

PATENT SPECIFICATION

193,035



Convention Date (Germany): Feb. 11, 1922.

Application Date (in United Kingdom): Feb. 3, 1923. No. 3291/23.

Complete Accepted: July 3, 1924.

COMPLETE SPECIFICATION.

Ciphering Machine.

We, NAAMLOOZE VENNOOTSCHAP INGENIEURSBUREAU "SECURITAS", of No. 656, Prinzengracht, Amsterdam, Holland, a corporation duly organized under the Dutch law, 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:—

10 It has already been proposed for ciphering a clear text and for deciphering messages in cipher, to use machines which either type the ciphered letters in a similar manner to a typewriting machine or which produce a ciphered perforated cable tape or operate an indicating device. The operation of machines of this type is based for instance on the interchanging of the closed circuits between the keys marked with the letters of the alphabet and the type levers respectively, or the levers of a perforator for cable tapes each time after the sending of one or a determined number of letters.

The transmission of a message from the sender to the receiver when such machines are employed takes place in the following manner:—

30 The sender has a machine which corresponds exactly to and operates in exactly the same manner as the machine at the receiving end. Before commencing the ciphering operation the sender announces to the receiver the key word, that is to say indicates the particular setting of the transposing drums with which the ciphering is to commence. The receiver then sets his machine to this key word and receives in clear text on his machine the message transmitted to him in cipher in any suitable manner, for instance by cable.

45 A condition is however that the number of letters counted from the same starting position has remained the same. At

the sending of telegrams, especially with wireless telegraphy, one must however count with the omission of certain letters or groups of letters. The machine which is used in such a case for deciphering has thus the drawback that not only the letters which have been omitted but also all the succeeding text cannot be deciphered.

55 According to the invention this inconvenience is avoided or at least restricted as much as desired by providing on the ciphering machine a counting mechanism by means of which the finish of a group of letters of determined length is signalled every time to the operator of the machine so that he can mark the beginning of the new group of letters in the ciphered text. It is thus possible to compare and if necessary to correct the setting of the deciphering machine after every group of letters. The termination of the group of letters is preferably signalled by the sounding of a bell or by the lighting up of an incandescent lamp. It would be better still if, after the termination of a determined group of letters, the machine is stopped automatically entirely or partly, or thrown out of work so that it is impossible to continue the typing. The mechanism which serves for counting the letters may for instance be stopped. The beginning of the new group of letters may then be indicated for instance by repeatedly sending the same letter, for instance ten times. The counting mechanism which effects the interchange of length of the group of letters may continue to work, if this should be desirable for any reason, if the same letter is repeated each time for a determined number of times. It would be still better to revert the machine in such a manner that it types clear text, the mechanism which effects the interchange of letters

being stopped, wherefrom results the advantage that in the clear text an easy recognisable sign can be given and that after the sending of this sign the ciphering can be continued with the mechanism which during the sending of this sign has not been adjusted. Such a sign can consist for instance of a control figure, or even the number of letters which have been sent up to this moment.

At the commencement of the ciphering operation the ciphering machine must start operating with a definite setting (key word of the machine) and this setting of the ciphering machine must of course be communicated to the receiving station which is provided with an identical machine. This key word can also be changed at the end of the transmission of every group, say of one thousand characters, and this new key word can be communicated to the receiving station by means of interposed clear text at the end of a group.

Service regulations might further be inserted. Clear text might further be signalled by special signs, for instance by spaced type. This may also be done automatically by the machine. In producing typed ciphered texts by directly typing or indicating machines the indications of the number of letters after each group of letters of a determined length presents the same advantages as the deciphering is thus facilitated. Also in this case it is therefore important to draw the attention of the ciphering operator to the termination of a group of letters of determined length so that he can make by hand or with the aid of the machine the signs between the ciphered text. The ciphering machine could also comprise a device which, after a determined number of letters, produces automatically a sign by means of a greater spacing.

In order to make the invention clearly understood, we shall proceed to describe the same with reference to the accompanying drawing, which shows by way of example a ciphering machine according to this invention.

