Aug. 10, 1937. B. C. W. HAGELIN 2,089,603

CIPHERING MACHINE

Filed Aug. 23, 1935 2 Sheets-Sheet 1

FIG. 1.

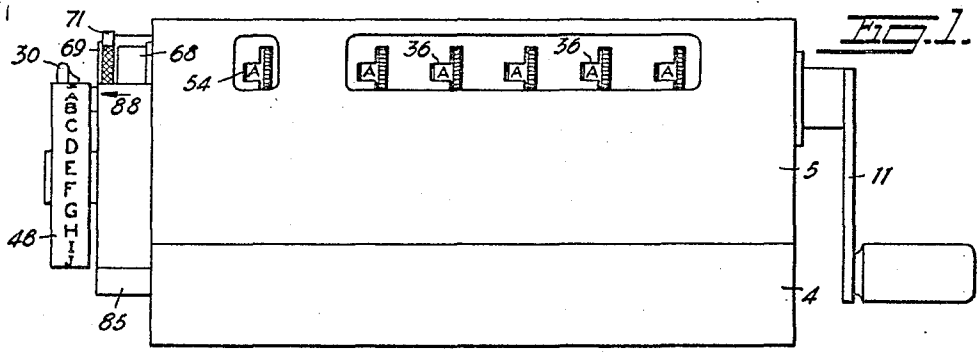

FIG. 2.

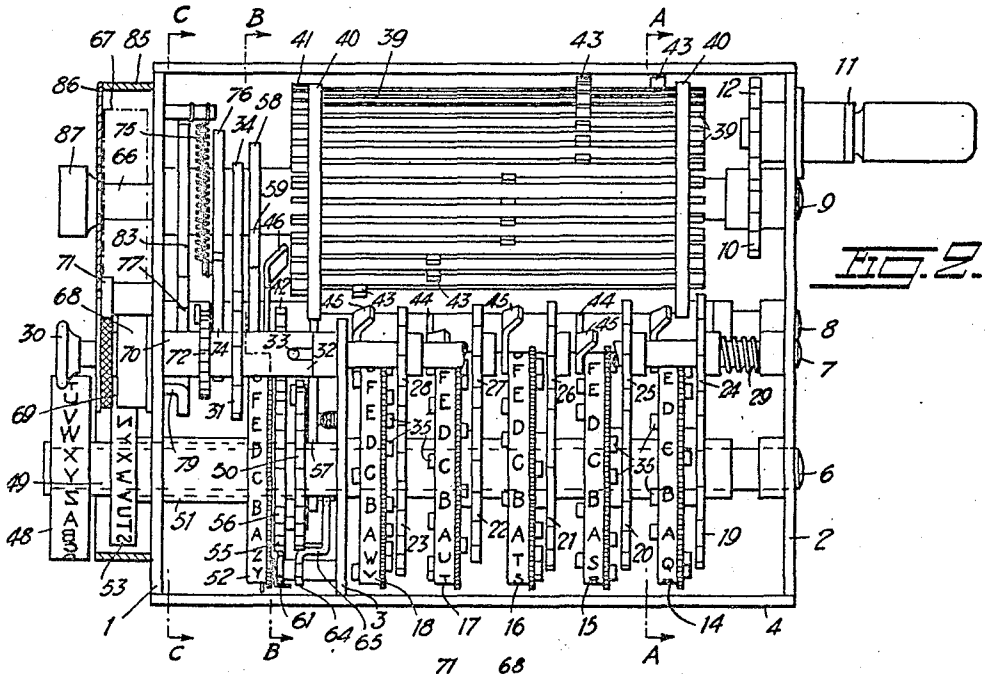

FIG. 3.

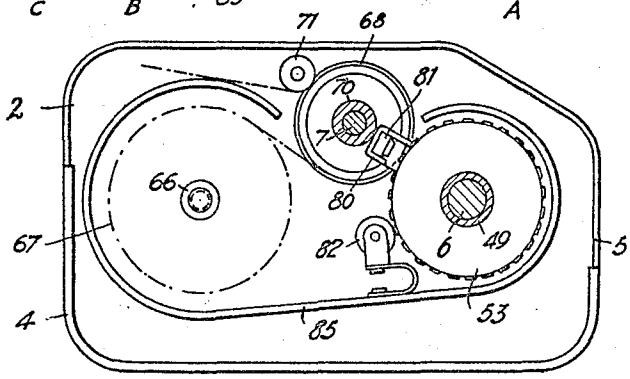

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FIG. 4.

