

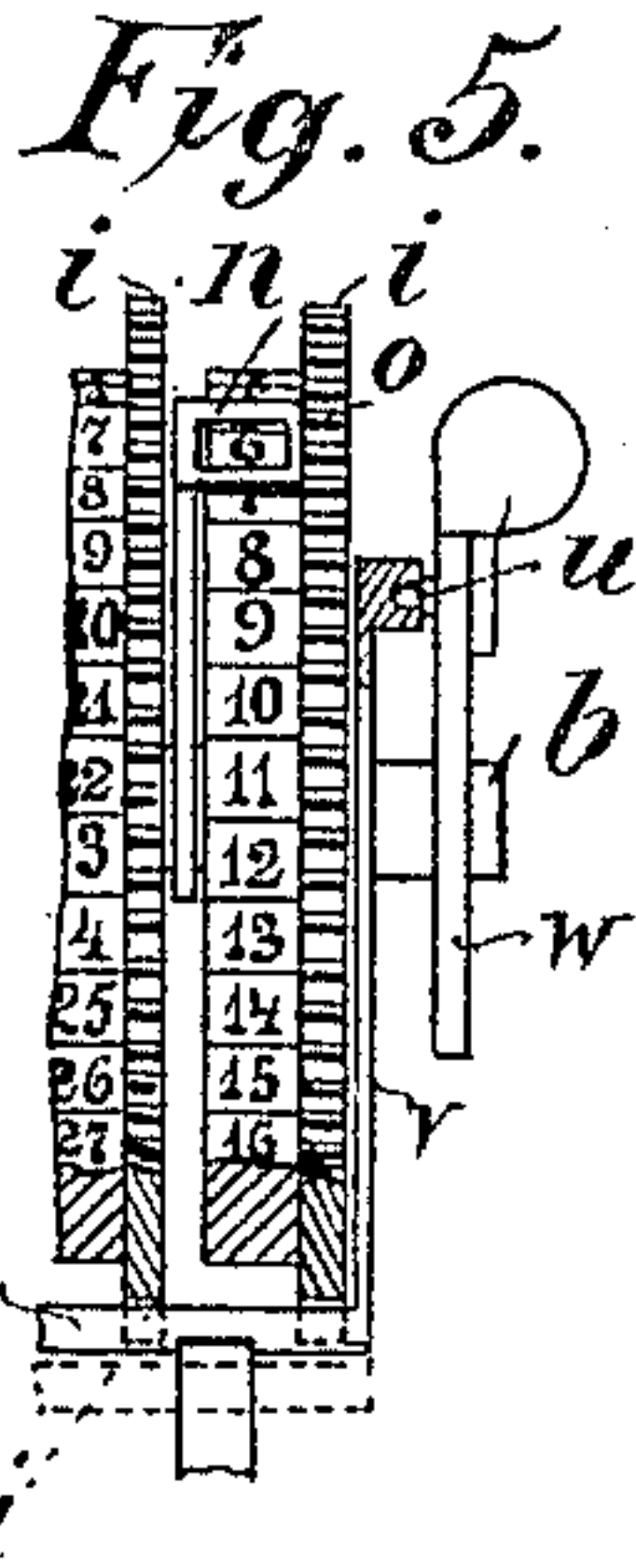