Each key of the key board 1 of the typewriting machine connects by means of a contact operated at the depression of the key the lead 2 with a lead belonging to this key. The several leads corresponding with the keys are insulated from one another and united to form a cable 3 which is in contact with a drum 4. Upon the end faces of this drum as many contacts are arranged in a circle as the typewriting machine has keys and the several leads of the cable 3 are connected with these contacts in such a manner that every two opposite contacts are connected with the same lead. The drum 4 is mounted on a shaft 5 so that it may be displaced in longitudinal direction but cannot revolve with said shaft. Upon the same shaft four revoluble drums 6, 7, 8 and 9 are arranged which carry on both end faces the same number of contacts as drum 4. In these drums 6—9 the opposite contacts are however not connected with one another but the contacts of the opposite groups of contacts are interconnected indiscriminately so that only one of the contacts of the one side is connected with one of the contacts of the other side. Upon the ends of shaft 5 two drums 10 and 11 are keyed which have contact pins only on the end face which is turned towards the other drums. These contact pins of each drum 10 and 11 are connected by cables 13 and 14 respectively, with a drive for a type lever of a perforator 12. The type levers of the telegraphic perforator may for instance be operated each by one electric magnet. The other terminals of the several drives for the telegraphic perforator are connected with the minus pole of a source of current. The drums 6—9 are coupled with the driving wheel 15 by toothed wheel gear having various transmission ratios. For clearness sake only the couplings for the drums 6 and 8 are shown on the drawing. The toothed wheels 16 and 21 on the one hand and 17 and 22 on the other hand are keyed on shafts 19 and 20. The toothed wheels 16 and 17 are in gear with the spur wheel 18 rigidly connected with the driving wheel 15, the toothed wheels 21 and 22 being in gear with toothed crowns of the drums 6 and 8 respectively. The driving wheel 15 has teeth 23 at its circumference with which the blade spring 24 of a resiliently mounted armature 25 engages. Opposite the armature an electric magnet 26 is arranged the exciter coils of which are connected by one of its terminals with the lead 2. The drum 4 is pressed by springs 28, through the intermediary of lever 27 against the drum 6 but it may be brought in contact with the stationary drum 10 against the action of spring 28 by the depression of the lever 27. The drives for the type levers of the telegraphic perforator are connected with the contact pins of drum 10 in such a manner that, at the contact between the pins of the drums 4 and 10, the same letter of the telegraphic perforator is operated by the same letter of the key board 1. On lever 27 an insulated electric current conducting plate 29 of sheet metal, connected with the plus

pole of the source of current, is fixed. This piece of sheet metal 29 has at its front end two contact plates 30 and 31 opposite which two spring controlled contacts 32 and 33 are arranged. The contact 32 is connected with the lead 2 and the contact 33 is connected with the terminal of the electro magnet 26. The contact 33 is supported by a lever 35 which is pivotally mounted on a stud 34 so that it oscillates only with difficulty and remains in any position to which it is brought. On this lever 35 a blade spring 36 is fixed so that it is not in contact with the armature 25 if the lever 35 is in the position of rest shown on the drawing. Opposite spring 36 the armature 25 has a groove 37 and behind this groove a nose 38. 39 is a counting mechanism of commonly used construction the electricity conducting figure disks of which are connected across the axle and the casing of the counting mechanism with the lead between the contact 33 and the magnet 26. Upon the circumference of the figure disks the contacts 40—44 slide, said contacts being adapted to be singly connected with the plus pole of the source of current by means of the switches 45—49. The figure disks with sliding contacts have on their circumferences plates of insulating material (those visible on the drawings are designated 50, 51, 52) which are of such size and which are arranged in such a manner that they interrupt the conducting connection between the sliding contacts 40—44 and the figure disks only if said figure disks are in the zero position. The feeding of the counter is effected by the driving wheel 15 so that at each part-rotation of wheel 15 the unit disk of the counter is advanced for one figure.