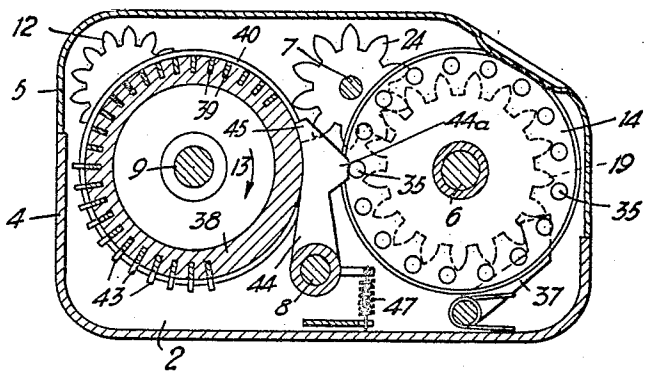


FIG. 5.

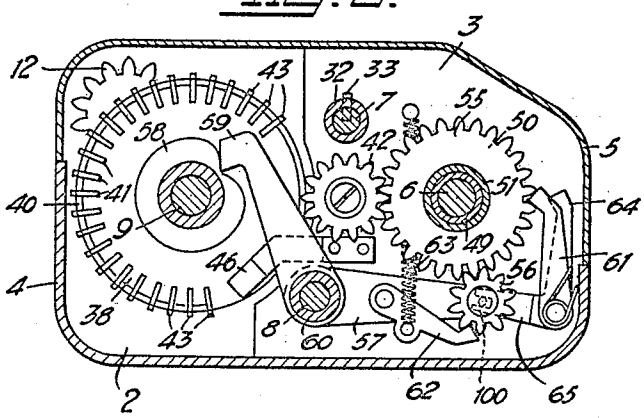
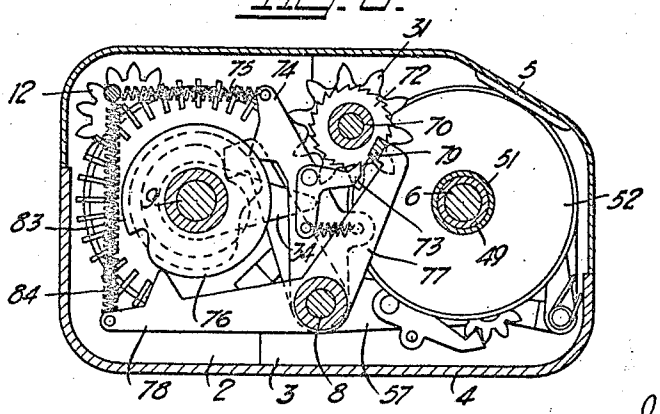


FIG. 6.



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UNITED STATES PATENT OFFICE

2,089,603

CIPHERING MACHINE

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Application August 23, 1935, Serial No. 37,594
In Sweden February 21, 1935

10 Claims. (Cl. 35—3)

In ciphering machines mechanical means are usually employed in order, after each indication or marking of a primary sign, that is, a clear text sign, when ciphering, and a cipher-sign, when deciphering, to change the position, or effect the displacement, of the element or elements which serve to reproduce, or control the reproduction of the secondary signs, that is, the cipher-signs, when ciphering, and the signs of the original text, when deciphering. The reproduction of the secondary signs may be effected by any of the methods as hitherto used in connection with ciphering machines, that is to say, by direct reading, by printing, by the reading from signal lamps or by printing on a typewriter, The devices as hitherto used for effecting the displacement have only allowed certain predetermined adjustments and, as a result, they have not been able to afford the large range of variations which is necessary to safeguard, at least practically, the cipher against unauthorized reading.

The present invention has for its primary object to provide a displacing device which permits the production of ciphers which will be practically impossible to force. Another object of the invention is to provide a ciphering machine having such a displacing device, which is of a comparatively simple structure, easy to handle and so compact that it may be carried in a pocket.

The invention is characterized, chiefly, by the fact that the displacing device comprises a plurality of operative elements so arranged that they may be brought into and out of operative position, in order to permit any desired variation of the number of elements in operation at a time and, thus, also of the number of displacing steps.

A ciphering machine embodying this invention is illustrated in the annexed drawings. Fig. 1 is a front view of the machine, and Fig. 2 is a plan view with the cover of the machine casing removed and with certain parts broken away, or shown in section. Fig. 3 is an end view, partly in section, and Figs. 4 to 6 show cross sections on the lines A—A, B—B and C—C, respectively, of Fig. 2.