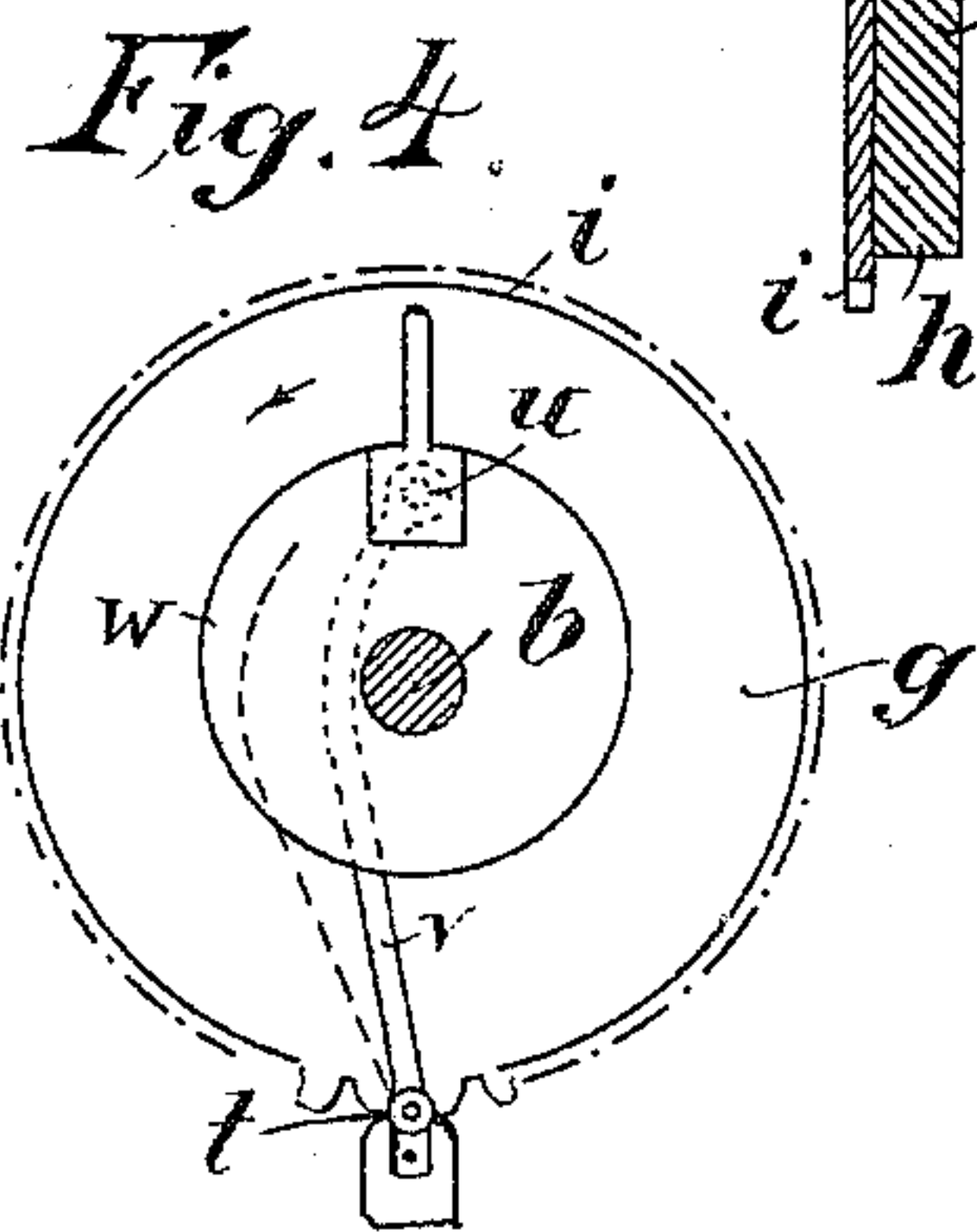