The ciphering machine works as follows:—

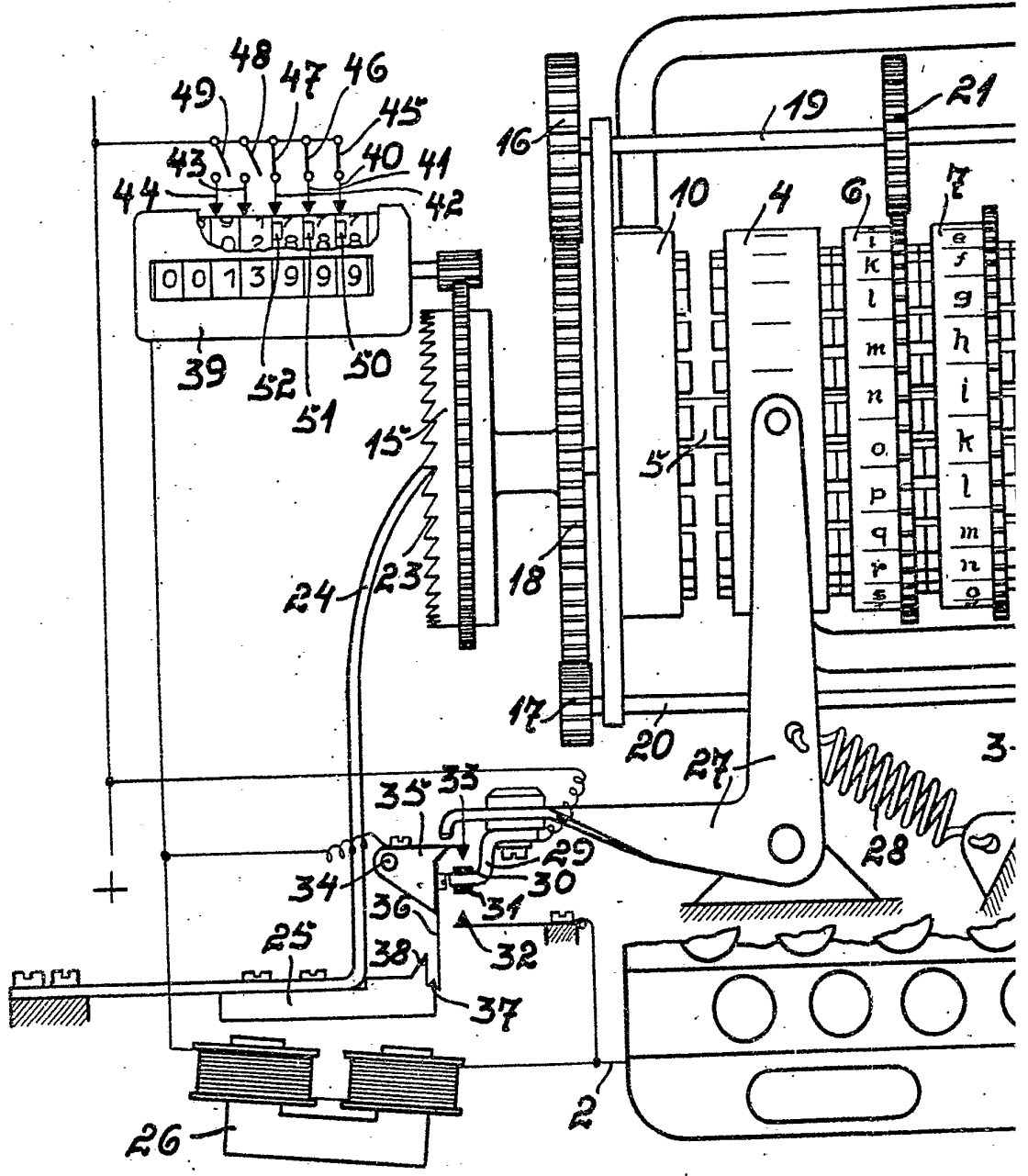
By the depression of a key of key board 1 one of the electro magnets of the perforator 12 is excited which is determined by the position of the drums 6, 7, 8 and 9 so that the corresponding letter is perforated. At the same time the magnet 26 situated in the circuit 2 common to all letters is excited and the armature 25 is attracted. When the key is being released the circuit is interrupted and the armature is released by the magnet, so that it returns to its initial position and makes the driving wheel 15 rotate for one tooth. With the driving wheel 15 the spur wheel 18 rotates and makes the rotatable drums 6—9 rotate through different angles owing to the toothed wheel transmissions of different ratios. All the connections of the key board 1 with the telegraphic perforator 12 are thus changed, so that, at the next depres-