Most of the parts of the ciphering machine are enclosed in a boxlike casing, at the same time forming the frame of the machine. Said casing comprises a bottom piece 4, which also constitutes part of the lateral walls of the casing, two end walls 1 and 2, rigidly secured to the bottom piece, and a removable cover 5, which may, if desired, be hinged to the bottom piece. Also belonging to the frame parts is a partition 3 secured to the bottom piece which is parallel to the end walls.

Extending between the end walls are a plurality of shafts 6, 7, 8 and 9 of which the shafts 6 and 8 are rigidly attached to the end walls, while shaft 9 is rotatably and shaft 7 both rotatably and slidably mounted therein. Secured to the shaft 9 is a toothed wheel 10 meshing with a toothed wheel 12 on the shaft of a crank 11, whereby the shaft 9 can be rotated in the direction of the arrow 13 (Fig. 4) when the crank is rotated in a clockwise direction.

Mounted on the shaft 6 so as to rotate thereon independently of each other, are a plurality of wheels 14 to 18, hereinafter referred to as "key-wheels". Each of these key-wheels is rigidly attached to a toothed wheel 19 to 23, respectively, and each of these toothed wheels is in mesh with a separate one of a set of pinions 24 to 28 carried by the shaft 7. By pushing the shaft 7 to the right in Fig. 2, against the action of the spiral spring 29, which tends to keep the shaft in the position shown in the figure, the toothed wheels 24—28 can be brought out of mesh with the toothed wheels 19—23 in order to permit a rearrangement of the key-wheels with respect to each other. To this end the shaft 7 carries a knob 30 at its end projecting through one end wall 1 of the casing. The shaft 7 also carries a toothed wheel 31 having a bush 32 formed with an axially extending slot engaged by a pin 33 secured to the shaft 7 (Figs. 2 and 5). The toothed wheel 31 is, therefore, caused to rotate with the shaft 7 but does not follow the shaft when displaced axially. Secured to the shaft 9 is an arm 34 by which the toothed wheel 31 is moved one step for each revolution of shaft 9. By this movement the pinions 24—28 carried by the shaft 7 are also moved one step, inasmuch as each of them has the same number of teeth, for instance, ten, as the toothed wheel 31 has.

The toothed wheels 19—23 rigidly connected to the key-wheels have each a different number of teeth. The numbers of the various wheels are chosen so that they, as far as possible, are prime factors, or at any rate have no common denominator. In the present example, the wheels 19—23 have seventeen, nineteen, twenty-one, twenty-three, and twenty-five teeth, respectively. By this feature, the key-wheels will return to their common starting position only after a very long period of step-by-step movement through the action of the toothed wheels 24—28, corresponding to the product of the numbers of teeth of all of said toothed wheels.

The key-wheels are formed with a set of equally spaced axially extending holes adjacent the

periphery of the key-wheels, said holes being equal in number to the teeth of the respective toothed wheels 19—23. Inserted in said holes are cylindrical pins 35 the length of which is slightly larger than the width of the key-wheels. Said pins may slide in the holes so as to protrude on the one side or the other of the key-wheels, spring operated locking means, not shown, being provided to maintain the pins in their end positions. The key-wheels carry on their peripheral portion a row of signs, which in the case illustrated are taken from the letters of the alphabet. Said signs are visible through apertures 36 formed in the cover 5 and serve to indicate the position of the respective key-wheels. In order to facilitate the displacement of the key-wheels by hand, the key-wheels are provided with a milled flange which can be operated through the aperture 36. By means of pawls engaging the toothed wheels 19—23, one of which is shown at 37 in Fig. 4, the toothed wheels are maintained in proper position for restoring their engagement with the toothed wheels 24—28 when the shaft 7 is allowed to return to its normal position, after having been decoupled.

The shaft 9 carries a cylindrical drum rigidly secured to the shaft which extends along the key-wheels. Said drum comprises two discs 38, keyed to the shaft, and a number of bars 39 which engage radial grooves in said discs, in which they can slide longitudinally. Said bars are maintained in their engagement with said grooves by means of rings 40 provided at the ends of the drum. Said bars, the number of which in the example shown is twenty-five, may be pushed from their normal position, as shown in Fig. 2, thus far to the left that, when the drum is rotated in the direction of the arrow 13, their left hand ends 41, which represent a row of teeth, will be brought into engagement with the teeth of a toothed wheel 42 mounted on a journal attached to the partition 3. The bars 39 are held in their end positions by means of spring operated locking members, not shown, or by frictional engagement. Each of said bars carries between the rings 40 an abutment 43 projecting slightly beyond the periphery of the drum. These abutments are arranged in groups approximately in register with the various key-wheels. Thus, for instance, the abutment of one bar is in register with the key-wheel 18, the abutments of two bars are in register with the key-wheel 17, the abutments of four bars are in register with the key-wheel 16, the abutments of eight bars are in register with the key-wheel 15, and those of ten bars are in register with the key-wheels 14. The number of bars belonging to the individual groups is so chosen as to allow any desired number of bars, that is, in the example shown, from one to twenty-five, to be displaced to the left under the influence of one or more groups of abutments.