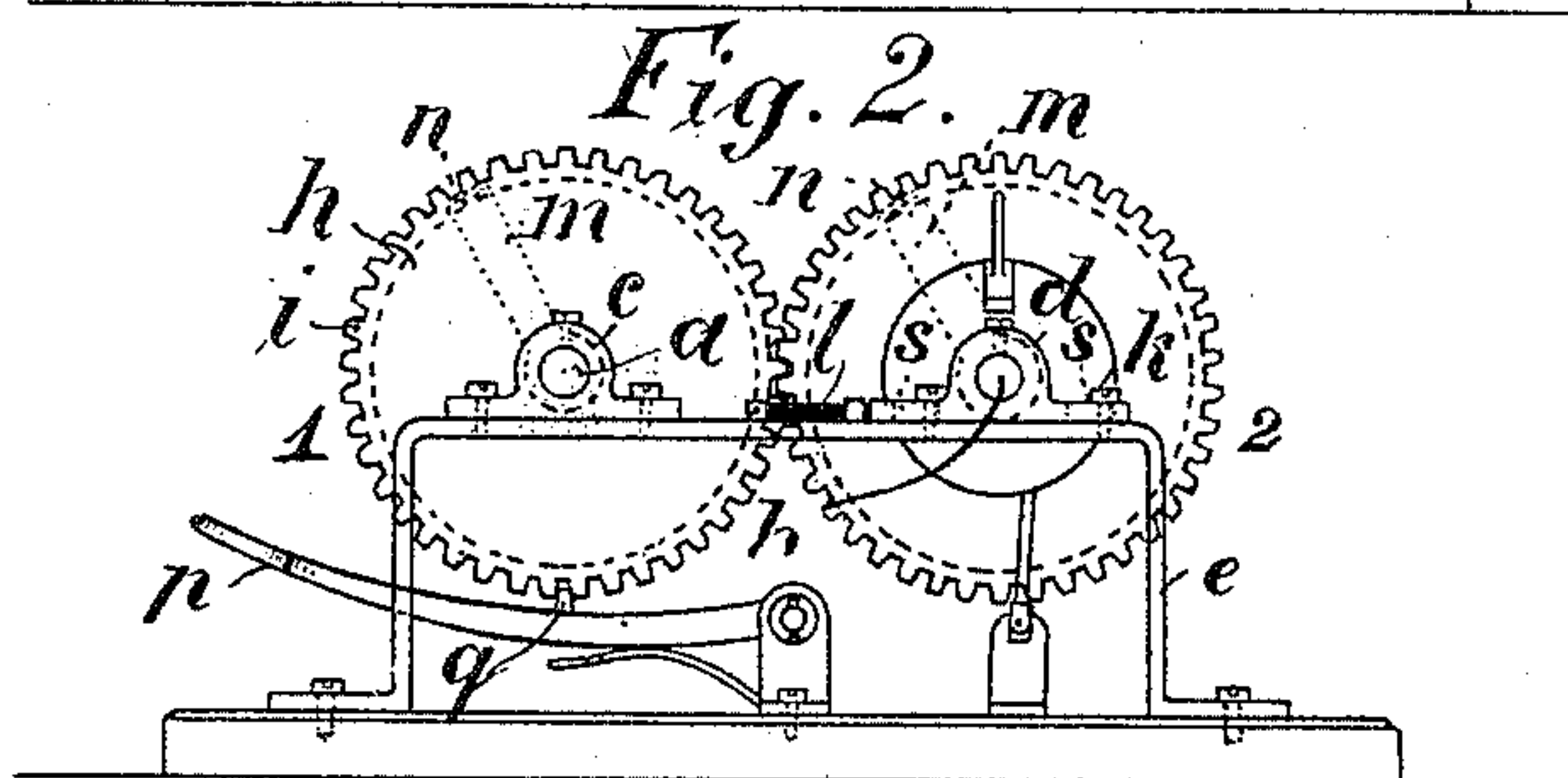
