

No. 642,721.

Patented Feb. 6, 1900.

W. J. ROUSSEL.
CIPHER CODE SYSTEM.

(Application filed May 16, 1899.)

(No Model.)

3 Sheets—Sheet 1.

Cider - Cigars - Cigarettes		Cider - Cigars - Cigarettes	
1 A	Cask Cider 50 gals	1 A	Cask Cider 50 gals
2 B	Panel " 30 "	2 B	Panel " 30 "
3 C	Reg " 15 "	3 C	Reg " 15 "
4 D	Reg " 16 "	4 D	Reg " 16 "
5 E	Candidate	5 E	Candidate
6 F	Candidate	6 F	Candidate
7 G	Candidate	7 G	Candidate
8 H	Candidate	8 H	Candidate
9 I	Candidate	9 I	Candidate
0 J	Candidate	0 J	Candidate
1 K	Candidate	1 K	Candidate
2 L	Candidate	2 L	Candidate
3 M	Candidate	3 M	Candidate
4 N	Candidate	4 N	Candidate
5 O	Candidate	5 O	Candidate
6 P	Candidate	6 P	Candidate
7 Q	Candidate	7 Q	Candidate
8 R	Candidate	8 R	Candidate
9 S	Candidate	9 S	Candidate
0 T	Candidate	0 T	Candidate
1 U	Candidate	1 U	Candidate
2 V	Candidate	2 V	Candidate
3 W	Candidate	3 W	Candidate
4 X	Candidate	4 X	Candidate
5 Y	Candidate	5 Y	Candidate
6 Z	Candidate	6 Z	Candidate
7 A	Candidate	7 A	Candidate
8 B	Candidate	8 B	Candidate
9 C	Candidate	9 C	Candidate
0 D	Candidate	0 D	Candidate
1 E	Candidate	1 E	Candidate
2 F	Candidate	2 F	Candidate
3 G	Candidate	3 G	Candidate
4 H	Candidate	4 H	Candidate
5 I	Candidate	5 I	Candidate
6 J	Candidate	6 J	Candidate
7 K	Candidate	7 K	Candidate
8 L	Candidate	8 L	Candidate
9 M	Candidate	9 M	Candidate
0 N	Candidate	0 N	Candidate
1 O	Candidate	1 O	Candidate