The displacement to the left of the bars 39, individually or in groups, is effected by means of guide arms 44 disposed beside the key-wheels, said guide arms being mounted to swing about shaft 8. The guide arms are each formed with a projection 44*a*, Fig. 4, by means of which they may be acted on by those pins 35 which protrude on the same side of the key-wheels, where the guide arms are positioned, so as to be caused to swing towards the periphery of the drum 38, as shown in Fig. 4, and, as far as the guide levers provided beside the key wheels 14, 16 and 18 are concerned, as also shown in Fig. 2. The upper ends of the guide arms are bent to form oblique sliding surfaces 45 which in the above mentioned swung-out position of the guide arms are engaged by the abutments 43 of the bars 39 when the drum 38 is rotated, thereby displacing the abutments and thus also the bars 39 to the left in Fig. 2, bringing their ends, which serve as teeth, into proper position for engagement with the toothed wheel 42. In order to restore the bars 39 there is provided, just outside the respective (left) end of the drum, a guide bar 46 secured to the partition 3, the free end of which is bent towards the drum in an oblique direction with respect thereto. After the bars 39 have been in engagement with the toothed wheel 42, they are brought, upon the continued rotation of the drum, into engagement with said bent end of the bar 46 to be thereby restored to their initial or starting position shown in Fig. 2. When the guide arms 44 are not held in their swung-out position by the action of a pin 35 of the respective key-wheel, they are retracted from the drum under the action of springs, one of which is shown at 47 in Fig. 4, to the position shown in Fig. 2 in respect of the guide arms situated beside the key-wheels 15 and 17. By this retraction the guide surfaces 45 of the levers are moved to a position outside the path of the respective abutments 43, so that upon the rotation of the drum the corresponding bars 39 will not be displaced and their ends serving as teeth will not be able to engage the toothed wheel 42.

On the left hand side, Figs. 1 and 2, of the ciphering machine there is a freely accessible indicating device in the form of a circular disc 48. This disc carries on its peripheral portion a set of primary signs, which in the example illustrated include the twenty-six letters of the alphabet internationally used, ranged in their regular alphabetic order. The indicating disc 48 is secured to one end of a tubular shaft 49 rotatably mounted on the shaft 6. Attached to the other end of said tubular shaft 49 is a toothed wheel 50, the number of teeth of which is equal to the number of signs of the indicating disc, that is, in the example shown, twenty-six. Surrounding the tubular shaft 49 is another tubular shaft 51 loosely mounted on the shaft 49, on which the reproducing elements of the machine are mounted. Said elements comprise, in part, a reproducing or reading disc 52 and, in part, a type wheel 53. The peripheral portion of the reproducing or reading disc 52 carries a set of secondary signs which in the example shown consist of the same letters as those appearing on the indicating disc 48, though arranged in the reversed order. Said secondary signs are for the sake of reading them visible through an aperture 54 formed in the cover 5. The type wheel 53, which serves to reproduce the signs by printing them in a manner to be hereinafter described, is provided with the same set of signs as those appearing on the reproducing or reading disc 52, though the type letters are, of course, elevated and formed as reflected images of the respective letters and, in addition, displaced in the direction of rotation a certain angle suited to the place where the printing is to take place, so that the same sign will be printed as that simultaneously visible through the aperture 54. Close by the toothed wheel 50 carried by the tubular shaft 49, an exactly similar toothed wheel 55 is secured to the tubular shaft 51, said wheel 55 being in constant mesh with the above mentioned toothed wheel 42 that can be operated by

