch' in combination.

38 is the initial Chinese phonetic representing P'ê, or P' in combination.

39 is the initial Chinese phonetic representing Jih, or J in combination.

40 is the initial Chinese phonetic representing an initial nasal sound difficult to represent accurately in roman letters, commonly transliterated as "Gn" or "Ng".

41 are double parallel lines extending completely across a letter space, used like the underscore in English to indicate emphasis.

The characters represented in the upper case positions of the second row from the top, which print when the shift key is operated, are as follows:—

42 and 43 are the opening and closing parenthesis signs as used in English.

44 is the Chinese numeral representing one million, as used in literary and ordinary work.

45 is the Chinese numeral for 100,000.

46 is the Chinese numeral for 10,000.

47 is the Chinese numeral for 1,000.

48 is the Chinese numeral for 100.

All of the above are in the same style as No. 44.

49 is a compound phonetic formed by combining the medial character designated as 68 and the final character designated as 84, the two together representing the sound of "iün".

50 is the compound phonetic formed by combining 68 and 51, representing "üo" final.

51 is the final phonetic representing the sound "ê".

52 is a tone mark on a "dead" key which does not effect a letter space movement of the paper carriage. This mark can be used to indicate the rising inflection, or tone, by which the varied meanings of Chinese sounds are indicated.

The characters in the lower case positions of the second row of keys from the top are as follows:—

53 is the compound phonetic composed of 79 and 90 representing "uo" or "o" final.

54 is the initial phonetic giving sound of "K'ê," or "K'" only, in combination.

55 is the initial phonetic for the sound of "Kê", or "K" only, when combined.

56 is the initial phonetic for the sound of "Hê", or of "H" when in combination.

57 is the initial phonetic representing the sound "Shih" or "Sh" in combination.

58 is the initial phonetic for "Chi".

59 is the initial phonetic for "Tê".

60 is the initial phonetic for sound of "Pê", or "P" when combined.

61 is the initial phonetic for Lê or "L" in combination.

62 is the compound phonetic character combining medial 79 and final 104, which represents the sound "ung".

63 is the tone mark on a "dead" key and which can represent an even tone of pronunciation. This tone is sometimes understood when a character is not marked, in which case this sign could be used to indicate a fifth tone employed in some Chinese dialects.

The characters in the upper case position of the third row from the top, which print when the shift key is held down, are as follows:

64 is the compound phonetic character composed of the medial 79 and the final 97 expressing the termination "ua".

65 is the initial phonetic representing "V" in combination.

66 is the compound phonetic character printing the medial 79 and the final 84, the combination representing the termination sound "un".

67 is the compound phonetic character uniting the medial 81 with the final 96 to express the sound "iu".

68 is the medial phonetic character expressing the sound of "ü".

69 is the compound phonetic character composed of medial 68 with final 101 and representing the termination "üan".

70 is the compound phonetic character formed of medial 81 and final 84 to represent the ending "in".

71 is the compound phonetic made up of medial 81 and final 97 to represent the termination "ia".

72 is the initial phonetic expressive of a nasal initial sound difficult to express in roman letters but usually represented as "ng" or "ang".

73 is the compound phonetic combining medial 79 and final 100 which represents the terminal sound "uang".

74 is a tone mark on a "dead" key by which mark the "falling" tone of Chinese pronunciation can be indicated.

The characters placed in the lower case position of the third row of keys from the top and which print without the use of the shift key, are as follows:—

75 is the phonetic compound consisting of the medial 81 and the final 98, indicating the sound of "iao" as an ending.

76 is the initial phonetic expressing the sound of "Ssŭ", or a strong sibilant "ss" in combination.

77 is the initial phonetic representing a strongly aspirated "Ch'i", or a sound value of "Ch'" when used in combination.

78 is the initial phonetic for "Chi" or the sound of "Ch" (not strongly aspirated) when combined with other characters.

79 is the medial phonetic vowel conveying sound of "u" in combination. Occasionally used to represent "Wu" as an initial.

80 is the initial phonetic symbol for the sound "Hsi" or "Hs" when combined.

81 is the medial phonetic vowel for sound of "i". Also used for a few words as an initial "I" or "Yi".

82 is the initial phonetic expressing aspirated "T'e" or "T'" when combined.

83 is the initial phonetic character for the sound of "Mê" or "M" in combination.

84 is the final phonetic representing the sound of "ên" at the end of a phonetic combination.

85 is the tone mark upon a "dead" key which can be used to indicate that the character is to be pronounced in the abrupt tone.

The characters placed in the upper case position on the bottom row of keys which print when the shift key is depressed, are as follows:—

86 is the phonetic compound of the medial vowel 68 and the final 93, such compound representing the final sound "üeh".

87 is the phonetic compound composed of the medial vowel 79 and the final 101 to indicate the termination "uan".

88 is the phonetic compound combining the medial vowel 81 with the final 93 to express the sound "ieh" as an ending.

89 is the final phonetic symbol for sound "êrh" or a strongly aspirated "rh" sometimes also used as an initial in a few words.

90 is the final phonetic representing the sound of "o".

91 is the final phonetic expressing the sound of "ei" as a termination.

92 is the phonetic compound uniting the medial vowel sound 81 with the final 100 to form the termination "iang".

93 is the final phonetic representing the sound "ĕh" as a termination.

94 is the phonetic compound combining the medial 79 with the final 103 to express the terminal sound "uai".

95 is the compound uniting the medial 68 with the final 104 to form the ending "iüng".

