

PHOTO BY EUGENE HUTCHINSON, CHICAGO

Colonel George Fabyan

COLONEL GEORGE FABYAN, leading cipher writing expert of the United States, is head of the Riverbank Laboratories, at Geneva, Illinois, where he engages in scientific research. During the World War he trained most of the men who decoded enemy messages for the Government. Colonel Fabyan is a native of

Boston, where he was born fifty-seven years ago. As a young man he worked on the cattle ranges of the West. Later he became a cotton manufacturer, and it was while seeking a code for use in his business that he began his studies in cryptography. In the whole world there are not more than twenty experts in this line.

He Solves the Secrets Of Cipher Writing

“I have yet to find a message in secret code that cannot be read,” says Colonel George Fabyan, one of the greatest cipher experts of the world—He has unlocked the private codes of spies and criminals, and has mastered the most dangerous cipher in the world
He explains here how his work is done

By John Kidder Rhodes

THERE had been no treachery. However, the swarthy-skinned Hindu, who had taken his seat unnoticed in the back of the court-room, did not know that. The trial was being held in San Francisco, but it was headline news all over the country. This was in 1916; and the case was one that stirred the interest of an already war-excited public.

A political conspiracy had been set on foot; a royal prince of India had cast his lot with revolutionists who aimed to overthrow the British Government in India; Berlin was implicated; secret service operatives of two countries had pursued the plotters on a globe-encircling trail; threads of evidence had been woven into a pattern of facts; and finally some of the conspirators had been arrested in San Francisco.

The whole business was dramatic; but there was one especially sensational feature. Among the evidence submitted was a document in a cipher or pseudo code! This had been translated—worked out into plain language—and it was deadly testimony against the conspirators.

At the back of the court-room, the watching Hindu listened to the reading of the translated document. Himself one of the conspirators, he had been released on bail. To him, there was but one explanation of the deciphering of that incriminating piece of evidence.

He felt sure the cipher had been so well devised that no *outsider* could possibly have read it without possessing the key.

Yet the key to the cipher had been held in sacred secrecy by a small band of men. Who would or *could* have given it away, unless it was one of that band?—another

Hindu, who at the present moment occupied the chair on the witness stand.

Fully convinced that his conclusion was correct, the watcher suddenly rose, a revolver in his hand. Swiftly, he aimed over the heads of a score of people and fired at the witness. The latter crumpled up in his chair, and died almost instantly.

The bullet had penetrated his brain.

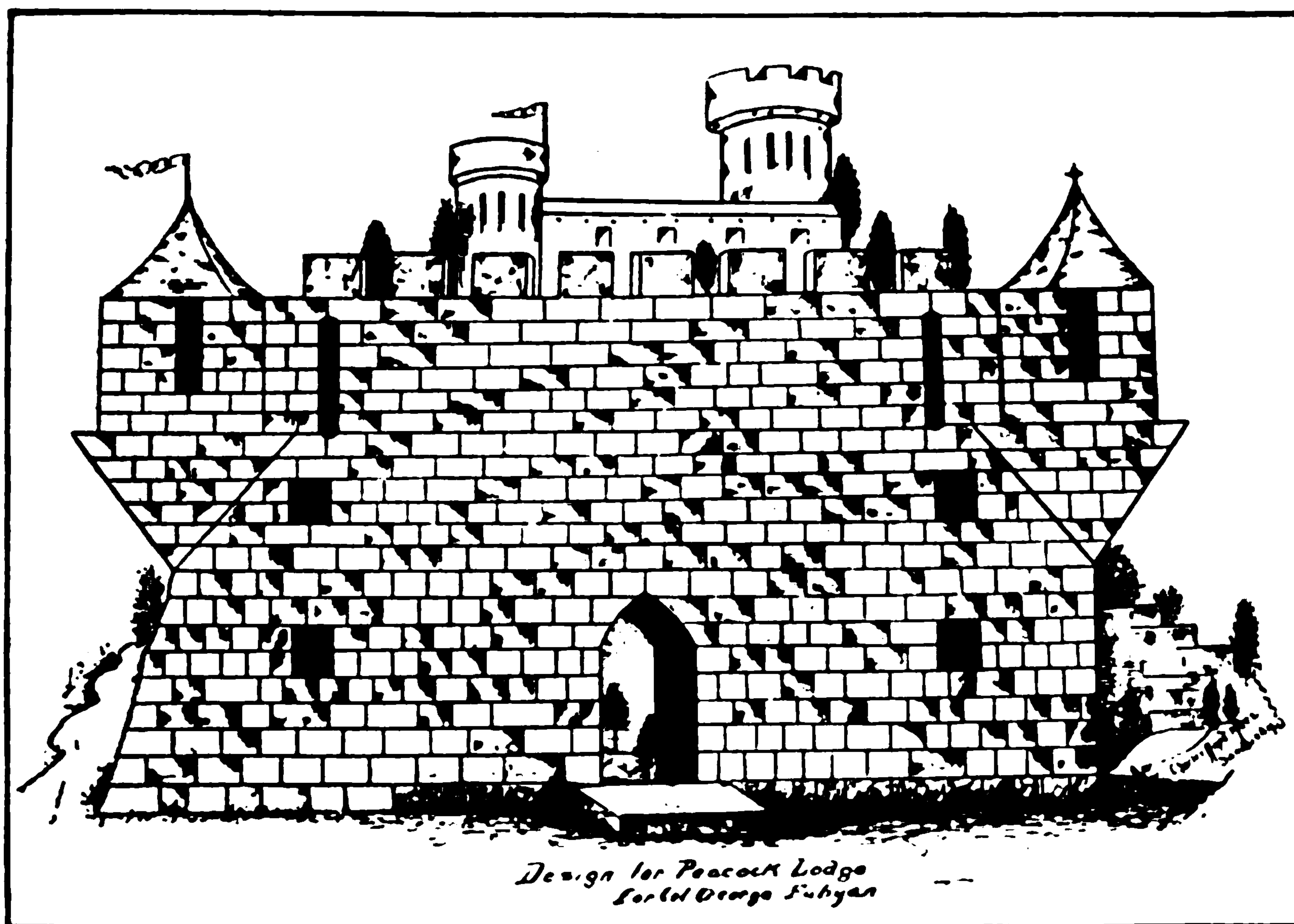
For a moment the shocked spectators sat motionless—absolutely stunned; and in that moment the bailiff drew his own revolver. It was risky business, firing over the heads of the crowd. Nevertheless, he fired. And his bullet went true. The murderer died as suddenly as had his victim!