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Witnesses

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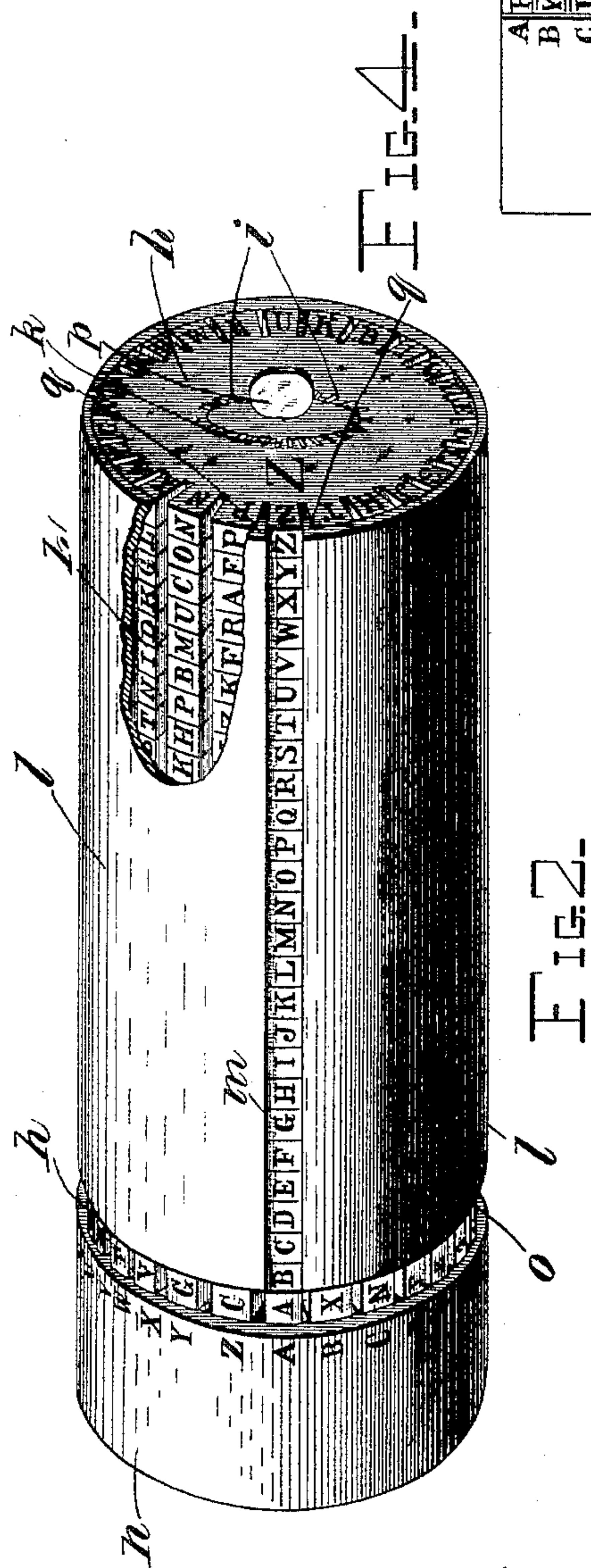
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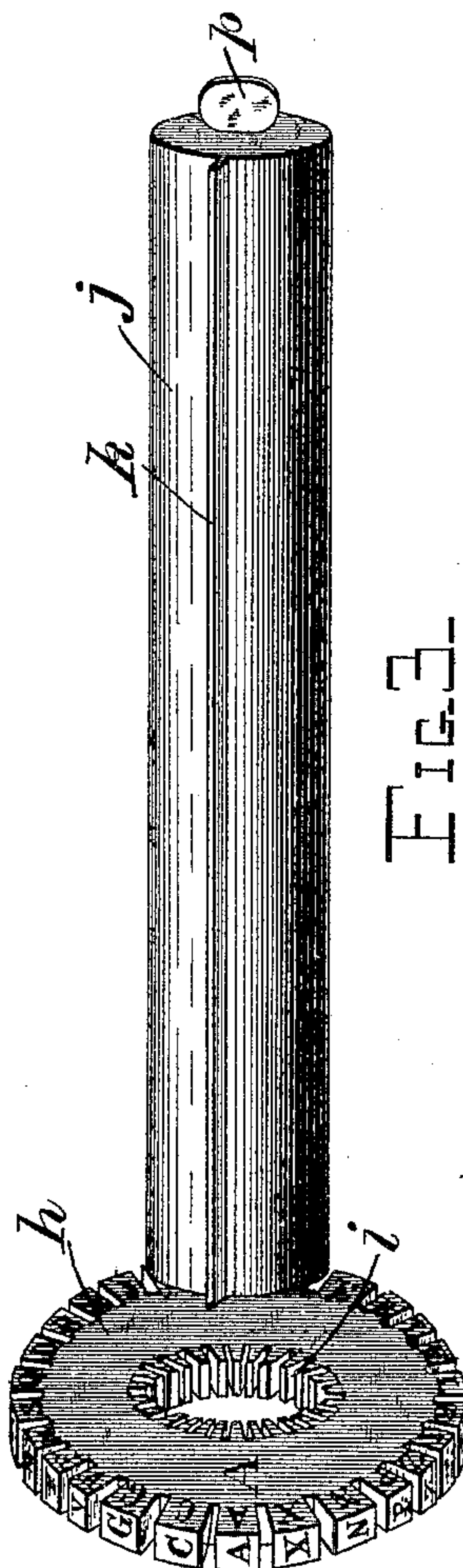
3 Sheets—Sheet 2.



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A	R	M	D	M	E	V	G	C	A	X	N	P	Z	T	H	J	S	L	O	E	V	Q	I	B	K	U
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	

