

PATENT SPECIFICATION



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246,307

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COMPLETE SPECIFICATION.

Improvements in Ciphering or Coding Machines.

I, ALEXANDER VON KRYHA, of Fasanenstrasse 39, Berlin, W. 15, Germany, of Ukranian nationality, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

It is known in ciphering machines to arrange two rows of characters, preferably in an endless series, for instance on two concentric circular dials, in such a manner that one row of characters, for instance the one on the inner dial, can be brought into a predetermined position with respect to the other row, for instance the one on the outer dial, by means of hand actuated setting mechanism, before commencing the ciphering operation. After the initial setting, each character of the plain text has opposite it a single definite character of the code text for the entire duration of the ciphering, so that owing to the statistic rules concerning the frequency with which the characters are repeated in any given language, even an unauthorised person can decipher the code message with comparatively little trouble. Ciphering machines are also known having a number of gear trains, some of the wheels in which have gaps in their peripheries, so that the movement of the following gear wheel is periodically interrupted. Such gear trains are used by uncoupling entire groups of wheels and then setting one shaft to correspond to a key word and the other shaft to a portion of the text to be ciphred, all the uncoupled groups of wheels being then coupled up again and a main driving shaft rotated forward by a pre-arranged number of revolutions. When deciphering, the cycle of operations is reversed, the driving shaft being rotated in the opposite direction. Such mechanisms are complicated and, owing to the large number of groups of wheels em-

ployed, which are liable to become faulty in operation and which do not permit of the cause of a breakdown, being readily traced, are not altogether desirable.

The ciphering machine according to the present invention comprises the combination with two members, provided with rows of characters to be used in conjunction with one another, of only a single gapped-wheel gear train, the arrangement being such, however, that a character is transcribed each time the driven row of characters comes to a standstill. In order that the readings may be effected within equal intervals of time, care is taken that the peripheral length of each group of teeth on the gapped gear wheel together with the length of the subsequent or previous gap, or together with half of the previous and the subsequent gaps, constitutes an equal fraction of the periphery of the wheel.

The invention is illustrated by way of example in the accompanying drawings, which show two constructional forms of the improved ciphering machine.

Fig. 1 is a plan view of the first constructional form, showing a portion of the top cover removed.

Fig. 2 is a plan view of the machine with the dials removed.

Fig. 3 is a section along the line III—III of Fig. 2.

Fig. 4 shows a portion of the ciphering wheel to a larger scale.

Figs. 5 and 6 show the pointer in top plan view and in section.

Fig. 7 is a side elevation and Fig. 8 a top plan view of the second constructional form of the invention, and

Fig. 9 is a top plan view of the gearing.

Referring to Figs. 1 to 6, the letters and figures are provided on two concentric dials 1 and 2, of which the annular dial 2 surrounds the dial 1. The dial 2 rests upon supporting members 3 fitted

on the inside of the wall of the casing 4. The dial 1 is fixed to a hollow shaft 5 which is slipped over a bearing stud 6 in the casing. The shaft 5 carries a ratchet wheel 7 and a gear wheel 8 which meshes with the ciphering wheel proper 9 likewise keyed on a hollow shaft 10. An additional gear wheel 11 is fixed on the shaft 10, said gear wheel being in engagement with the gear wheel 11¹ of the driving mechanism. The shaft 10 is placed over a bearing stud 12 fixed on the bottom of the casing and is secured in position thereon by means of a nut 13.

For preventing accidental reverse movement of the displaceable series of characters when the gapped wheel runs out of engagement with its mating wheel 8, the ratchet wheel 7 co-operates with a pawl 14 which is acted on by a spring 15. A handle 16 serves for enabling the pawl 14 to be brought into the required space between two teeth in the ratchet wheel when placing the shaft 5 in position. A pointer 17 serves for setting the wheel 9. The pawl 14 with the spring 15 and handle 16 as well as the pointer 17 are mounted on a separate frame consisting of four bars 18 and angle members suitably placed thereon.

The ciphering wheel 9 as shown in Fig. 4 is provided with groups of teeth 18¹, the number of teeth in the various groups differing in an irregular manner and the groups being separated by gaps 19.