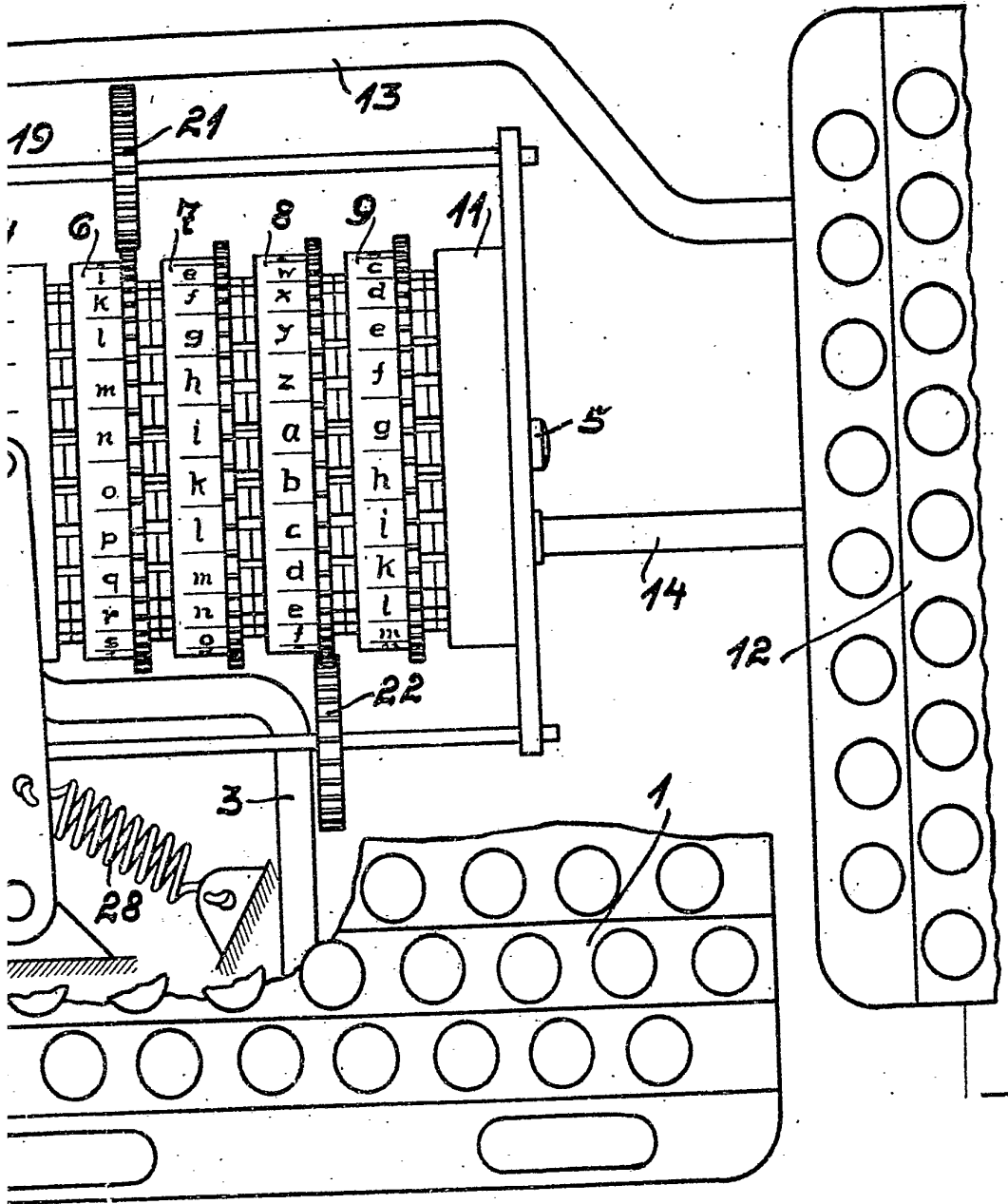
sion of the same key of key board 1, another letter as before would be perforated by the perforator.