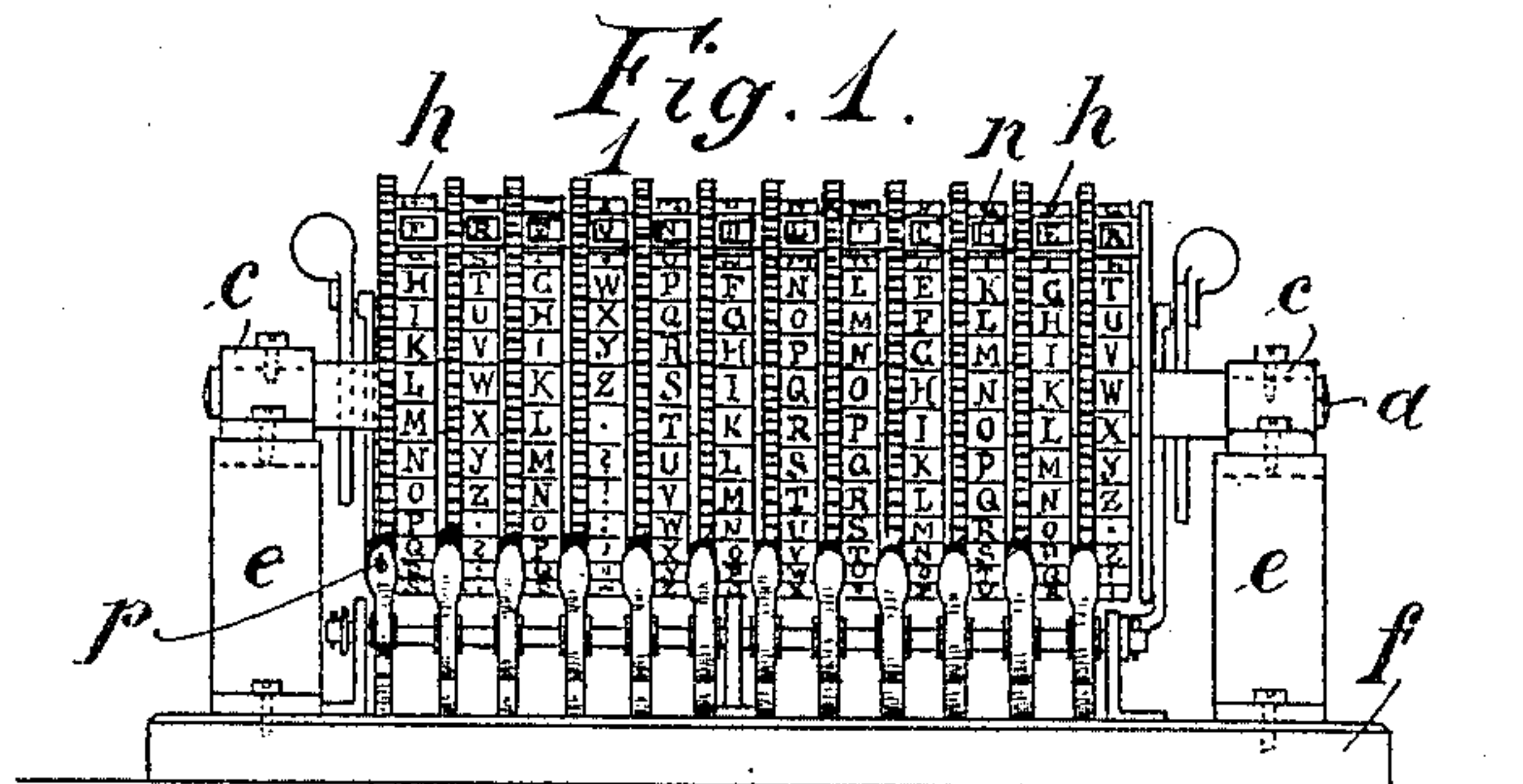
No. 641,481.