THIS double shooting concluded a tragedy of error. For the murdered man had *not* given away the secret of the cipher. *Nobody* had given it away. It had been discovered by the patient work of a man who never even had seen any of the Hindus implicated in the case.

Colonel George Fabyan, in whose laboratories at Geneva, Illinois, the work was done, knows more about ciphers than anybody else in the United States. There are not more than twenty great cipher experts—cryptanalysts, they are called—in the world! Colonel Fabyan is one of the foremost among them.

Years ago, seeking a code for use in messages connected with

Biliteral Cipher



Cipher Code

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

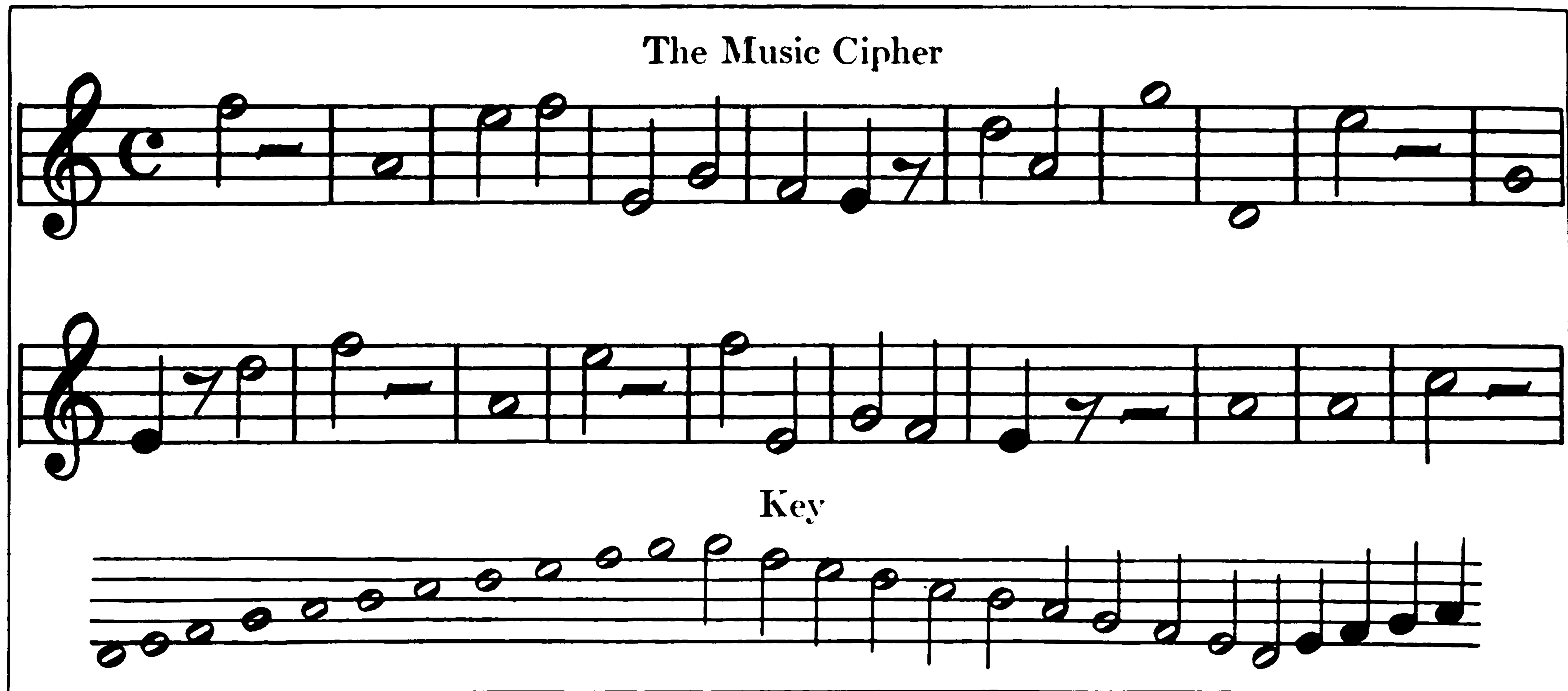
Explanation

This architect's sketch shows an interesting method of using the Biliteral Cipher (described later in the article). The white bricks represent the *a* letters, the shaded bricks the *b* letters. Begin at the top of the wall, below first flag, read from left to right, and assign an *a* or *b* to each brick on that principle, dividing the resultant *a*'s and *b*'s into groups of five. Then refer to the accompanying cipher code, which will show for which letter of the alphabet each group stands. The result will be amusing as well as interesting and instructive.

The cipher message above and the four others that accompany this article are mere child's play to cipher experts, but to the rest of us, who have had no training in this highly specialized field, they are difficult enough to be entertaining, and to constitute a test of patience and ingenuity. Colonel Fabyan selected these curious-looking messages as examples of ciphers which the average person will be able to read if he tries hard enough. By furnishing in each case the *key*—which under ordinary conditions could be discovered only by experts—he has performed for you the really difficult part of the solution.

In each instance correct reading of messages will be found at the end of this article.

The Music Cipher



his business, he became deeply interested in the subject and made profound study of it. Finally, the World War broke out; and the need for secret methods of communication brought a tremendous revival of codes and ciphers.

To fight spies and treachery, the Government had to find out the contents of secret messages. Colonel Fabyan was the only man in the country who could give the quality of help needed. Hence, most of the men who did the actual work of ferreting out hostile messages were trained to it under his direction.