The device which, according to the invention indicates the termination of a group of letters, in the present case by stopping the machine, is controlled from the counting mechanism 39. In the form of construction shown by way of example the machine is stopped always after the indicating of one thousand letters. With this object in view the sliding contacts 40, 41 and 42 are connected across the switches 45, 46, 47 with the network so that the current may flow from the plus pole of the net work over the figure disks for the units, tens and hundreds. Only if all three disks are at the zero position the current is interrupted through the insulating plates 50, 51 and 52 and the machine is stopped. By corresponding insertion of the switches 45—49 the length of the group of ciphered letters can be altered as desired and this length can be adapted to the changing secrecy of an unmutilated transmission of the ciphered text. In the drawings the counting mechanism shows the number 13,999. If a key of the key board 1 is now depressed, so that the 14,000th letter is ciphered, all number disks which have previously indicated "9" will indicate "0" as soon as the armature 25 returns to its position of rest. The plus pole of the source of current is thus cut off from the machine whereby further typing is prevented. If then the lever 27 is depressed the contacts 31 and 32 can be brought in contact whereby the plus pole of the source of current is directly connected with the lead 2 the switching magnet 26 and the counting mechanism 39 being out of circuit. At the same time the drum 4 is pressed against the stationary drum 10 so that clear text can be typed with the machine as long as lever 27 remains depressed. The feed mechanism for the ciphering, the driving wheel 15 and the counting mechanism 39 remain out of work during this time. If ciphering has to be typed again it is merely necessary to release the lever 27 so that it is returned into the initial position by the action of spring 28. At the depression of lever 27 lever 35 with contact 33 has been lowered at the same time. The blade spring 36 is thus brought in contact with the end face of the armature 25 along which it slides downward. As soon as lever 27 is returning to its initial position the connection between the contacts 31 and 32 is interrupted and a connection between the contacts 30 and 33 is produced so that now only the counting mechanism 39 is switched out of the circuit 2 common to