20 is the actuating rod of a brake of a kind such as is commonly used for the driving gears of talking machines, 21 being the driving mechanism consisting of a spring motor. Pins 36 are provided on the ciphering wheel 9 in the spaces 19 between the groups of teeth, against which pins bears the end of a spring pressed rod 37 which is actuated by means of a knob 38, 39 is a detent which can be interposed between the knob 38 and the wall of the casing whereby the end of the rod 37 can be held continuously out of engagement with the pins 36. If the spring motor 21 is wound up and the brake 20 taken off, the force of the springs of the driving motor is transmitted through the intermediary of the wheels 11¹, 11 and 9 to the rod 37, one of the pins 36 bearing with more or less pressure against the rod 37 (see Fig. 2) according to the number of springs employed in the driving motor. If the rod 37 is drawn out of the casing by means of the knob 38 then the device for stopping the driving motor is put out of action and the mechanism commences to operate. The speed of the driving mechanism can be retarded at will to any degree until the mechanism is brought to a complete standstill by screwing in or screwing out the rod 20, according to the construction of the braking lever, in order to simplify the work of inexperienced operators in deciphering or ciphering. This is more particularly for the case when the rod 37 by means of the locking member 39 is held continuously out of engagement with the pins 36. If this is not the case, then after each displacement of the dial 1 by the ciphering wheel 9 the driving mechanism is stopped, since the next pin 36 now bears against the rod 37. In the latter case the rod 37 must be pulled out from letter to letter.

22 is a pointer which can be moved over one of two concentric annular discs 23 and 24 provided on the top cover. Each of the rings 23 and 24 is not entirely closed in order to enable the pointer 22 to be transferred from the one ring to the other. The part 25 of the pointer 22 is provided with a groove 26, which as shown in Figure 6, engages with a dovetail guide 27, on one of the track shaped rings 23 and 24. The pointer itself is provided with an observation aperture 28 and a point 29.

Referring to Figs. 7 and 9, the two rows of letters are provided each on an endless band. During the operation of the machine the one band 30 is stationary while the other 31 is moved by the ciphering wheel. Motion is transmitted to the band 30 from the ciphering wheel 9 by a wheel 33 which is fixed on a shaft 32 on which are provided clutches 34 which can be brought into action by means of a handle 35 so as to operate either the band 30 or the band 31.

The improved machines operate as follows:

At the commencement of the ciphering or deciphering of a message the dials 1 and 2 or the bands 30 and 31 are moved into the prearranged positions relatively to one another and to the casing. The ciphering wheel 9 is then set by means of the knob 13 so that the first group of teeth agreed upon comes into action. For simplifying this setting the groups of teeth are identified by serial numbers as will be understood by referring to Fig. 2. The letter of the cipher text corresponding to the first character of the clear text or vice versa is now transcribed. For this purpose a beginner can move the pointer 22 so that the aperture 28 lies over the letter on the disc 2 corresponding to the first letter of the clear text and then read off the respective character of the cipher text against the point of the pointer or vice versa. After a little prac-

tice, however, it will no longer be necessary to employ the pointer, the corresponding letters and characters being capable of determination with the naked eye. The driving mechanism 21 is then put into operation and through the intermediary of the first group of teeth to come into action, for example the group having the number 7, rotates the ciphering dial 1. While the spring motor continues to run the ciphering dial 1 comes to a standstill and remains stationary until the gap behind the group of teeth 7 has passed beyond the position opposite the wheel 7. The beginner can arrest the ciphering wheel by means of the rod 37, or brake the spring motor by means of the brake 20 at the commencement of this pause until he has effected the transcription by aid of the pointer. In the case of an experienced user, however, the pause itself is quite sufficient to enable the transcription to be made without the aid of the pointer, so that the driving mechanism can remain continuously in operation and need only be arrested when the ciphering is interrupted, for instance by a telephone call.

It will be observed that both when ciphering and deciphering, the whole of the gearing runs forward. Reversal of the direction of rotation through the intermediary of a reversing gear and clutches is thus unnecessary. Changing over of the pointer when transferring from ciphering to deciphering is only necessary for the beginner. All these circumstances tend to simplify the whole apparatus considerably. The arresting device 20 is also used when deciphering in cases where a meaningless assembly of words results and consequently it must be assumed that when deciphering a mistake has taken place, for instance a letter has been missed out.

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. A ciphering machine having two series of characters to be used in conjunction, characterised by the feature that one of the two series is periodically displaced and brought to a standstill by means of one gapped, gear-wheel, in such

a manner that during the pause a single character is transcribed from clear text to cipher text or vice versa.

2. A ciphering machine as claimed in Claim 1, characterised by the feature that each group of teeth of the gapped wheel together with the subsequent gap or the previous gap, or together with the half of the previous and subsequent gaps, in the case of all the groups of teeth is an equal fraction of the circumference of the wheel.

3. A ciphering machine as claimed in Claim 1, characterised by the feature that each of the members, for instance in the form of dials or bands, bearing the characters and the gapped gear wheel is capable of adjustment before the commencement of the operation of the machine in order that a secret pre-arrangement can be made with regard to the use of the machine.