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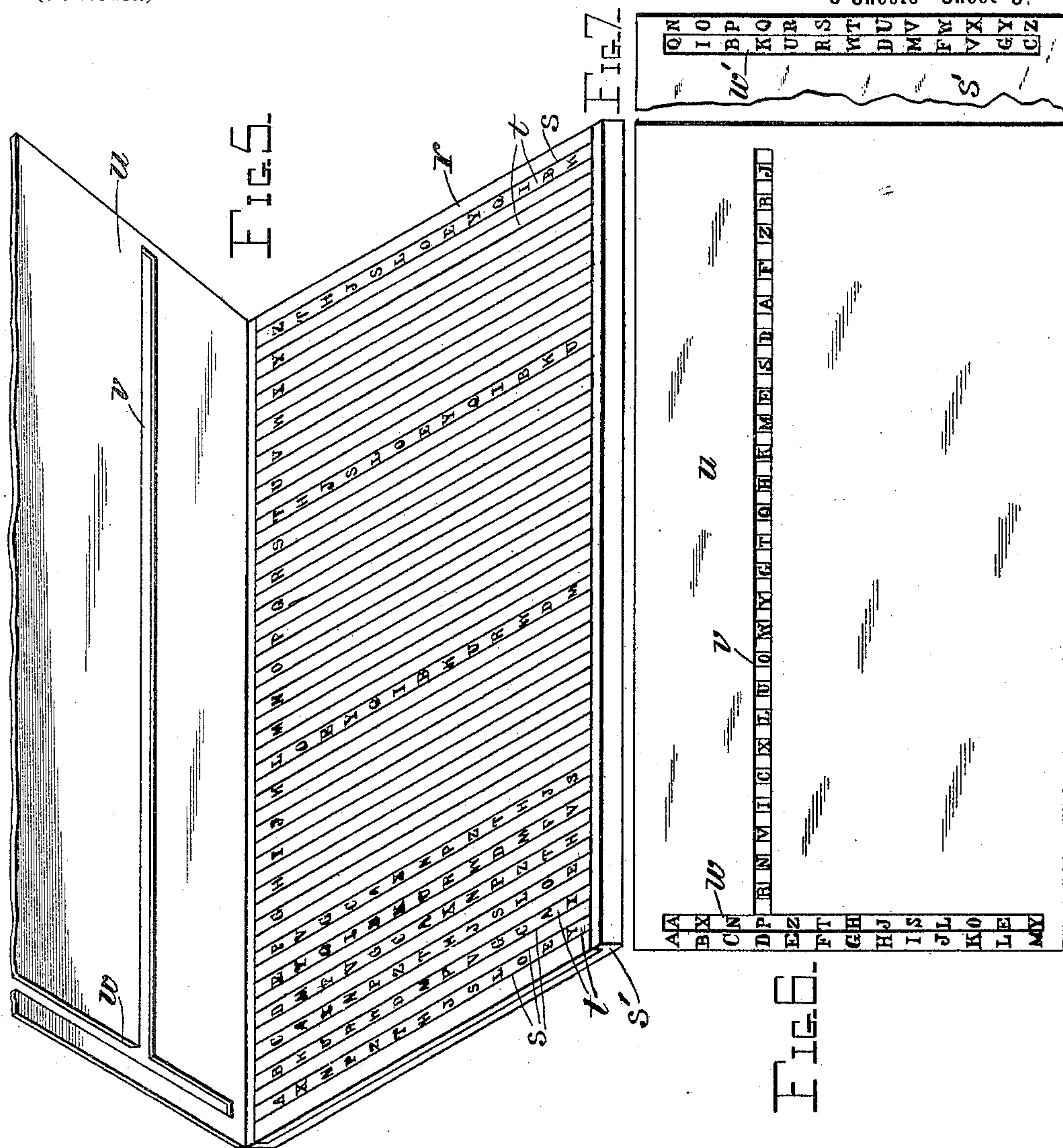
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(No Model.)

3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

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CIPHER-CODE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 642,721, dated February 6, 1900.

Application filed May 16, 1899. Serial No. 717,086. (No model.)

To all whom it may concern:

Be it known that I, WILLIS J. ROUSSEL, a citizen of the United States, residing at New Orleans, in the parish of Orleans and State of Louisiana, have invented certain new and useful Improvements in Cipher-Code Systems; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in cipher-code indexes and cryptographs employed in translating one or more words into or out of cipher.

No matter how small the cipher-code may be with those at present generally used by commercial houses and others for transmitting messages the users encounter great loss of time and much labor in searching for the meaning of a cipher-word. It is therefore one of the objects of my invention to obviate this difficulty by an improved form of cipher-code index by which, however bulky the code may be, the meaning of the words may be readily ascertained.

Another object of my invention is to further insure the secrecy of the code by the employment of a key or cryptograph of such a character that would render its correct operation by one not acquainted with it practically impossible.

To more thoroughly describe my said invention, reference will be had to the accompanying drawings, in which similar letters refer to similar parts throughout the several views.

