

No. 666,520.

Patented Jan. 22, 1901.

C. P. HALL.
CIPHER CODE SYSTEM.
(Application filed June 29, 1900.)

(No Model.)

2 Sheets—Sheet 1.

<i>D</i>	<i>C</i>	<i>B</i>	<i>A</i>	<i>D</i>	<i>C</i>	<i>B</i>
2051	Dayd	Debauchee		2067	Deac	Deciduous
		Debilitate				Decimal
2052	Dayf	Debility		2068	Dead	Decimate
		Debit				Decipher
2053	Dayg	Debonair		2069	Deaf	Decision
		Debouch				
2054	Dayh	Debris		2070	Deag	Decisive
						Deck
2055	Dayl	Debt		2071	Deak	Reclaim
2056	Daym	Debut		2072	Deal	Declamation
		Decade				
2057	Dayn	Decadence		2073	Deam	Declamatory
		Decamp				Declaration
2058	Dayp	Decant		2074	Dean	Declarative
2059	Dayr	Decantation		2075	Deap	Declaratory
2060	Days	Decapitate		2076	Dear	Declare
		Decay				Declension
2061	Dayt	Decease		2077	Deas	Decline
2062	Dayv	Deceit		2078	Deat	Declinity
						Decoct
2063	Dayx	Deceive		2079	Dear	Decolor
		December				
2064	Dayz	Decemvir		2080	Deax	Decompose
		Decency				
2065	Day	Decent		2081	Deaz	Decomposition
		Deception				Decorate
2066	Deab	Deceptive		2082	Deb	Decorative
		Decide				Decorous

WITNESSES:

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Wm. G. Foster

Fig 1

INVENTOR

Charles P. Hall.

BY

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Fig 2

D ²	9717	139	9186	6554	1803	1	2547	5795	1313	5872
D ¹	1	5772	5040	5949	1	2026	5327	1	5772	5040
D ³	9718	5911	4226	2503	1807	2027	7871	5796	7085	912
D ²	5919	1	6554	3327	4231	2143	3368	3054	536	7774
D ¹	5949	1	2026	5327	1	5772	5040	5949	1	2026
D ³	1868	2	8580	8648	4232	7915	8408	9003	537	9800
D ²	3234	6596	3903	3122	2143	3368	5394	739	1097	3675
D ¹	5327	1	5772	5040	5949	1	2026	5327	1	5772
D ³	8558	6597	9675	8162	8092	3369	7420	6063	1098	9447

Fig 3

D ³	9718	5911	4226	2503	1807	2027	7871	5796	7085	912
D ¹	1	5772	5040	5949	1	2026	5327	1	5772	5040
D ²	9717	139	9186	6554	1803	1	2547	5795	1313	5872
D ³	1868	2	8580	8648	4232	7915	8408	9003	537	9800
D ¹	5949	1	2026	5327	1	5772	5040	5949	1	2026
D ²	5919	1	6554	3327	4231	2143	3368	3054	536	7774
D ³	8558	6597	9675	8162	8092	3369	7420	6063	1098	9447
D ¹	5327	1	5772	5040	5949	1	2026	5327	1	5772
D ²	3234	6596	3903	3122	2143	3368	5394	739	1097	3675

Fig 4
a new light on a dark matter
D¹ 1 5772 5040 5949 1 2026 5327

WITNESSES:

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UNITED STATES PATENT OFFICE.

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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 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 a book, which I prefer to call an "index-book," and each page A contains one or more columns B of subject words or sentences, a column C of cipher words or symbols arranged alongside the column B and having single-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 index-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,

indicated by the corresponding numerals in 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 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, 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 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 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: "Wheat advanced two points; corn a drug—no 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 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," "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 "flok," "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 they are found to make the following words: "Whanaibi tyodploz. Cuapabadyefnidchag. Obliodra abaploz foabikradeub foolenbeanso

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-message 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 follows: "Whanaibityod plozcuapaba dyefnid-chag. Oblivodraaba plozfoabikra deubfoolenbe ansosiavfiok. Poarheumfam deubfoolmez biedbyntgoal." (Ten words.) The more important application of the system, however, 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 represents "wheat;" 139, "advanced;" 9186, "two," &c. These we set down in rotation in rows or lines D^2 , as shown in Fig. 2, leaving two blank spaces between each row or line D^2 of figures for the numerals D' , representing the "key," and one for the numerals D^3 , 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 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 two are added together, (see Fig. 2,) setting their sum down on the third line D^3 , 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 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 sent, which we find on consulting the vocabulary to be as follows: "Whapodi iklidus. Cuardap skitnifread. Boyccuov abbaswyn. Taxikreskym stevtrip audiwitwop. Poasweer. Snolsmut foomruid otlebyvveag." As 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 totally-different message will be the result. It is also palpable that the key can be changed *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 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 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 D^3 representing the cipher words or symbols, and these are written down in 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 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 the remainder D^2 will be the original. This the recipient proceeds to do, and should the key-numeral be larger than the message-numeral he adds 10,000 to the latter, as he knows that 10,000 is the highest limit of the series 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 9186 6554
"Wheat advanced two points."

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

5872 5919 1 6554
"Oats off a point."

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

6596 3903
"Pork heavy."

3122 2143 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 index-page with a column containing subject words 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 thereof, as set forth.

2. A cipher-code system having an index-page with a column containing subject words or sentences, a column containing cipher-numerals for the subject words or sentences, 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 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 column containing cipher-numerals for the subject words or sentences, and a key for the

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.