the bars 39. The said two toothed wheels 50 and 55 and thus also the indicating and reproducing elements carried by the respective shafts 49 and 51 may be coupled together in order to be rotated in common by means of a pinion 56, Fig. 5, the width of which is sufficient to permit the pinion to simultaneously mesh with both of said first-mentioned toothed wheels. In order to enable the release of all of the above said parts from each other, the pinion 56 may be caused to swing out of engagement with the toothed wheels 50 and 55. To this end the pinion 56 is carried by the outer end of a lever 57 mounted to oscillate about the shaft 8, the oscillation of said lever being controlled by a cam 58 on the shaft 9 through the intermedium of a lever 59 the free end of which engages the cam, said lever 59 being attached to the common bush 60 of the two levers 57 and 59. When released, the toothed wheels are maintained in their proper adjusted position under the influence of individual pawls. Thus, for instance, the toothed wheel 55 is held in position by a pawl 61 acted on by a weak spring, said pawl, however, allows a continued feeding of the wheel any desired number of steps. The toothed wheel 56 is held in position by a pawl 62 carried by the lever 57, acted on by a spring 63 which at the same time tends to restore the lever 57 back again to the position shown in Fig. 5, thereby keeping the lever 59 pressed against the cam 58. The toothed wheel 50, when released, is held in its temporary position by a pawl 64. This is due to the fact that said last-mentioned pawl is formed with an angularly bent arm 65, the fork-shaped end of which is engaged by a pin 100 projecting from the back of the lever 57, as shown in Fig. 5, which acts during the outward swinging motion of the lever 57 to carry the angular arm with it, thereby bringing the pawl 64 into a positive engagement with the teeth of the toothed wheel 50.

The mechanism for printing the secondary signs is constructed as follows: On the left hand side wall 1 of the machine, Figs. 1 and 2, there is attached a pin 66 situated on a line with the shaft 9, said pin being adapted to carry a paper roll, indicated by dotted lines at 67 in Fig. 2, consisting of a narrow paper strip. From said roll the paper strip is led from beneath round a guide cylinder 68, as shown in Fig. 3, rigidly attached to the wall 1 which is concentric with respect to the shaft 7. The periphery of said guide cylinder extends almost to the type wheel 53 situated beside said cylinder. The width of the guide cylinder is less than that of the paper strip to allow a feed roller 69 situated beside the guide cylinder to also engage the paper strip. Said feed roller presents the same diameter as the guide cylinder, and is mounted on the shaft 7 by means of a bush 70. A smaller roller 71 is provided to press the paper strip against the feed roller, the periphery of said smaller roller being preferably milled. The portion of said bush 70 situated inside the machine carries a ratchet wheel 72 engaged by a spring operated pawl 73, Fig. 6. This pawl is mounted on a lever 74 which is pivoted on the shaft 8 and the end of which is formed as a tooth pressed against a cam 76 on the shaft 9 under the action of a spring 75. The rotation of the shaft 9 imparts an oscillating movement to the lever 74 on account of the shape of the cam. The pawl 73 which takes part in this movement will feed the ratchet wheel 72 one tooth for each revolution of the shaft 9. The motion of the ratchet wheel is transmitted to the feed roller 69 which in turn feeds the paper strip a distance corresponding to the proper distance between two type letters.

For the printing of the letters of the type wheel upon the paper strip, there is provided a bell crank lever 77, 78, pivoted on the shaft 8 immediately inside the respective end wall 1, the two arms 77, 78 of said lever forming approximately a right angle to each other, as shown in Fig. 6.

The free end of arm 77 is offset, as shown at 79, and protrudes through an opening 80 in the end wall 1 into the guide cylinder 68, the peripheral portion of which is broken away right opposite said aperture. The aperture 80 and the broken away part of the guide cylinder are situated at the place where the paper strip passes at the shortest distance from the elevated letters of the periphery of the type wheel. The paper strip is here exposed to a beat of the hammer-like end portion 81 of the offset end 79 of the lever arm 77, and owing to this beat the strip will be pressed against that letter type of the type wheel which for the moment is in position for printing. This type has been inked from the ink roller 82 in the preceding rotation of the type wheel so as to make a print of the letter upon the paper strip when pressed thereagainst. The beat of the hammer 81 is controlled by a cam 83 on the shaft 9, Fig. 6, said cam being formed with a recess into which the free end of the arm 78 will enter, as the shaft 9 rotates, under the influence of a spiral spring 84 acting on the free end of the arm 78. The type wheel and the paper roll are protected by a surrounding metal border 85 secured to the end wall 1, and outside the end of the paper roll there is a protecting plate 86 carried by the screw-threaded end of the journal 66 and held in place by a nut 87.