Figure 1 represents a fragmentary view of my improved cipher-code index, showing the same in its open position. Fig. 2 represents in perspective a cylinder code-key. Fig. 3 is a perspective view showing the core of the cylinder-key removed with one disk in position to be placed on the core. Fig. 4 represents, on a slightly-reduced scale, a development of a portion of the key and one of the disks shown in Fig. 2. Fig. 5 is a perspective view of the portfolio-key with a portion of the cover broken away, and Fig. 6 is a top plan view of the same. Fig. 7 is a fragmentary plan view of the back of one end of the portfolio.

In describing my invention I shall first de-

scribe the cipher-code index, and will assume for this purpose that the code is that employed by wholesale grocers, though it is obvious that my invention is not at all confined to such use, as will be hereinafter explained.

The index consists of a book in which are classified all the cipher-words and the phrases which they represent and the letters and numerals employed in translating or locking and unlocking the cipher-words. (See Fig. 1.) The cipher-words are arranged on the left-hand side of each page, and in alphabetical order and corresponding to each cipher-word is a letter of the alphabet or numeral located on the left of the cipher-word and on the same line with it. The cipher-words are entered in order according to the letter they begin with—thus, "Abbey," "Baby," "Canaster," &c.—and are arranged in the columns indicated by *a*, and the letters and numerals used in the operation of translating them occupy the columns *b* and *c*, respectively. Each cipher-word represents a phrase or sentence, the same phrases or sentences being entered in the index opposite their corresponding cipher-words. At the edge of the leaves, as at *d*, appears the letter index, each letter being allowed the number of folios necessary to provide for the matter of a particular class coming under that letter. On the right-hand margin of the folios are inscribed one under the other the names of the subjects or goods which occur on that folio. Thus, for example, under the index-letter "C" we see along the right-hand margin the subjects "Capers," "Cheese," "Chocolate," "Cider," "Cigars," "Cigarettes," &c. The margins are cut, as at *e*, so as to allow the eye when the book is opened at any letter to run down this margin and see all the names and nothing but the names of the subjects and goods beginning with the letter at which page the book is opened. Thus it will be seen that by opening the index at the letter "C," for example, all of the subjects beginning with the letter "C" are in plain sight on the right-hand margin of the folios. As shown in Fig. 1, the first folio on the right under the letter "C" is devoted entirely to the subjects "Cider," "Cigars," and "Cigarettes." The information concerning the various subjects is written in the center of the folio and opposite its corresponding

cipher-word. Thus under the head of "Cider" will be found, for example, "Cask of cider, 50 gals.," and opposite this the cipher-word "Canaster," which means "Cask of cider, 50 gals.;" and so it is with the heads "Cigars" and "Cigarettes." For example, the word "Cannon" stands for "Cigars, Key West brand, 25 in a box." By the arrangement of this code-index there is no necessity for loss of time or labor when referring to the contents.

If you wish to use a cipher-word relating to "Telegrams," the index would be opened at the page indexed "T." The eye then runs down the margin index to the word "Telegrams," when the book may be opened at the very page containing the cipher words and phrases pertaining to "Telegrams." The same remarks apply to cipher-words—i. e., if you want to find a cipher-word beginning with "T," you open the letter index at "T," and the column of cipher-words is run down until you reach the cipher-word desired. Suppose it is desired to send the information "Cigars at \$15.00 per M." The index would be opened at the letter "C." All of the subjects beginning with "C" are then in plain sight in the marginal index on the right. From this you can pick the word "Cigars" and open the index directly at the page containing all of the information about "Cigars." Then the cipher-word to be used is next selected. The one corresponding to "Cigars at \$15.00 per M" is the word "Candidly;" but the word "Candidly" is not the one actually transmitted. "Candidly" is transformed into another word which is transmitted and converted by the receiver back into the word "Candidly," which he finds according to his index to correspond to the message.

Before describing the operation of translating a message into and out of cipher I will describe a form of key embodying my invention, by means of which the translation is effected. This key is shown in Figs. 2, 3, and 4 and is composed, among other parts, of a plurality of toothed disks *h*, all mounted on the same horizontal axis, so that their peripheries will form a cylinder. Each of these disks carries a letter of the alphabet upon the top of each of its teeth, and upon each disk these letters are arranged in different combinations. Each disk is also provided with a central aperture, which is toothed, as at *i*. The disks after being properly arranged are placed upon a central core *j*, which is provided with a projection *k*, which fits between the teeth *i* of the disks and prevents them from turning on the core, while the latter is held from turning by the projections *q q*. A tube or cylinder *l* incloses the disks and is provided with a longitudinal slot *m*, through which a single row of letters on the disks may be seen at one time. There is also a cylindrical portion *n*, which is attached to the tube or cylinder *l*, through which the disks pass as they are used, being pushed out to allow the

next disk to appear in the aperture *o*. This portion *n* is provided with the letters of the alphabet arranged in regular order near the outer edge next to the tube *l*. There are twenty-six disks, each disk containing twenty-six letters of the alphabet arranged in an irregular manner.