The Riverbank Laboratories at Geneva are extraordinarily interesting, being devoted purely to scientific research, chiefly along the line of physics and medicine. Cryptography is only one phase of Colonel Fabyan's interests. Scientific discoveries of far-reaching importance have been made here in recent years. These have been given freely to the world, even though they might—if commercially developed—mean a fortune to him.

HOWEVER, my purpose in going to the laboratories was to have Colonel Fabyan talk about ciphers. I wanted to know what people use them for: whether ordinary folks, like you and me, could have a cipher of our own; and some of the interesting human stories that must have centered around this fascinating subject.

I found that ciphers are used in peace and in war, in love and in business, by courtiers and by criminals. Diplomats send important messages in cipher. Business firms use this method when secrecy is essential. When money is telegraphed to you, the dispatch is sent in cipher. In fact, ciphers have been used for secret messages for thousands of years, and are still used all over the world.

"I could show you thousands of ciphers and codes," Colonel Fabyan said to me. "They could be multiplied and varied, until you would be sick of the sight of them. One of the common business uses

for codes occurs when banks telegraph instructions about money. A bank in Chicago, let us say, wants to wire a bank in New York the following message:

"Pay twenty-five hundred dollars to Adam K. Bell, and charge to our account. Identification waived."

"That authorizes the New York bank to pay twenty-five hundred dollars to the first man who comes in and says he is Adam K. Bell. Naturally, such a message could not go in plain words, for every telegraph operator, messenger boy, stenog-

"Here's another instance of a business use for ciphers. A number of years ago, I had information which cast grave doubts on the financial soundness of one of our important customers in the West. In trade circles, so far as I knew, not an unfavorable word had been breathed against this concern. Nevertheless, I was uneasy, and wired our New York office these instructions:

"Cancel all shipments to (naming the concern). Have information I cannot confirm that they are about to fail."

"Of course I sent the message in cipher—partly out of fairness to the firm itself. Rumors have a way of starting from very small beginnings. The concern might not be as badly off as I believed. In that case, my telegram, if openly read and circulated about, might have the effect of giving the finishing push to a company which otherwise would perhaps manage to pull through. As it was, however, within a week after I sent my cipher telegram, all creditors were accepting fifty cents on the dollar from this house, and glad to get it.