The operation of the ciphering machine above described is as follows: The machine is first adjusted, in order to bring it into correspondence with other machines of the same type, so as to function on a certain determined system. To this end certain predetermined pins 35 of each of the key-wheels 14—18 are pushed into working position, that is to say, to the left in Fig. 2. Then the key-wheels 14—18 are released by pressing the knob 30, inasmuch as this pressing action will bring the toothed wheels or pinions 24—28 out of mesh with the toothed wheels 19—23, belonging to the key-wheels. The key-wheels are then rotated by hand, so that certain predetermined signs will be visible through the apertures 36 of the cover 5. The indicating disc 48 is now turned until a letter, agreed on, comes to a position in register with the arrow 88, appearing on the protecting border 85, as shown in Fig. 1, to serve as an index, and at last also the reproducing or reading disc 52 is turned until a certain letter is visible through the aperture 54. In order to permit the said last-mentioned adjustment, the crank 11 is turned a little in either direction, so that the coupling between the reproducing or reading disc 52 and the indicating disc 48 will be released, allowing the former to be rotated by operating its milled flange accessible through the opening 54. After all parts have been thus adjusted, so that their letters form a certain combination, which may, for instance, represent an arbitrarily chosen key word, the apparatus is ready for use.

The ciphering of a message is now accom-

plished by turning the indicating disc 48 so as to place the letters of the clear text, one after another, before the index 88.

Subsequent to each adjustment of a letter, the crank 11 is rotated in a clockwise direction one revolution from the position shown in Fig. 1. This rotation will cause the drum 38 to perform one revolution in the direction of the arrow 13, and when the abutments of the bars 39 of said drum pass beyond those of the guide arms 44 which are displaced to operative position under the influence of the pins 35 carried by the key-wheels, the respective groups of bars 39 will be pushed to the left, in order upon the continued rotation of the drum to displace the toothed wheel 42 a corresponding number of steps. The coupling between the toothed wheels 50 and 55 has been released at the beginning of the movement of the crank in the way already described, and the toothed wheel 55 meshing with the toothed wheel 42 will, therefore, be displaced the same number of steps, carrying the reading disc 52 and the type wheel 53 with it, while allowing the toothed wheel 50 and the indicating disc 48 to remain in their previous position. With the adjustment shown in Fig. 2, a rotation of the drum 38 through one revolution will therefore cause those groups of bars 39 which are represented by one, four and ten abutments 43 to be displaced into working position, and as a result, the toothed wheel 42 and thus also the reading disc and the type wheel will be displaced fifteen steps, that is, for instance, from the letter A to the letter P. The said last-mentioned letter will thus become the cipher letter desired in the example under consideration. During the revolution, the arm 74 is oscillated by the cam 76 to feed the paper strip one space, and when this feeding has been completed, the end of the arm 78 will engage the recess of the cam 83 just before the revolution is finished, causing the cipher letter to be printed on the paper strip, as hereinbefore described. After the last bar 39 has passed the toothed wheel 42, the key-wheels are moved forward one step under the influence of the tooth of arm 34 acting on the toothed wheel 31, and as soon as the revolution has been completed, all of the bars 39 have been restored to their starting position under the action of the guide bar 46. The machine is now ready for commencing the ciphering of the next clear text letter.

The deciphering of a cipher message is accomplished in the same way as the ciphering operation hereinbefore described. The machine is first adjusted to suit the combination of letters or the key word agreed upon, and the letters of the cipher text are then brought before the index 13, one after the other, and for each letter the crank 11 is turned one revolution, just as it was done in the ciphering operation, allowing the corresponding clear text letter to be read in the aperture 54, or printed on the paper strip 67. It is to be noted that the possibility of employing the same apparatus, without any modifications, both for ciphering and deciphering operations, is based on the fact that the primary alphabet on the indicating disc and the secondary alphabet on the reading disc and the type wheel are reciprocal, that is, consist of the same signs, although the secondary signs are arranged in an inverse sequence as compared with the primary signs. The angle of displacement between the signs of the clear text and the corresponding signs of the cipher text, as compared with corresponding signs of the cipher text and those of the clear text, will then always be the same, a fact which is known per se from earlier ciphering machines.