The operation of the key and the way in which a message is translated into and out of cipher are as follows: For each cipher-word to be transmitted an arbitrary letter of those appearing on the peripheries of the disks *h* is selected, which I will designate "key-letters," and of these letters a sentence is constructed the letters of which are arranged in the order in which the words that they represent are to be read. Suppose we select for this sentence the following, containing just twenty-six letters: "I have come to see your pictures." This gives a letter for each disk. The disks are then slipped on the central core in such order that the letters on their peripheries appearing in the slot *m* will compose the sentence "I have come to see your pictures." If the sentence composed of the key-letters exceeds twenty-six letters, the disks would be drawn back by means of the knob *p* and replaced upon the core in their proper order. The key-sentence by which the disks are arranged having been selected, it is transmitted, together with the cipher-words, to the party by whom the message is to be received, so that he may set his key in exact accordance with that of the sender. Now such a sentence as that which I have selected by way of illustration ("I have come to see your pictures") would in practice accompany a sentence of a great many cipher-words—say twenty-six; but for the purpose of describing the principle of my invention we will assume that only one cipher-word is sent, or, in other words, I will describe the steps in translating only one cipher-word out of the group that would in practice accompany such a long key-sentence. I will therefore adhere, for the sake of clearness, to the example first selected in describing the index and select "Candidly" as the cipher-word and will assume that the key-letter for this word is "R." Then the disk upon which the letter "R" appears in the slot *m* is brought into the opening *o*. The member *n* is then turned until the letter "A" upon it is brought opposite the letter "R" of the disk. This sets the key. Referring then to the index, the cipher-letter opposite the word "Candidly" is the letter "H." Then referring again to the key a letter must be chosen from the letters on the member *n*, which is opposite the letter "H" on the disk. This, it will be seen, is the letter "O." (See the development, Fig. 4.) The cipher-word of the index opposite the cipher-letter "O" in the column *b* will be the word "Cunicule." The sender then sends the word "Cunicule."

The person receiving the message sets his key to "R"—that is, he brings "R" of the disk opposite the first letter of the alphabet

of the portion n , as explained. He then refers to his index and notes which letter is opposite the word "Cunicule." Finding this to be the letter "O," he then looks to see which letter on the disk of his key corresponds to the letter "O" on the part n . This he finds to be "H," and then referring to the same alphabet of cipher-letters in which "Cunicule" is represented he finds opposite the letter "H" the word "Candidly." "Candidly" being the real cipher-word, the receiver then looks along the line of the index upon which the word "Candidly" appears and finds the message "Cigars at \$15.00 per M." This is the complete operation of sending a simple message of one word, from which it will be seen that the message has to be twice converted, which operations, while simple, insure greater secrecy. The next cipher-word would be sent with the letter "P" as the key-letter, as it follows "R" in the sentence, and so on, the key-letters following in order.

Instead of using a separate key-letter for each cipher-word one may suffice for all the words sent and is much simpler than the foregoing method, but not possessing the great secrecy of the foregoing method.

There are still other ways of manipulating the key. For example, I may use as the key to the cipher-word the expression "B3/r," which means that "B" is the key-letter or the letter to be used in setting the key and that to find the cipher-word corresponding to the word transmitted it is necessary to turn three pages to the right in the index. The expression "B3/1" would mean the same thing, except in this case it would be necessary to turn three pages to the left. For example, let it be required to convert some cipher-word, as "Canoe," into another word to be transmitted, the key being "B3/r." The key would be set with the letter "B," as fully explained in the foregoing example when the letter "R" was used—that is, the letter "B" on the disk of the key should be set opposite the letter "A" on the member n . The cipher-letter opposite the word "Canoe" is found to be "X." Then the letter on the member n of the key which corresponds to the letter "X" on the disk is the letter "M." To find the cipher-word corresponding to "M" in the index, it is then necessary to turn three pages to the right from the page upon which the word "Canoe" occurs in order to find it.