"On the occasion of the death of any powerful banker of international importance, the news will travel around the world in cipher ahead of the news dispatches. It may mean hundreds of thousands of dollars to traders who are able to secure the information secretly, even just a little in advance of others.

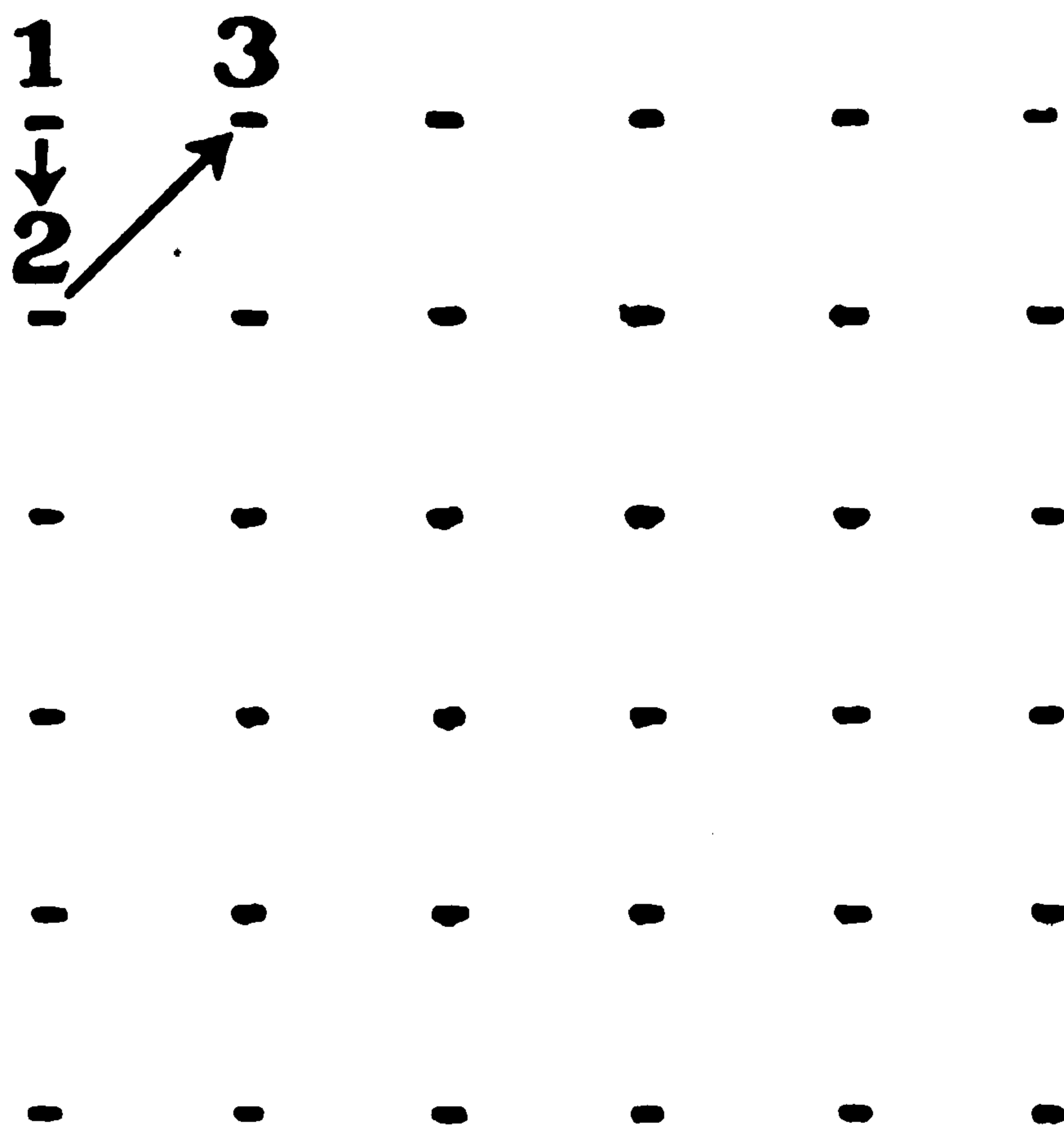
TH**ERE** is no end to the means of secret communication. During the war we found that an expert engraver was communicating with the enemy by engraving secret messages microscopically on

the heads of pins. A woman could use, in her clothing, enough of these pins to carry a long message; and she could pass any inspection under the sun! By chance, we found one of the pins, and discovered the trick.

"Some of the old kings used to shave a slave's head and tattoo a message on his scalp. When the hair grew out,

The Route Cipher

In Harding June Director named nineteen came of Dawes hundred to to the as twenty-one in see Washington budget the President the what for and first way could a Dawes of be year reducing done expenses.



Hint: Number the words in the message and route them through the square in the order indicated by the arrows.

rapher, and clerk to read. The temptation to impersonate Mr. Bell might be too strong for somebody to resist.