The characters occupying the lower case positions on the bottom row of keys which print without the use of a shift key are as follows:—

96 is the final phonetic character for the sound of "ou".

97 is the phonetic for the sound of "a" final.

98 is the final phonetic expressing the sound "ao" as a termination.

99 is the phonetic compound composed of medial vowel 81 and final 104 and representing the ending "ing".

100 is the final phonetic representing the termination "ang".

101 is the final phonetic expressing sound of "an" as an ending.

102 is the phonetic compound combining the medial vowel 81 with the final 101 to represent the termination "ien".

103 is the final phonetic expressing the termination "ai".

104 is the final phonetic giving sound of "eng" or "ng" in combination with the medial vowels.

105 is the phonetic compound combining the medial vowel 79 with the final 91 to represent the termination "uei".

It may here be noted that the forty simple forms which have been designed to represent the elementary sounds are divided into three sub-classes, initials, medials, and finals. The twenty-four initials are represented on the Fig. 3 keyboard diagram by the numbers 33 to 40 inclusive; 54 to 61 inclusive; 65, 72, 76, 77, 78, 80, 82 and 83. The three medials are represented by the numbers 68, 79 and 81; and the thirteen finals are represented by the numbers 51, 84, 89, 90, 91, 93, 96, 97, 98, 100, 101, 103 and 104. These forty simple forms are used to represent the sounds of the language as follows: for example, first, by the combination of initial, medial and final forms as 37, 79, and 101 representing "Ch'uan"; second, by the combination of initials and medials as 78 and 79 representing "chu"; third, by the combination of initials and finals as 60 and 91 representing "pei"; fourth the combination of medials and finals as 81 and 100 representing "yang"; and, fifth, occasionally by a single form only as in initial 57 representing "shih", medial 81 representing "i", and final 89 representing "êrh". These last single forms, however, are not very frequent.

As the new system embodying the Chinese phonetic alphabet is to be read in true Chinese form, that is, in columns beginning at the right-hand corner of the sheet and proceeding column by column toward the left, the types of my machine are preferably placed sidewise upon the type blocks with the tops of the characters toward the left side of the segment or machine. Thus positioned it is only necessary after the sheet has been written to turn it quarter-way round in order to read it in the Chinese manner.

What I claim as new and desire to secure by Letters Patent is:—

1. In a typewriting machine for writing the Chinese language employing the official phonetic alphabet, a keyboard and type bar system comprising forty simple phonetic symbols, namely:—Nê, Fê, Tz'u or Ts'u, Tzu or Tsu, Ch'ih, P'e, Jih, Gn or ng, Ê, K'e, Ke, He, Shih, Chi, Tê, Pê, Lê, V, ü, Ng or Ang, Ssŭ, Ch'i, Chi, u, Hsi, i, T's, Mê, en, êrh, o, ei, ĕh, ou, a, ao, ang, an, ai, eng; twenty-one compound characters, namely:—iün, ün, uo or o, ung, ua, un, iu, üan, in, ia, uang, iao üeh, uan, ieh, iang, uai, iüng, ing, ien, uei; fifteen Chinese numerals,

namely:— Shih Chiu, Pa, Ch'i, Liu, Wu, Ssŭ, San, Êrh, I, Chao, Ee, Wan, Chien, and Pai; and eight miscellaneous characters, namely:—a cipher or punctuation sign, emphasis character, opening and closing parentheses, rising tone, even tone, falling tone, abrupt tone, making a total of eighty-four characters arranged as shown in Fig. 3 of the drawings.

2. In a typewriting machine for writing the Chinese language employing the official phonetic alphabet, a keyboard so arranged that the important initial characters, namely:—Kê, K'e, Gn, Chi, Ch'i, Tê, T'ê, Nê, Pê, Mê, Fê, Tzŭ or Tsŭ, Tz'u or Ts'u, Ssŭ, Chih, Ch'ih, Shih, Hê, Hsi, Lê, Jih; are disposed in the upper part of the keyboard, those that are used frequently, namely:—Shih, Hê, Kê, K'e, Chi, Tê, Pê, Lê, Chih, Ch'i, Ssŭ, Hsi, T'e, and Mê, being placed in the central lower case positions on the second and third banks of keys; and less frequently used initial characters, such as Nê, Fê, Tzŭ, Tz'ŭ, Ch'ih, Pê, Jih, and Gn upon the top bank.

3. In a typewriting machine for writing the Chinese language employing the official phonetic alphabet, a keyboard so arranged that the initial characters are disposed in the upper part of the keyboard, those that are used frequently being placed in the lower-case central positions on the second and third banks of keys and less frequently used ones on the top bank, the final characters and the commonly used compound characters being placed in the lowest bank so that the almost invariable action of the typist's fingers will be rapid sweeping motions of one or both hands from the upper to the lower keys.

4. In a typewriting machine for writing the Chinese language employing the official phonetic alphabet, a keyboard so arranged that compound characters combining medials and finals in one printing character are disposed substantially as follows:— ian, ing, uei, in the lower case position in the bottom bank of keys; ieh, iang, uai, uan, üeh, üng, in the upper case of the bottom bank; iao, in the lower case of the third bank; ia, iou, in, ua, uang, un, üan, in the upper case of the third bank; üo and üng, in the lower case of the second bank; and üo and ün in the upper case of the second bank.

Signed at the borough of Manhattan, city of New York, in the county of New York, and State of New York this 10th day of March, A. D. 1924.

ROBERT McKEAN JONES.