The device above described for effecting the displacement of the reproducing elements for the secondary signs under the control of the key-wheels permits the full use of all possibilities of variation with regard to the displacements which can be thought in connection with the series of signs under consideration, allowing the production of a cipher well safeguarded against unauthorized reading. Due to the fact that the machine contains a number of elements represented by the bars 39 which corresponds to the largest number of displacement steps conceivable, all displacement intervals possible, in the example shown including from one to twenty-five steps, may be obtained. In the present case, the said elements, i. e. the bars 39, may be brought into and out of operative position either individually or in suitable groups. The said different intervals follow each other in a regular series, controlled by the key pins 35, the periods of said series, however, being so long as not to present any holds which may be utilized for an unauthorized reading of the cipher. The length of the period, as determined by the number and pitch of the keywheels, will in the case under consideration be equal to 3.900.225, representing the product of the numbers of teeth of the toothed wheels 19—23 associated with the key-wheels. By the choice of different key words for every message to be ciphered, it is possible to produce a large number of ciphers, without using any part of a series of displacement intervals of a previous message in a succeeding message. It is further to be noted that by suitable adjustments of the pins 35 of the key-wheels, it will be possible to form a large number of new series of displacement intervals, in the case under consideration, so large that their number can only be expressed by an astronomic figure. It is thus evident that an unauthorized reading of a message ciphered by means of the machine forming the subject matter of this invention is, practically, impossible.

The displacing device hereinbefore described as well as the associated parts of the ciphering machine may, of course, be varied in many different ways, as far as their construction is concerned, without departing from the principle of the invention. The number of groups and the grouping of the elements acting in connection with a displacement of the reproducing elements for the secondary signs may be different from that above described and shown in the drawings. The displacing elements belonging to the various groups may be coupled together and controlled by a common control member replacing the various abutments 43. Furthermore, they may be designed in another way than in the form of sliding bars adapted to act as teeth, and may, for instance, be arranged upon a disc or an equivalent element instead of upon a drum, and as to their bringing into working position, they may be controlled by other means than the key-wheels shown. As to the indicating and reproducing elements, it is to be noted that said elements may comprise, in their most simple form, a single disc provided with signs, on which both the indication of the primary signs and, after rotation of the disc by means of the displacing device, reading of the ciphered text may take place. In order that this apparatus may be used for de-

ciphering purposes, it must be so designed as to cause the disc to rotate backwards a number of steps as determined by the key series, instead of rotating forwards, as in the ciphering operation, or the disc may be displaced at intervals, the number of steps done by the disc at each interval representing, when taken in relation to the total number of signs of the disc, the complement of the number of steps as done by the disc at the displacement intervals of the ciphering operation. Said intervals may in the present case be easily obtained by allowing the disc to be displaced under the action of those sliding bars which remain in their original position instead of by those sliding bars which are pushed to the left into their inactive position, contrary to what is the case in the coding operation. Likewise, the reproducing disc may be provided with signs appearing in an order quite different from that in which the signs of the indicating disc appear. In that case it will be necessary, for the deciphering operation, to have another identically adjusted machine within reach, the indicating and reproducing discs of which carry the same signs as the indicating and reproducing discs of the former machine, though arranged in the reversed order. It is possible, in the said last-mentioned case, to utilize one type wheel for printing the secondary text and the other for printing the primary text. The indicating element may, without departing from the principle of the invention, be designed, for instance, so that the indication may be realized by means of keys for the individual primary signs, as in a typewriter keyboard, or in some other way.

The displacing device according to the invention may, of course, also be applied to ciphering machines having ciphering cylinders, i. e. to electrical or electromechanical ciphering machines. In that case the displacing device may either operate the ciphering cylinders directly or act to control contacts of an electrical or electromechanical displacing element.

What I claim is:—

1. In a ciphering machine, means for indicating the primary signs, means for indicating and reproducing the secondary signs, a gear wheel for operating said last-mentioned means after each indication of a primary sign, a device for variably operating said gear wheel, said device including a rotatable carrier and a plurality of operating elements carried thereby, said elements being individually movable on the carrier into and out of position for engaging said gear wheel, and said carrier being adapted to be rotated through its entire path of rotation after each indication of a primary sign, in order that the gear wheel may be acted upon by all of said operating elements in active position so as to be able to displace the secondary indicating and reproducing means a number of steps equal to the number of elements in active position.

2. In a ciphering machine, means for indicating the primary signs, means for indicating and reproducing the secondary signs, said last-mentioned means being capable of occupying as many different positions as there are secondary signs, a gear wheel for operating said secondary indicating and reproducing means after each indication of a primary sign, a device for variably operating said gear wheel, said device including a rotatable carrier and as many individually shiftable operating elements carried thereby as there are secondary signs, means for bringing said operating elements into and out of position for engaging said gear wheel, and means for moving said carrier through its entire path of rotation after each indication of a primary sign, in order that the gear wheel may be acted upon by all of the operating elements in active position so as to be able to displace the secondary indicating and reproducing means a number of steps up to that corresponding to the number of secondary signs.