"Sometimes a bank keeps its cipher in a locked box which can be opened only when two keys are inserted. As each key is in the possession of a different man, no message can be sent or deciphered unless both are present.

the slave was sent to the person who was to receive the message. The latter again shaved the slave's head, and there was the tattooed communication.

"In deciphering any secret message without the key, you usually have to 'cut and try,' as we express it, until you find a solution that fits. We have *several hundred* ways of attacking cipher messages. Some messages are so simple and obvious—although they may look complicated to inexperienced users—that one glance is sufficient to tell a trained eye how to proceed. Others may lead to a tremendous amount of work before they can be broken. But I have yet to find one that *couldn't* be broken if enough work was put on it. What one mind has locked up another can unlock!

"One of my assistants, Miss Cora Jensen, has an immense working knowledge of ciphers and of the ways to attack them. When there is a message to be deciphered, she starts with 'work sheets' of foolscap paper, cross-lined. If it seems to be one of the common ciphers, she makes a few 'tries,' according to well-known methods, putting each attempt down on a work sheet.

"Naturally, an expert does not waste time putting down silly guesses. For one thing, the 'translator' must not destroy *any* of the work sheets, but must return all that have been given to him. So he thinks in his head, as far as possible, not on paper.

"**T**HERE can be only *one* correct reading of a cipher message. An incorrect solution may fit up to a certain point, but it is sure to strike a snag somewhere. So it is a case of trying, over and over again, until a perfect fit is found. In the case of the Hindu cipher we translated for the San Francisco case, the total number of work sheets used was fifty."

"How are ciphers invented, or constructed?" I asked.

"Well," said Colonel Fabyan, "a cipher can be made up by using *other* letters and symbols in place of the *correct* ones. To decipher a message of that kind, it is necessary to know which letters of the alphabet *occur most frequently in general use*. We made a study of this, counting the letters on thousands of pages of printed matter. We found that this is the order of frequency in which the letters of our alphabet occur:

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

"On the average printed page, *fifteen per cent* will be E; whereas only *two per cent* of the letters will be K, X, Q, J, and Z, *all together*.

"Knowing this, we can count the times the different letters appear in a cipher message where wrong letters are used for right ones. And this helps us to find out enough right ones to give us the clue.

"During the war, of course, the various Governments were constantly changing their own codes, for they knew the old ones would be discovered sooner or later. About as soon as a new code came into use we knew the fact, and would set to work to break it; that is, to decipher it. Sometimes we were helped by the very men who were most anxious that we shouldn't succeed—the agents of the foreign Government that was changing its code. They would send this message, in the *old* code, to their superiors:

"Haven't received my new code book yet. Repeat your message in the old one.

"We would then wait for the repeated message. We already had received it in

the new code, but did not know what it meant. Now, when it was repeated in the *old* code—which we, of course, had broken and understood perfectly—it was the simplest thing in the world to break the new code.

"Here was a rather amusing thing: When codes were changed, the operators used to practice them for a while; and they usually did so by sending proverbs! One fellow apparently knew only one proverb. He used to tune in every morning at ten minutes past seven. Knowing his limitations, we never had much trouble with a new code when we caught him practicing it over and over with the solitary proverb he knew!

"**T**HERE was one message that upset all the experts who studied it. It came in a strange cipher which nobody could fathom. When I saw it, I thought it had a familiar look, and I took it to Mangasar Mangasarian—a noted man among his people in Chicago—and asked him if he could help me with it. He called a stenographer, and rapidly dictated the English translation. It was simply a letter written in Armenian!

"Once a message came to us to be deciphered. It had originated in Spain—although we did not know this. It looked like a difficult and unusual code. But what had happened was probably something like this: The man who was to send the message wrote it out and left his assistant to translate it into cipher. The assistant handed the job to the stenographer. And I should judge that *she* handed it to the office boy!

"When the message came to us to be deciphered, several people were completely baffled. It was finally given to a stenographer to copy. She happened to know some Spanish; (Continued on page 60)

The Corner Cipher

VJΓΩΠ ΕΞΖΓΑ ΕΠΖΓΓ ΓΛΟΛΩ ΚΑΚΛΩ ΛΑΥΓΩ
 ΚΑΚΛΕ ΛΑΓΓΑ ΚΕΛΕ ΑΥΕΞΕ ΚΑΠΩ ΓΕΕΕΩ
 ΓΟΠΩ ΕΑΠΩ ΓΛΩΖ ΓΑΠΓ ΑΠΖΓΩ ΕΓΕΛΑ
 ΓΩΚΑΛ ΩΚΕΕΓ ΛΩΥΚ >ΖΕΕΩ

| | | |
|-----|-----|-----|
| HL. | MS. | AC. |
| PR. | FK. | EO. |
| BD. | UW. | IX. |

The two diagrams showing the letters of the alphabet indicate how the symbols in the cipher message above were made. Each symbol represents a letter

The Rail Fence Cipher

OEWOOLBFRUA EHBGNIGSVRTIGTMNH W
 UDEOTNTTEEINNIEEYHN

Divide the letters in this message into two parallel lines, putting a letter at each point in the zigzag rail fence, and continuing the fence until all letters are used. Then, if you have divided the letters in the right place, the message will be apparent

He Solves the Secrets of Cipher Writing

(Continued from page 30)

and after a few lines it struck her that the message, while it was sadly cut up, looked a good deal like Spanish, and not like a cipher at all.

