C. P. HALL. CIPHER CODE SYSTEM.

(Application filed June 29, 1900.)

(No Model.)

2 Sheets—Sheet 1.

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INVENTOR Charles P. Hall.

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C. P. HALL.

CIPHER CODE SYSTEM.

(Application filed June 29, 1900.)

(No Model.) -

2 Sheets-Sheet 2.

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United States Patent Office.

CHARLES P. HALL, OF NEW YORK, N. Y., ASSIGNOR TO CHARLES P. HALL AND FRANK HART, OF SAME PLACE, AND EMMA C. MORRISON, OF TROY, NEW YORK.

CIPHER-CODE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 666,520, dated January 22, 1901.

Application filed June 29, 1900. Serial No. 22,061. (No model.)

To all whom it may concern:

Be it known that I, CHARLES P. HALL, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Cipher-Code System, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved cipher-code system arranged to permit the sending of long messages with the use of comparatively few words or numerals not liable to be deciphered by unauthorized persons, thus maintaining the desired secrecy and at the same time permitting the receiver to readily decipher the message.

The invention consists of novel features and combinations of the same, as will be fully described hereinafter, and then pointed out to in the claims.

The invention is illustrated in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate the various features of the invention.

Figure 1 is a face view of a page of the index-book. Fig. 2 is a face view of the cryptograph message as made up by the sender. Fig. 3 is a like view of the same cryptograph message as deciphered by the receiver, and Fig. 4 is a plan view of the key and the numerical value thereof.

The cipher-code system consists, essentially, of leaves preferably arranged in the form of 35 a book, which I prefer to call an "indexbook," and each page A contains one or more columns B of subject words or sentences, a column Cof cipher words or symbols arranged alongside the column B and having single-40 syllable words for one, two, or more of the subject-words in the column B. A third column D contains cipher-numerals, one for each cipher-word, as will be readily understood by reference to Fig. 1. In addition to the in-45 dex-page keys are used, one of which is represented in Fig. 4, the key E consisting of a number of words or a sentence B', selected from the column B in the index-book, so that the words in the key have a numerical value, I

indicated by the corresponding numerals in 50 the column D. For instance, as shown in Fig. 4, the key consists of the sentence "A new light on a dark matter," the numerical value for the several words corresponding to the numerals in the column D opposite the 55 words in the column B.

If it is the intention of the user to simply avoid exorbitant telegraph-tolls, the message is made up of cipher-words corresponding to the subject words or sentences of the message, 60 the several cipher-words being joined together in groups of three or four according to the number of letters they contain, as it is well known that telegraph companies allow only words of twelve letters or less, and hence the 65 combination syllable-words should contain but twelve letters or less. The receiver of the message thus formed separates the syllables and then refers to the index-book to find the corresponding cipher-words and their 70 meaning in the opposite subject words or sentences in the column B. For instance, if a grain and provision broker desires to advise out-of-town customers of the state of the market he would wire the following sentences: 75 "Wheat advanced two points; corn a drugno change; oats off a point; flour in demand for export at seven-fifty; pork heavy; fair demand for mess beef by government." (Thirty words.) Turning to the index-book it will be 80 found that "wheat" is represented by "whan," "advanced" by "aibi," "two" by "tyod," "points" by "ploz," "corn" by "cuap," "a" by "aba," "drug" by "dyef," "no" by "nid," "change" by "chag," "oats" by "obli," 85 "off" by "odra," "a" by "aba;" "point" by "ploz," "flour" by "foab," "in" by "ikra," "demand" by "deub," "for" by "fool," "export" by "enbe," "at" by "anso," "seven" by "siav," "fifty" by "fiok," 90 "pork" by "poar," "heavy" by "heum," "fair" by "fam," "demand" by "deub," "for" by "fool," "mess" by "mez," "beef" by "bied," "by" by "bynt," "government" by "goal." Writing these syllables in groups 95 they are found to make the following words: "Whanaibi tyodploz. Cuapaba dyefnidchag. Obliodra abaploz foabikradeub foolenbeanso