4. A ciphering machine as claimed in Claims 1 to 3, characterised by the feature that during ciphering and deciphering, the characters of the transcribed text are ascertained by means of a pointer which is capable of being moved over a concentric annular guide on the cover of the machine and is provided with an observation aperture and a point by means of which the respective characters are determined.

5. A ciphering machine as claimed in any of Claims 1 to 4, characterised by the feature that a pawl having a spring and handle is provided for preventing accidental reverse movement of the displaceable series of characters when the gapped wheel runs out of engagement.

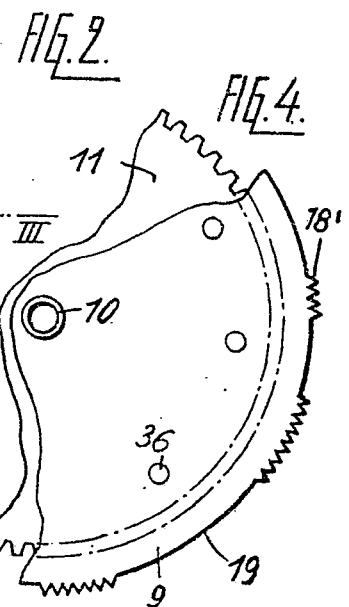
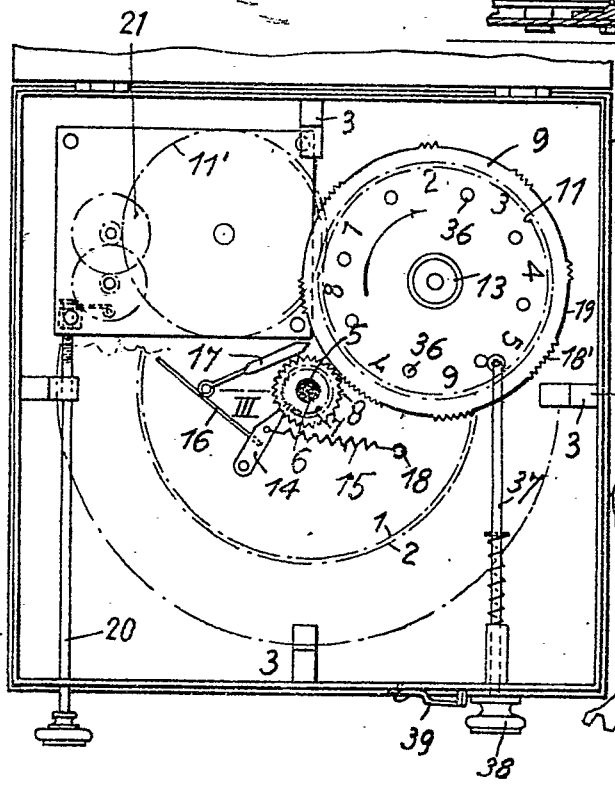
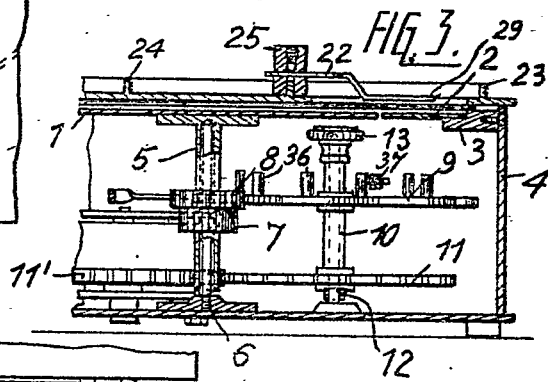
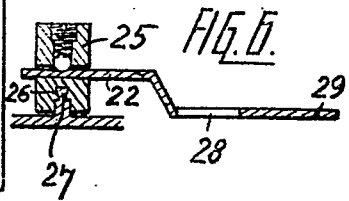
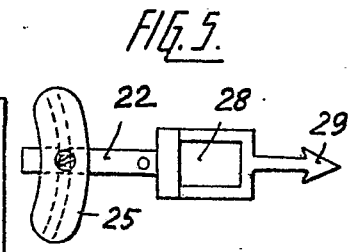
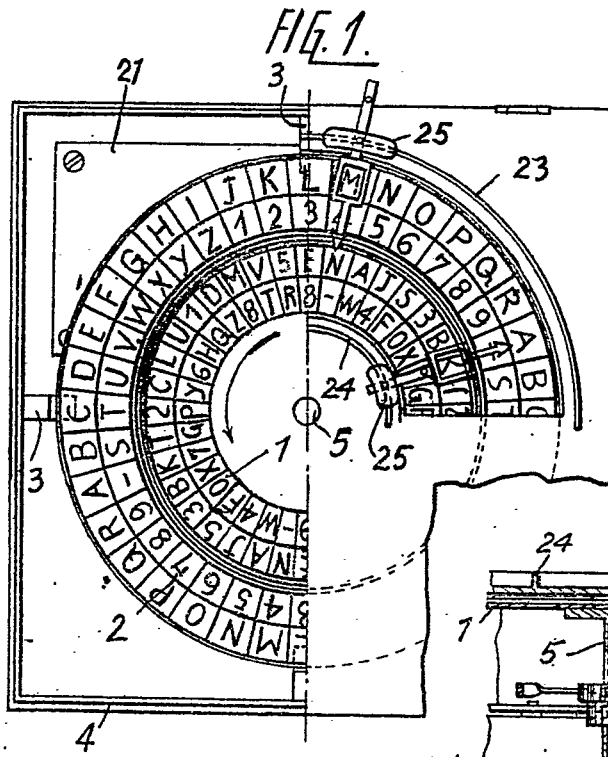
6. A ciphering machine as claimed in any of Claims 1 to 5, characterised by the feature that the gapped gear wheel is held in position by means of a nut, the removal of which enables the wheel to be moved out of engagement with the teeth of its mating wheel and set by aid of a pointer independently of the rest of the mechanism.