"That, in fact, was just what it was—straight Spanish! The letters had been divided off into groups of fives, *preparatory* to being translated into the cipher. But before this was done the message was sent out by mistake—simply a hashed version of the real thing.

"Once a message in an unknown cipher was brought to us, a message so short that we could not hope to decipher it without some clue. I had none—so I threw the paper on the floor. I did this with a purpose; and I advise you to try it yourself sometime when you have handwriting that you can't read. You will see it at a different angle, as well as at a different distance; and very often you will notice something that escaped you before.

"The message I speak of fell with its back up, and I saw that there was a smudge on that side of the paper. It turned out that the man who had received the message originally, some correspondent who possessed the key, had deciphered it and written the translation on the back, then scratched it out with his lead pencil. It was easy enough to read through this smudge and get the message.

"**SHALL** I show you what is the most dangerous cipher in the world?" asked Colonel Fabyan.

I said that nothing would please me better, so we sat down opposite each other at a table; and on a foolscap sheet of paper I wrote what he told me to. When I was through this is what I had:

| | |
|-------------|-------------|
| aaaa—A | abbaa—N |
| aaaab—B | abbab—O |
| aaaba—C | abbba—P |
| aaabb—D | abbbb—Q |
| aabaa—E | baaaa—R |
| aabab—F | baaab—S |
| aabba—G | baaba—T |
| aabbb—H | baabb—U & V |
| abaaa—I & J | babaa—W |
| abaab—K | babab—X |
| ababa—L | babba—Y |
| ababb—M | babbb—Z |

"That," Colonel Fabyan repeated, "is the most dangerous cipher in the world, because it is capable of being almost infinitely varied, and almost perfectly disguised. It is known as the biliteral cipher, and was invented three hundred years ago by Sir Francis Bacon. It is just as dangerous to-day as it was then.

"If you learn *how* its combinations are made, you can tear up your copy and reproduce it at any time from memory. Read from top to bottom on the key you have just written. There are five columns of letters. The fifth column reads a, b, a, b, from top to bottom. The fourth column is a, a, b, b, a, a, b, b, all the way down. They go down in twos. The third column reads a, a, a, a, b, b, b, b, and so on—in fours. In the second column you have eight a's, under them eight b's, and so on. And in the first column you have sixteen a's, then eight b's.

"What makes this cipher so dangerous

is the fact that you don't have to use the letters a and b. You could use squares and circles, dots and dashes, trees and bushes—*any two things that can be made* to look even slightly different. Look at *this*." Colonel Fabyan whirled about in his chair and pointed to the wall. "What do you see there?"

"A photograph with a lot of soldiers."

"Anything special about them?"

"Not that I notice."

"Well, there *is* something special, nevertheless. That photograph was specially posed to show a way of using the cipher, and it carries the message, 'Knowledge is power.' Most of the soldiers, you observe, are directly facing the camera; a few are looking sideways, but not enough to seem unnatural. The fellows looking sideways represent the b's in the cipher as I showed it to you; the others represent the a's.

"Plans have been worked out for sending messages with this cipher in bouquets of flowers. One color flower stands for a, another for b."

There is another way to vary the cipher which Colonel Fabyan called the most dangerous in the world. Instead of allowing the first group of five letters to represent "a," and the next five "b," employ some other for the alphabet. A simple plan is to start off with a key word, then follow with the remaining letters of the alphabet in proper sequence. Say you have decided to use the word "united." Then the key to the cipher would read:

| | |
|---------|---------|
| aaaa—U | aabab—D |
| aaaab—N | aabba—A |
| aaaba—I | aabbb—B |
| aaabb—T | abaaa—C |
| aabaa—E | abaab—F |

(etc.)

You can use any key word of any length, or any combination of letters you like; and so long as the person addressed knows *how* you have varied the key, he can decipher any message you have written. There are almost infinite possibilities in this one cipher.

"**NOW** come with me," Colonel Fabyan went on; "we'll go up-stairs and take a look at the way Sir Francis Bacon used the cipher which he invented."