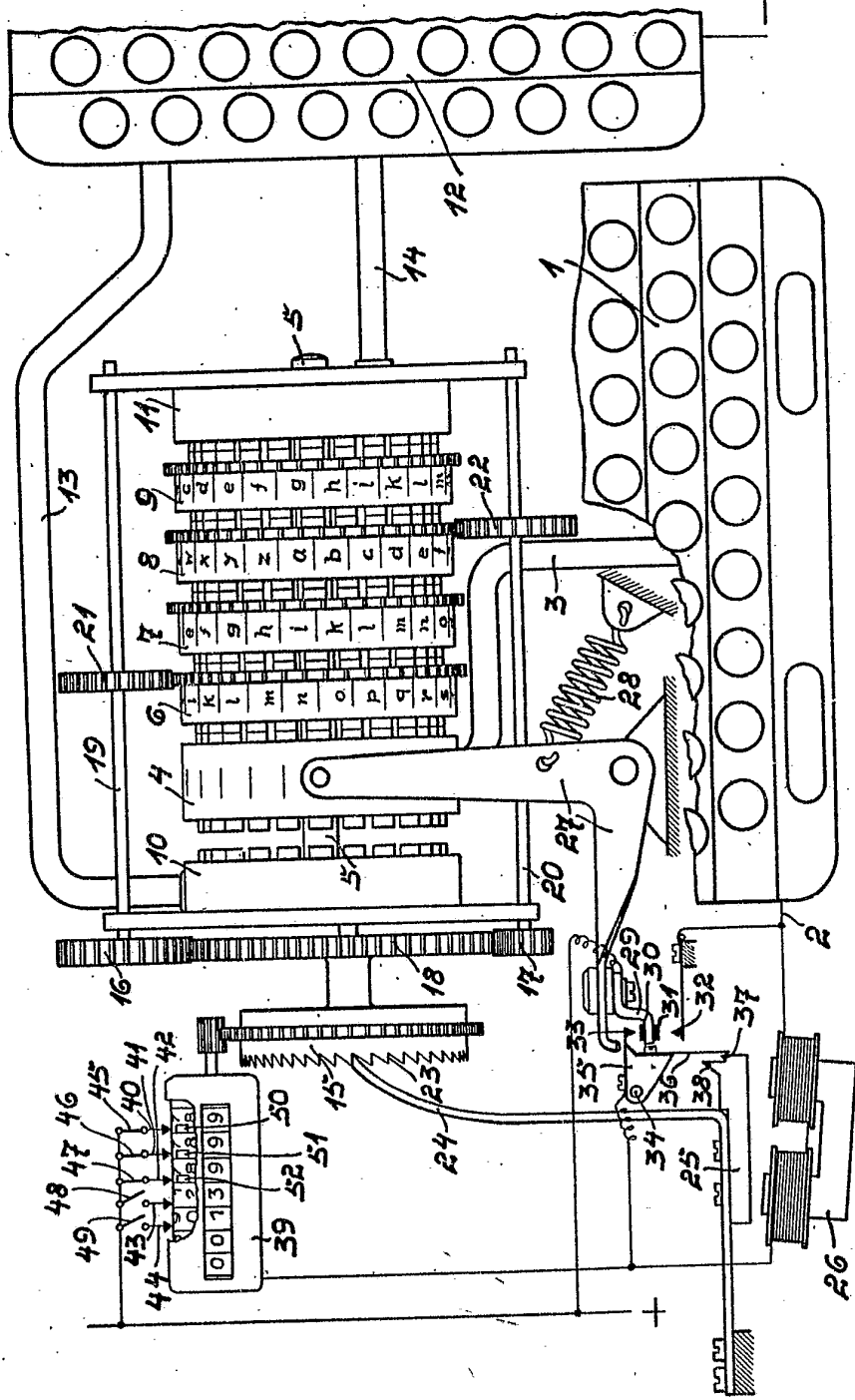
- all keys. If now a key of the key board 1 is depressed and the first letter of the new group of ciphered letters is thus being typed the feeding mechanism executes a feeding movement so that the counter registers again the letter which has been transmitted, the counter indicating the number 14,001. The connection over contact 40 and the unit disk is thus re-established. At the same time the connection of the contacts 30 and 33 is interrupted in the following manner. When the armature approaches the magnet 26 the front face of the armature releases the blade spring 36 so that this blade spring can come in contact with nose 38. At the return of the armature 25 to the position of rest the blade spring 36 engages with groove 37 in which it moves upward through the intermediary of the armature. The lever 35 returns thus to the initial position. At the next descent of the armature the blade spring 36 which is still in engagement with groove 37 is released and adopts again the position of rest shown on the drawing.
- The lever 27 is primarily provided for the purpose of setting the machine in operation again after it has been stopped owing to the completion of a group of characters to which it has been set. It also serves however to enable clear text to be interposed at any point of the ciphered message. When this lever is moved into the "clear text" position, the magnet 26 which actuates the drums 6 to 9 and at the same time works the counting mechanism, is placed completely out of circuit because in this position of the lever 27 no current flows through the magnet and consequently through the counting mechanism. The current on the contrary, takes the direct path through the member 29 and the contacts 31, 32, since the resistance in this circuit is considerably less than that of the windings of the magnet 26. Consequently no current flows in the circuit of the magnet 26 which will thus not actuate the drums 6 to 9 and the counting mechanism.
- Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—
1. Ciphering machine having members which are moved at every ciphering operation, characterised by a counting mechanism which modifies the operation of the machine after a predetermined number of individual characters have been ciphered and thereby enables the beginning and end of a group of cipher characters to be recognised. 65
 2. Ciphering machine as claimed in Claim 1 characterised by a counting mechanism from which a device is controlled which signals the termination of the group of characters. 70
 3. Ciphering machine as claimed in Claims 1 and 2 in which a counting mechanism of a known kind having figure disks subdivided according to the decimal system serves as a counting device, characterised in that the working current is conducted at least for one part of the driving gear of the machine by sliding contacts over the several figure disks and is interrupted at determined positions of the counting mechanism by insulating parts arranged on the disks. 75
 4. Ciphering machine as claimed in Claim 3 characterised in that the sliding contacts are connected in parallel and adapted to be switched out singly with the object of selecting at will the length of the group of letters ciphered. 80
 5. Ciphering machine as claimed in Claims 1 to 4 characterised in that by the counting mechanism the switch gear of the ciphering mechanism including the counting mechanism itself is put out of operation. 85
 6. Ciphering machine as claimed in Claims 1 to 5 characterised by a device by which the machine can be reverted to clear text. 90
 7. Ciphering machine as claimed in Claims 1 to 6 characterised in that at the return of the reverting device for clear text into the initial position the machine is automatically made ready for work. 95
 8. Ciphering machine as claimed in Claims 1 to 7, characterised in that the device which serves for putting the ciphering mechanism into operation again at the termination of a definite group of cipher characters, is adapted to be used also for interrupting the ciphering operation at any desired point of the cipher message and causing clear text to be interposed. 100
 9. Ciphering machine as claimed in Claims 1 to 8, characterised in that the machine automatically inserts in the ciphered text, at the end of a predetermined group of characters, previously agreed signs for the purpose of enabling the groups to be identified, for instance special spacings between predetermined groups of cipher characters. 105
- Dated this 3rd day of February, 1923. 110
- MARKS & CLERK. 125

[This Drawing is a full-size reproduction of the Original.]





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