3. In a ciphering machine, means for indicating the primary signs, means for indicating and reproducing the secondary signs, a toothed wheel for moving said indicating and reproducing means after each indication of a primary sign, a displacing device for variably operating said toothed wheel, said displacing device including a rotatable carrier and a plurality of shiftable elements carried thereby, said elements acting as teeth engaging said toothed wheel when shifted to operative position, and means to individually bring predetermined groups of said elements into operative position independently of the remaining groups.

4. In a ciphering machine, means for indicating the primary signs, means for indicating and reproducing the secondary signs, a toothed wheel for moving said indicating and reproducing means after each indication of a primary sign, a displacing device for operating said toothed wheel, said device including a rotatable carrier and a plurality of shiftable elements carried thereby, said elements acting as teeth in engagement with said toothed wheel, guiding means to engage said elements in groups for bringing individual groups in operative position independently of the remaining groups, and means for variably controlling said guiding means.

5. In a ciphering machine, means for indicating the primary signs, means for indicating and reproducing the secondary signs, a toothed wheel for displacing said indicating and reproducing means after each indication of a primary sign, a displacing device for moving said wheel, said displacing device including a rotatable carrier and groups of shiftable displacing elements carried thereby, said elements being adapted to engage said wheel, and the groups thereof being so arranged as to include, either individually or in combination with each other, any number of units of displacing elements up to the maximum number as represented by all groups together, a guiding device for controlling each individual group, and a key-wheel for each guiding device for bringing the respective group into active position independently of the remaining groups.

6. In a ciphering machine, means for indicating the primary signs, means for indicating and reproducing the secondary signs, a toothed wheel for displacing the position of said indicating and reproducing means after each indication of a primary sign, a displacing device for controlling said toothed wheel, said displacing device comprising a rotatable carrier, teeth in said carrier shiftable from an inactive to an active position, in which they may engage said toothed wheel, guiding devices for shifting the position of said teeth in groups, and key-wheels for controlling said guiding devices.

7. In a ciphering machine, means for indicating the primary signs, means for indicating and reproducing the secondary signs, a toothed wheel for displacing said reproducing means after each indication of a primary sign, a displacing device for controlling said toothed wheel comprising a rotatable drum and a set of axially extending bars

slidably mounted in said drum, said bars being shiftable between two extreme positions, viz an inactive position and an active position, in which they protrude at one end of the drum for engagement with said toothed wheel, means including key-wheels to control the shifting of the bars, and means to rotate said drum one complete revolution after each indication of a primary sign.

8. In a ciphering machine, elements for indicasting the primary signs, elements for indicating the secondary signs, elements for reproducing the secondary signs, a toothed wheel to control the movement of said last-mentioned indicating and reproducing elements, a rotatable drum adapted to be rotated one complete revolution after each indication of a primary sign, a set of axially extending bars slidably mounted in said drum so as to be capable of an axial movement therein between an inactive position and an active position, in which said last-mentioned position they can engage said toothed wheel, guide arms to move predetermined groups of said bars into active position, and a set of key-wheels, one for each group, to control said guide arms.

9. A ciphering machine having, in combination, means for indicating the primary signs, means for indicating the secondary signs, means for reproducing the secondary signs, a toothed wheel to control the movement of said indicating and reproducing means, a rotatable drum adapted to be rotated one complete revolution after each indication of a primary sign, a set of axially extending bars slidably mounted in said drum so as to be capable of an axial movement therein between an inactive position and an active position, in which they can engage said toothed wheel to move same upon the rotation of the drum, an abutment on each bar, guide arms to engage said abutments for moving groups of bars into their active position, a set of key-wheels having adjustable operating pins for acting on said guide arms, said abutments being arranged into circumferential groups, a guide arm being provided for each group so that upon each revolution of the drum the guide arms acted on by the respective key-wheels will displace the corresponding group of abutments and associated bars into their active position.

10. A ciphering machine having, in combination, means for indicating and reproducing secondary signs, a shaft, means to rotate said shaft one complete revolution upon each operation thereof, a drum on said shaft, axially extending bars slidably mounted in said drum, another shaft, a set of key-wheels on said other shaft, means to rotate said key-wheels one step for each complete revolution of said first-mentioned shaft, an intermediate shaft, a toothed wheel thereon for operating said indicating and reproducing means, and means under the control of the key-wheels for shifting the position of said bars to bring various groups thereof into position to allow them to engage said toothed wheel and rotate same upon the rotation of the drum.

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