Patented Jan. 16, 1900.

G. B. N. VALVASORI.
CIPHER APPARATUS.

(Application filed Apr. 7, 1899.)

(No Model.)



Witnesses:
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UNITED STATES PATENT OFFICE.

GIOVANNI BATTISTA NOB. VALVASORI, OF PADUA, ITALY.

CIPHER APPARATUS.

SPECIFICATION forming part of Letters Patent No. 641,481, dated January 16, 1900.

Application filed April 7, 1899. Serial No. 712,129. (No model.)

To all whom it may concern:

Be it known that I, GIOVANNI BATTISTA NOBILE VALVASORI, of Padua, in the Kingdom of Italy, have invented certain new and useful Improvements in Cipher Apparatus, of which the following is a specification.

This invention relates to apparatus with the assistance of which cipher telegrams and the like can be composed and deciphered, different words being written with partially similar letters, but always with different numbers.

The apparatus consists of two cylinders, each of which is composed of several disks rotatably mounted on a fixed shaft and furnished with teeth, and on the surface of which are letters, numbers, and other characters, as well as single words and syllables, by means of which any syllables, words, or whole sentences in any language can be composed and deciphered in open square frames arranged radially to the axis. The disks, or, in other words, the letters, numbers, and the like, slide under the frame of the open squares, which are firmly connected with the axis by means of arms and form a row of open squares over the cylinder in the direction of the shaft, which conjointly create a reading-frame. Obviously, the number of these squares is regulated by the number of the rotatable disks on the fixed shaft. The disks of one cylinder bear the letters, signs, and words, the letters on each disk being arranged in suitable alphabetical order, and the opposite disks of the second cylinder bear numbers running in continuous order. The tooth-wheels of the several disks of the two cylinders can be put into or out of engagement by the arrangement of an adjustable bearing to one cylinder. The rotation of the several disks can only be effected when a cam which engages in the tooth-wheel of the disk of one cylinder has been put out of engagement by the pressing down of the spring-arm on which the cam rests. When the cylinders are put out of engagement, the disks of the second cylinder are held stationary by means of a small metal rod, which is simultaneously raised.

The invention is illustrated in the accompanying drawings.

Figure 1 is a front elevation; Fig. 2, a side elevation; Fig. 3, a section of a single disk with frames engaging the same, and Figs. 4

and 5 front and side elevations of the apparatus for putting the second cylinder out of engagement and holding it still.

The shafts *a b* are firmly seated in the bearings *c d* on the bearing-block *e* of the bed-plate *f*, and on each of them a similar number of disks *g* (in the drawings twelve) are rotatably mounted. These disks *g* have a projecting edge which forms a tooth-wheel *i*. The bearings *d* of the shaft *b* are movable in the slots *s*, their movement being restricted by the bolts *k*. The adjustment is effected by the screw-bolt *l*. By means of this apparatus the tooth-wheels *i* can be put into or out of engagement. Each disk-rim *h* of the disks seated on the shaft *a* is furnished with letters in suitable alphabetical order—syllables, words, or other characters—while each disk-rim of the disk seated in the shaft *b* is furnished with numbers arranged in successive order. This arrangement is intended to be employed for facilitating the operations of composing and deciphering cipher telegrams and the like.

On the shaft *a*, as also on the shaft *b*, an arm *m* is fixed adjoining each disk. The rectangular bent end *n* of this arm engages over the disk-rim, so that the disk can slide through freely below the end *n* and be freely rotated backward and forward. The end *n* engaging above the disk-rim *h* forms the frame of an open square or eye *o*, in which, upon the disk being rotated, a letter, syllable, word, sign, or number appears. As these open squares *o* run over the whole cylinder in the direction of the axis, whole words and sentences in any language can be composed in the squares by the adjustment of several letters, &c., just as a series or row of different numbers can be obtained on the number-cylinder.

For holding the tooth-wheels, or, in other words, the disks of the cylinder 1, (see Fig. 2,) firmly, spring-arms *p*, with stop-pins *q* attached below the wheels, are employed. These stop-pins engage in the tooth-wheels. As soon as a spring-arm *p* is pressed down the disk which had been firmly held by it can rotate backward and forward. After the operation of disengaging, the disks of the cylinder 2 are held still by means of a metal rod *t*, (see Fig. 4,) running under the cylinder, this rod *t* being raised by the lever-arm *v*, pivoted at *u* to

the eccentric disk *w* and which rod engages in the toothed wheels of the disks.