and the control of the second of the control of the

siavfiok. Poarheum Famdeubfool mezbied byntgoal." (Thirteen words.) As will be observed, owing to the shortness of the sentences, many of the words in the cipher-mes-5 sage contain only seven or eight letters, this being rendered necessary by the exigencies of punctuation. As the above message, however, would from the context punctuate itself it might be written in ten words, as fol-10 lows: "Whanaibityod plozcuapaba dyefnidchag. Oblivodraaba plozfoabikra deubfoolenbe ansosiavfiok. Poarheumfam deubfoolmez biedbyntgoal." (Ten words.) The more important application of the system, however, 15 is its employment as a cryptogram. Taking the same message as an example, and turning to the vocabulary, we set down, instead of the syllables, the numerals corresponding to each word. Thus we find that 9717 repre-20 sents "wheat;" 139, "advanced;" 9186, "two," &c. These we set down in rotation in rows or lines D², as shown in Fig. 2, leaving two blank spaces between each row or line D² of figures for the numerals D', representing the 25 "key," and one for the numerals D3, representing the sum of both. Now we will suppose that the key agreed upon between the broker and one of his customers is the sentence, "A new light on a dark matter," (see 30 Fig. 4,) and turning to the vocabulary we find that "A" is represented by 1; "new" by 5772; "light" by 5040, &c. These numerals are set down in pencil at D' underneath those representing the original message and the 35 two are added together, (see Fig. 2,) setting their sum down on the third line D3, but disregarding the highest figure, should it be 10,000. As there are but seven words in the key it is necessary to repeat the same as 40 often as required. The sums of the two numbers are found to be 9718, 5911, 4226, 2503, &c., and therefore the cipher words or symbols corresponding to those numbers represent the "cipher" or secret message to be 45 sent, which we find on consulting the vocabulary to be as follows: "Whapodi iklidus. Cuardap skitnifread. Boyccuov abbaswyn. Taxikreskym stevtrip audiwitswop. Poasweer. Snolsmut foomruid otlebyvveag." As 50 will be seen, the above bears no resemblance to the former message, and it is also evident that as often as the key is changed a totallydifferent message will be the result. It is also palpable that the key can be changed 55 ad infinitum. Let us now follow the message to its recipient and note the method by which it is deciphered. First, the recipient separates the symbols, and if the symbol commences with a consonant it also ends with 60 one, or if it commences with a vowel it ends with one, and as all symbols consist of not less than three nor more than four letters the task is easy, for if the first letter is a vowel and the third a consonant then the recipient knows 65 that there are four letters in the symbol, or if the first and third letters are vowels or are both

consonants then the symbol contains only three letters. Secondly, the recipient finds the numerals D³ representing the cipher words or symbols, and these are written down in 70 rotation, as shown in Fig. 3. Thirdly, the recipient writes down beneath the numbers D' representing the cipher words or symbols of the key E, or rather the numerals representing the same—that is, 1, 5772, 5040, &c., (the 75 second row above,) representing "A new light on a dark matter." Fourthly, as the message received is the sum of the original message added to the key, it is plain that if the key E is subtracted from the message 80 the remainder D² will be the original. This the recipient proceeds to do, and should the key-numeral be larger than the message-numeral headds 10,000 to the latter, as he knows that 10,000 is the highest limit of the series 85 and that figures above that number are disregarded in dispatching messages. The remainders are 9717, 139, 9186, &c., and upon looking them up in the vocabulary the recipient finds that they represent—

> 9717 139 91866554"Wheat advanced two points."

1803 1 2547 5795 1313 "Corn a drug—no change."

> 5872 5919 1 "Oats off a point."

3324 4231 3368 3054 536 7774 3234 2143 "Flour in demand for export at seven-fifty." 100

> 65963903 "Pork heavy."

3122 3268 5394 739 1097 3675"Fair demand for mess beef by Government."

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. A cipher-code system having an indexpage with a column containing subject words 110 or sentences, a column containing cipher-numerals for the subject words or sentences, and a key for the message and arranged for use in connection with the numerical value of the message, to change the numerical value 115 thereof, as set forth.

2. A cipher-code system having an indexpage with a column containing subject words or sentences, a column containing cipher-numerals for the subject words or sentences, 120 and a key for the message, and composed of a plurality of subject words or sentences selected from the subject word or sentence column, and having numerical value according to the numerals in said numeral-column of 125 the index-page, as set forth.

3. A cipher code, comprising an index-page having a column containing subject words or sentences, a second column containing single-syllable cipher-words, and a third col- 130 umn containing cipher-numerals for the subject words or sentences, and a key for the

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message, and composed of a plurality of subject words or sentences selected from said column of subject words or sentences and having a numerical value represented by corresponding numerals in said numeral-column, as set forth.

In testimony whereof I have signed my

name to this specification in the presence of two subscribing witnesses.

CHARLES P. HALL.

Witnesses:

E. H. SIGNOR, GEO. H. MORRISON.