He led the way to a moving picture projection-room on the top floor of the laboratories. Here he directed on the screen an amazing exhibition of human ingenuity and patience. It consisted principally of slides reproducing pages from the *original* editions of Sir Francis Bacon's writings. Colonel Fabyan himself has a rich library of Baconian and Elizabethan literature, and his researches have taken him far afield to consult other volumes which he does not possess, and which money cannot buy.

In instance after instance, the slides showed the striking fact that for every letter in the alphabet, both capitals and small letters, *two distinct kinds of type* had been employed. The differences, especially in the capital letters, were instantly noticeable in some cases; but in other cases it was necessary to examine

the letters minutely in order to see how they differed.

"In Bacon's day," Colonel Fabyan pointed out, "three inventions were most important: gunpowder, the compass, and the printing press. There were only four type founders and twenty licensed printers in the whole country, and it was a penitentiary offense to possess any part of a printing press without a license.

"The two styles of type used in the original printing of Bacon's writings were *his method of making use of the cipher*."

"Bacon had good reasons for not revealing his private method of using the cipher. So, for three hundred years and more, there lay hidden in books known to have been written by him, and in many others not thought to have been written by him, secret revelations of an astonishing character.

"Of course, Bacon didn't do it all himself. He had amanuenses and secretaries.

"Talk about patience!" he went on. "The work of using the cipher in the first place was certainly no greater than the work of deciphering it after all these years. We have spent thirty years at it, I guess, and we have ream after ream of Bacon's secret writings here to-day! The credit for that must go where it belongs, to Mrs. Elizabeth Wells Gallup."

FROM one of these books of Bacon's deciphered writings, I asked permission to make a couple of quotations. The first, taken from his autobiography as he tells it in the cipher (hidden in the other text), shows very clearly why, in an age of political intrigue, there was much that Bacon could not publish openly. It reads:

Though constantly hemmed about, threatened, kept under surveillance, I have written this history in full in the cipher, being fully persuaded, in my own mind and heart, that not only jesting Pilate but the world ask: "What is truth?"

The principal work is, as you may suppose, writing a secret story of my own life, as well as a true history of the times. Yet it is much mixed or twined into many others herein given. Indeed, a whole national record must be changed by the revelation which I have prepared with much pains for posterity.

That this shall be such true history that it shall be worthy of preservation I have not blenched aught, howsoever much it may irk me, or weary those who read it. But some of it I would I could forget after it hath been set down.

I am, indeed, by virtue of my birth, that royal, though grossly wronged, son to our most glorious, yet most faulty, Queen Elizabeth, of the stock that doughty Edward truly renowned. Of such stock Henries the Fifth, Seventh, and Eighth, historic battle kings, came, like branches sent from the oaks.

My true name is Tudor. . . .

Bacon explains in subsequent pages why Queen Elizabeth, who loved the title of the Virgin Queen, would never allow her marriage to the Earl of Leicester to be made known; and why she would not recognize publicly her two sons, nor allow her first-born, known to the world as Francis Bacon, to be recognized as the heir apparent to the British throne.

The following cipher passage, from much further along in the same book,

appears to shed light on a very old controversy among students of Shakespeare:

My plays are not yet finished, but I intend to put forth several soon. However, the biliteral work requiring so much time, it will readily be seen that there is much to do after a book doth seem to be ready for the press, and I could not well say when other plays will come out. The next volume will be under W. Shakespeare's name. As some which have now been produced have borne upon the title page his name, though all are my own work, I have allowed it to stand on many others which I myself regard as equal in merit. Having put forth a number of plays in his theatre, I shall continue so doing, since I do make him the thrall to my will. . . .

"Don't bring me into any discussion of who wrote Shakespeare's plays!" Colonel Fabyan warned me emphatically. "I don't know whether Bacon wrote them or not, and I don't care. But as a cryptanalyst I *am* interested in cipher writing, wherever I find it.

"We've proved the accuracy of various passages in Bacon's secret writings in any number of ways. For instance, he told in one passage about a panel in a wall which could be moved when a secret spring was touched, revealing a compartment behind it in which certain articles would be found. We sent the instructions he gave over to England. They found that the building was still in existence; and the wall, panel, and secret spring were all where he said they'd be!"

IF YOU want to experiment in ciphers, perhaps with some friends, here are some you can try. They are really very easy to understand. The first is made by dividing the alphabet into groups, then selecting a symbol to represent each group. You repeat the symbol one, two, or as many times as the cipher calls for, to represent a letter within the group.