The action of the apparatus is as follows: In order that a cipher communication may be sent to another person for him to read, it is necessary that such person should be in possession of a similar apparatus. The two persons agree on one or two words, each of which consists generally of as many letters as there are disks to the cylinder. With the apparatus illustrated in the accompanying drawings, where twelve disks are supposed to be employed, a word with twelve letters is agreed upon, which is to be adapted to the word "Freundlicher," for example. For the second cylinder, which is furnished with numbers, a certain grouping of numbers is arranged—for example, "12," "18," "40," "26," and so on. The word "Freundlicher" forms the cipher-word, and the numbers agreed upon serve the same purpose. The word "Freundlicher" must now be arranged on the cylinder 1, which is effected thus: The arm *p* being simultaneously pressed down, the letter "F" is adjusted in the open square of the first disk by rotating this disk, Fig. 1, left-hand side. After this has been done the spring-arm *p* is relieved of the pressure that was on it and the disk is stopped and in consequence cannot rotate. Then the adjoining arm *p* is pressed down, the letter "R" brought into the open square by rotation of the second disk, and the latter made fast by the releasing of the arm *p*, until in this manner the word "Freundlicher" has been adjusted in the open squares on the cylinder. The same process is repeated on the second cylinder 2, furnished with numbers, the agreed numbers "12," "18," "40," "26," &c., being placed in the squares, regard being had to what is said above. When these preparatory steps have been taken and for which, as the apparatus is easily managed, only a short time is required, the two cylinders are put together, so that the toothed wheels engage with each other.

If it be now desired to write, for instance, "Hilfe nötig," ("help wanted,") the spring-arm *p* is pressed down and the first disk of the cylinder 1 rotated until the letter "H" appears in the square. Through the motion transmitted by means of the tooth-wheel the number "19" appears simultaneously in the square of the first disk of the cylinder 2. Continuing in this manner the letter "I" is placed on the second disk of the cylinder 1, whereupon the number "38," for example, appears on the coupled disks of the cylinder 2, this action being repeated until the phrase "Hilfe nötig" ("help wanted") is placed in the square of the cylinder 1, whereupon the numbers of the squares of the cylinder 2 are communicated to the person addressed. It is clear that the receiver of this communication proceeds in an inverse way, after first

adjusting his apparatus to the cipher, words, and groups of numbers agreed upon and variable, as desired. He accordingly rotates the first disk of the cylinder *b* until the number "18" appears in the square, whereby through the motion transmitted to the first disk the letter "H" is adjusted in the square. If, therefore, number "38" be adjusted on the second disk, the letter "I" will appear on the one lying opposite until the whole phrase is completed.

With longer communications it is advisable that the operation be commenced from the last disk on the right instead of with the first disk on the left, as already described.

It should be borne in mind that it is not possible by this invention to decipher by comparison of the groups of numbers, as is the case with the methods hitherto employed, by which when any one word showing a similar grouping of letters had been guessed the remainder could be quickly discovered. With the present apparatus, moreover, words like "Anna" "Nein" "Ebbe" never show the same numbers for the same letters; but like letters are always represented by different numerals in each word.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a cipher apparatus, two rows of rotatable disks bearing peripheral characters, means for throwing opposite disks into and out of engagement, means for simultaneously rotating opposite disks, and eyes above the disk-rims through which one of the characters on each disk is exposed, substantially as specified.

2. In a cipher apparatus, a pair of shafts, a laterally-adjustable bearing for supporting one of the shafts, two rows of opposite intergeared disks rotatable on the shafts and bearing peripheral characters, and eyes above the disk-rims through which one of the characters on each disk is exposed, all being so constructed that opposite disks are intergeared and simultaneously rotatable, substantially as specified.

3. In a cipher apparatus, a pair of shafts of which one is laterally adjustable, two rows of opposite intergeared disks rotatable on the shafts and bearing peripheral characters, eyes above the disk-rims through which one of the characters on each disk is exposed, and means for locking the disks in position, all being so constructed that opposite disks are adapted to be intergeared and simultaneously rotated, substantially as specified.

Signed by me at Venice, Italy, this 18th day of March, 1899.

GIOVANNI BATTISTA NOB. VALVASORI.

Witnesses:

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