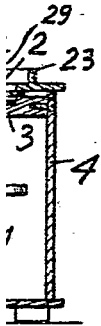
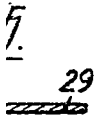
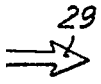
7. The improved ciphering machine, constructed and operating substantially as described with reference to the accompanying drawings.

Dated this 22nd day of January, 1925.

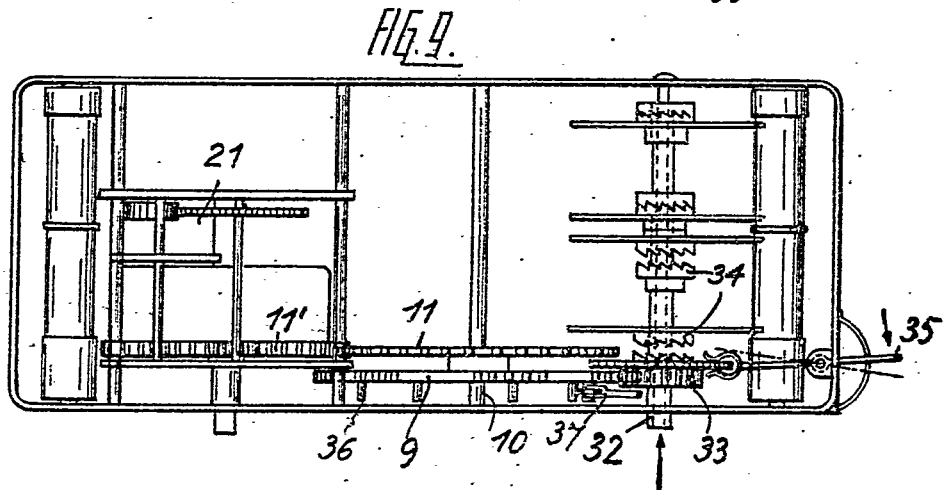
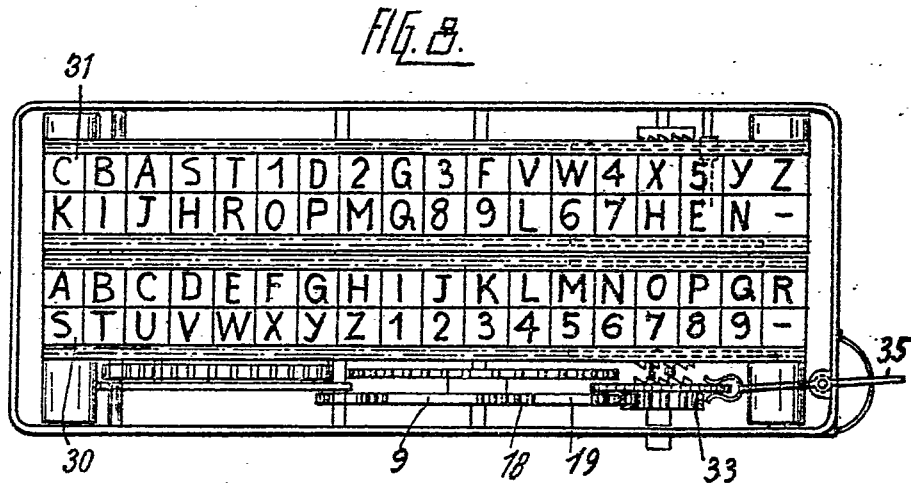
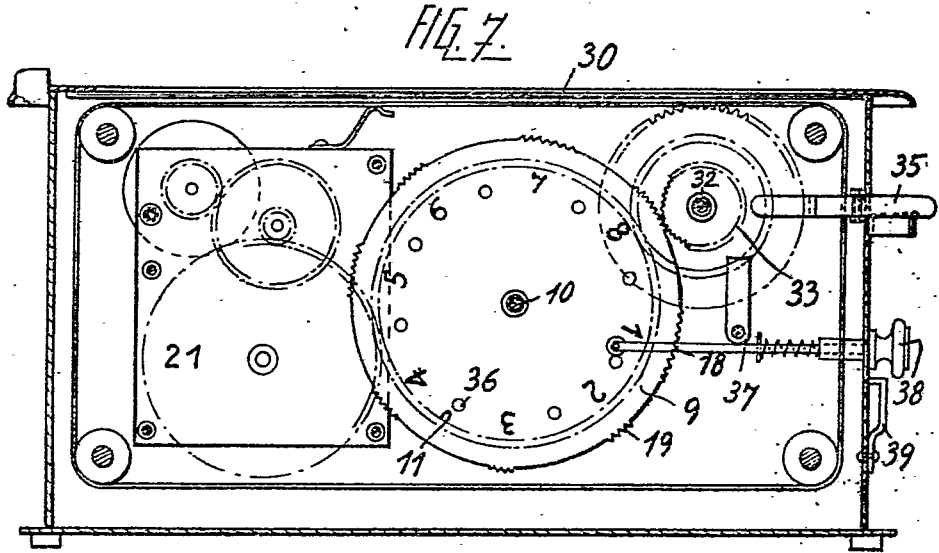
MARKS & CLERK.