For example, divide the alphabet into four groups, and let the symbols be a dollar mark (\$), an asterisk (*), a zero (0), and the small letter (x). Then your cipher key looks like this:

| | | | |
|---------------------------|---|---|---|
| \$ | * | 0 | x |
| 1—A.....G.....N.....T | | | |
| 2—B.....H.....O.....U & V | | | |
| 3—C.....I & J.....P.....W | | | |
| 4—D.....K.....Q.....X | | | |
| 5—E.....L.....R.....Y | | | |
| 6—F.....M.....S.....Z | | | |

Suppose you want to convey secretly, with this cipher, the message "Send the jewels to Sam." Then your message looks like this:

000000\$\$\$\$\$0\$\$\$\$\$x**\$\$\$\$\$***\$\$\$\$\$xxx
 \$\$\$\$\$\$****000000x00 000000\$*****

If you want to send on a post card a message that will probably stump the delivery clerk who tries to read it, a simple but baffling cipher can be made by merely *transposing* the words of the message. Of course, the person who is to receive it must know *how* they are transposed.

First, write the message in vertical columns, one word under the other, as many columns as you happen to need. Then, when you *send* it, write the words as they read *across* these columns.

Here is an example. The message as *sent* reads:

Need don't my bonds proceeds a let safety sell must lot John box then have of know and wire in money go get me hand quick to two Tuesday.

When the sender was preparing it, in vertical columns, this was what he had:

| | | | | |
|-------|-------|--------|-------|----------|
| Need | don't | my | bonds | proceeds |
| a | let | safety | sell | must |
| lot | John | box | then | have |
| of | know | and | wire | in |
| money | go | get | me | hand |
| quick | to | two | the | Tuesday |

By starting at the top of the left-hand column and reading *down*, the message becomes plain:

Need a lot of money quick. Don't let John know. Go to my safety box and get two bonds. Sell. Then wire me the proceeds. Must have in hand Tuesday.

ANOTHER simple plan is to use the dictionary. Small pocket dictionaries, exactly alike, should be in the possession of the persons communicating by this method. Instead of sending the word you mean, you agree to select one somewhere close to it. For instance, you can select the word which comes *five places after* the one you mean, or five places before it, or twenty places after or before it wherever you want. A result something like this may be what you will get:

Weapon warble youth toboggan ghastly somnolent dyspepsia Andersonville melancholy usurp their utensil plain midway weevil.

Which, translated, reads:

We want you to get some dynamite and meet us the usual place midnight Wednesday.

The Hindus involved in the plot mentioned at the start of this article used a "book cipher." Whenever they wanted a cipher symbol for a certain letter, they turned to any page in the book that had been agreed upon among them, found the letter they wanted, then referred to it by page, line and letter, thus: 52-7-28, meaning that the letter would be found on page 52, line 7, 28th letter in the line.

In this instance it was not absolutely necessary to find the book used by the conspirators, as their cipher could be read by comparing it with certain known words, such as the names of the people who were arrested along with the leader. But the book used by the Hindus actually was found—though Colonel Fabyan declares the finding of it was a "fluke."

Colonel Fabyan's office at the laboratory has very peculiar windows, about the size and shape of portholes. These date from the period of the recent war, when he was doing work there which was of vital importance to the Government, and when there was danger of some alien sympathizer taking a pot shot at him. His peace-time clients are mainly government departments—the Navy, the Army, and the Department of Justice.

Solution to Biliteral Cipher

**My business is to write prescriptions,
 And then to see my doses taken;
 But now I find I spend my time
 Endeavoring to out-Bacon Bacon.**

Solution to Music Cipher

Men must work and women must weep

Solution to Route Cipher

| | | | | | |
|----------|-------|------------|---------|------------|-----------|
| 1 | 3 | 6 | 10 | 15 | 21 |
| IN | JUNE | NINETEEN | HUNDRED | TWENTY-ONE | PRESIDENT |
| 2 | 5 | 9 | 14 | 20 | 26 |
| HARDING | NAMED | DAWES | AS | THE | FIRST |
| 4 | 8 | 13 | 19 | 25 | 30 |
| DIRECTOR | OF | THE | BUDGET | AND | DAWES |
| 7 | 12 | 18 | 24 | 29 | 33 |
| CAME | TO | WASHINGTON | FOR | A | YEAR |
| 11 | 17 | 23 | 28 | 32 | 35 |
| TO | SEE | WHAT | COULD | BE | DONE |
| 16 | 22 | 27 | 31 | 34 | 36 |
| IN | THE | WAY | OF | REDUCING | EXPENSES |

In June nineteen hundred twenty-one, President Harding named Dawes as the first Director of the Budget, and Dawes came to Washington for a year to see what could be done in the way of reducing expenses.

Solution to Corner Cipher

The alphabet would look like this:

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
 L 7 E 7 C O < J 7 V 0 J U A E 3 > 3 U V N < 7 F > A

**This world would be a far pleasanter place
 And in heaven more pews be took,
 If women were all they wished to be
 And men as good as they look.**

Solution to Rail Fence Cipher

O E W O O L B F R U A E H B G N I G
 T M N H W U D E O T N T T E E I N N
 S V R T I G
 I E E Y H N

To men who would be fortunate the beginning is everything.