If the expression "NB3/1" is used as the key for any two words, it means that "N" is the key-letter for the first and "B3/1" the key for the last.

Instead of using key-letters key-numerals may be used, when the operation becomes the same, except that the numerals are substituted for the letters.

Obviously certain signs or symbols may be substituted for both letters and numerals without departing from the spirit of my invention.

Now it becomes apparent that as every disk

bears a different combination of letters and such letters are so arranged that no two letters alike will appear on any row of teeth when all the disks are fastened to the core in alphabetical order it is necessary that the sender's key as well as the receiver's key be set alike, otherwise the keys will not give the same result. For this reason each disk is known by the letter with which its combination begins—that is, the disk where the combination of letters begins with "A" is known as "Disk A," that with "B" as "Disk B," &c. This system also permits the use of combinations to set the disks on the core. For instance, suppose we select for the use of the disks a combination other than the one shown in the drawings, which is the alphabetical order, say, "Z, K, C, Y, A, D, E, V, M, X, P, R, U, Q, B, N, F, W, I, H, T, J, L, O, S, G." This would mean that the disks in spelling out the combination "I have come to see your pictures" would be used as follows: The disk marked "Z" would be used for "I," the disks marked "K, C, Y, A" to spell "Have," &c. Now unless the receiver of the message has his disks set on the core in exactly the same manner as the sender the same combination "I have been to see you once to-day" would give you an entirely different meaning to the telegram. Therefore it becomes obvious, considering the multiplicity of combinations the numerals and letters will permit, that the system of secrecy becomes inviolable, for no one can penetrate into the contents of a message unless he becomes first acquainted with the combination for the disks and, second, with the combination used to lock the message, and this locker will permit such modifications that it is the privilege of all users of the code to have his own private combinations, and the telegraphic messages remain perfectly legible, as the orthography of the cipher-words is not at all impaired. The key shown in Fig. 2 may be made of metal, wood, pasteboard, or any other suitable material.

In Figs. 5 and 6 is shown another form of key—viz., the portfolio-key. In this case the key consists of a base r , having a plurality of parallel grooves s , in each of which slides a strip t , and upon each of these strips are arranged the letters of the alphabet in various combinations. The portion r is held within the bottom s' of the portfolio and is adapted to slide longitudinally therein. A cover u , provided with the longitudinal slot v and the transverse slot w , hinged to the base, is adapted to cover the strips, so that all of the letters or only one may be visible at one time, and these through the slot w upon the outer edge of the cover, and next to the slot w is arranged the alphabet. The key is set for the proper letter by sliding the strip which occupies the position beneath the slot w until the key-letter is brought to its proper place.

The operation of the portfolio-key is practically the same as that of the cylinder-key.

The combination being selected, the strips are set by sliding them in their support *r* until the combination selected appears in the slot *v*, the various strips being interchanged and used just as are the disks of the cylinder-key, being brought successively into the transverse slot *w* or *w'*. As the slot *w* will not accommodate all the letters of the alphabet, there is a similar slot *w'* cut through the back of the portfolio directly behind the slot *w* and also provided with its row of letters along its edge. (Shown in Fig. 7.)

The various strips *t* are used for different messages or cipher-words, each being used separately.

Obviously instead of the various letters used in the keys numerals, symbols, or signs of any kind may be used, as stated, with reference to the cipher-letters of the index. While for the sake of clearness in explaining this system I have applied it to sending information regarding mercantile business, it is by no means confined to that use alone. It may be used in transmitting messages in the navy or army or in transmitting secret telegrams by the State Department, or, in fact, it may be used in any case where a cipher-code may be used.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. A cipher-code index having a column of cipher-words on each page, a parallel column of cipher-letters corresponding each respectively to a cipher-word, the information represented by said cipher-words inscribed on the same line with its corresponding cipher-word and the subjects contained on any page being inscribed on the right-hand margin of the folio, substantially as described.

2. A cipher-code index having a column of cipher-words on each page, a parallel column of cipher-symbols corresponding each respectively to a cipher-word, the information represented by said cipher-words inscribed on the same line with its corresponding cipher-word, the subjects contained on any page being inscribed on the right-hand margin of the folio, substantially as described.