[This Drawing is a reproduction of the Original on a reduced scale.]



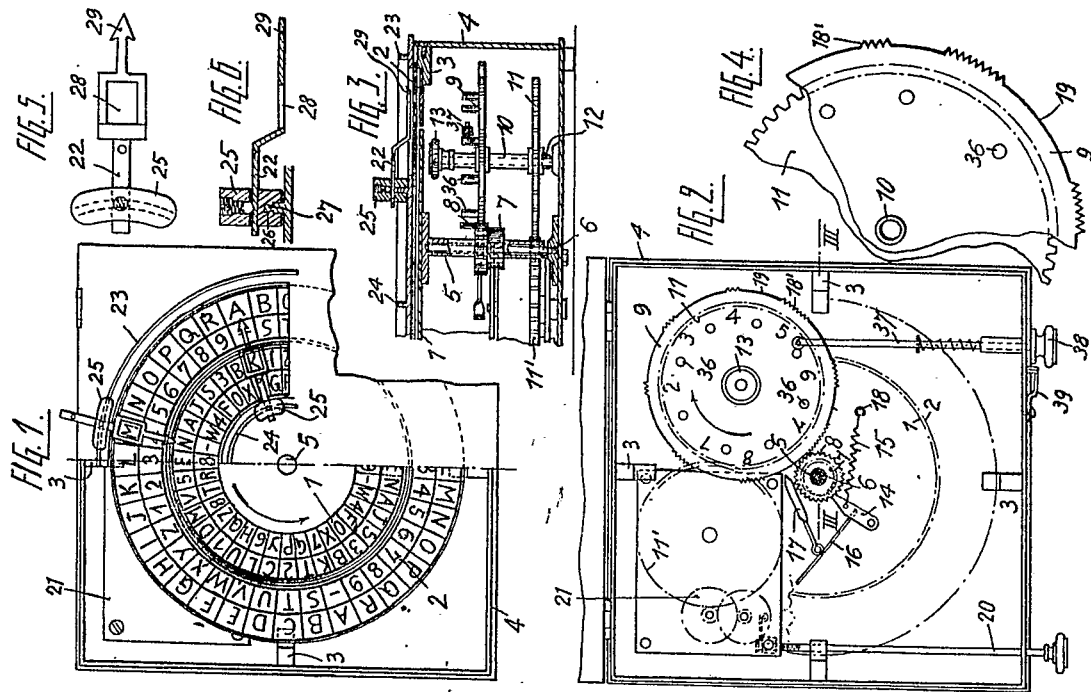


7.4.



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SHEET 1.



[This Drawing is a reproduction of the Original on a reduced scale.]

2 SHEETS
SHEET 2