3. A cipher-code index having a column of cipher-words on each page, a parallel column of cipher letters and numerals corresponding each respectively to a cipher-word, the information represented by said cipher-words inscribed on the same line with its corresponding cipher-word and the subjects contained on any page being inscribed on the right-hand margin of the folio, the said subjects being arranged in alphabetical order and the edges of said folios being cut away so that one page of any group of subjects will not hide from view another group of subjects of the same letter, substantially as described.

4. A cipher-code index having a column of cipher-words on each page, a parallel column of cipher-symbols corresponding each respectively to a cipher-word, the information represented by said cipher-words inscribed on the same line with its corresponding cipher-word, the subjects contained on any page being inscribed on the right-hand margin of the folio, the said subjects being arranged in alphabetical order and the edges of said folios being cut away so that one page of any group of subjects will not hide from view another group of subjects of the same letter, an alphabetical index along the right-hand margin of the code-index each letter of which represents its respective class of subjects and cipher-words, substantially as described.

5. A cipher-code index having a column of cipher-words on each page, a parallel column of cipher letters and numerals corresponding each respectively to a cipher-word, the information represented by said cipher-words inscribed on the same line with its corresponding cipher-word and the subjects contained on any page being inscribed on the right-hand margin of the folio, the said subjects being arranged in alphabetical order and the edges of said folios being cut away so that one page of any group of subjects will not hide from view another group of the same letter, an alphabetical index along the right-hand margin of the code-index each letter of which represents its respective class of subjects and cipher-words, substantially as described.

6. In a cipher-code key, the combination with a plurality of circular toothed disks of uniform size, each having symbols inscribed upon the outer faces of the teeth, a cylinder inclosing said disks, a stationary cylindrical member located in axial alinement with said cylinder near said disks and having symbols inscribed upon its periphery the said symbols on the disks being brought into axial alinement with those of the second member by turning said disks around the longitudinal axis of said cylinder and thereby combined with those on the said stationary member in the translation of a cipher-word into or out of a communication, substantially as described.

7. In a cipher-code key, the combination with a plurality of circular toothed disks of a uniform diameter, each having symbols inscribed upon the outer face of the teeth and each of said disks having a central toothed opening, a cylinder inclosing said disks, and having a longitudinal slot displaying a row of the characters on said disks, a cylindrical member located near said disks, and in axial alinement therewith and having symbols inscribed upon its periphery, a core passing through the central openings in said disks and having a longitudinal rib which engages the teeth of the central openings of the said disks and prevents them from turning on said core, the said symbols on the disks being combined with those on the said stationary member in the translation of a cipher-word into or out of communication, by forcing one of said disks into the space between the two cylindrical members and by the angular adjustment of said disks relative to the

symbols on one of the cylindrical members, substantially as described.

5 8. In a cipher-code key, the combination with a plurality of circular disks *h*, having teeth around their outer peripheries and having a symbol inscribed on the outer face and side of each tooth, each of said disks having a central toothed opening, a cylinder *l* enclosing said disks and having a longitudinal slot *m* displaying a row of the characters on said disks, a stationary cylindrical member *n* located near said disks and in axial alinement therewith and having symbols inscribed upon its outer periphery next to said cylinder, a 15 core passing through the central openings of said disks and having a longitudinal rib which engages the teeth of the central openings of said disks and prevents them from turning on said core, lugs on the slotted cylindrical member fitting between the outer teeth of the said disks, the said symbols on the disks being combined with those on the said stationary member in the translation of a cipher-word into or out of communication by forcing one 25 of said disks into the space between the two cylindrical members and by the angular adjustment of said disks relative to the symbols on the periphery of one of the said cylindrical members, substantially as described.

9. In a cipher-code key, the combination 30 with a fixed member provided with a series of symbols; a plurality of movable members each carrying a plurality of symbols and all movable in proximity to said fixed member, whereby a symbol on any of the movable mem- 35 bers may be brought into alinement with a preselected symbol on the fixed member in the translation of a word into or out of cipher, substantially as described.

10. In a cipher-code key the combination 40 with a fixed member provided with a transverse slot and a series of characters arranged alongside the edge of said slot, and a longitudinal slot leading from said transverse slot, a series of movable members adapted to slide 45 beneath said slots whereby a character on any of the movable members may be brought into alinement with a preselected character on the fixed member, in the translation of a word into or out of cipher, substantially as de- 50 scribed.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIS J. ROUSSEL.

Witnesses:

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L. REM VILLARS.