[Second Edition.]

PATENT SPECIFICATION

Application Date : Nov. 10, 1919. No. 27,778 / 19. **163,357**

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COMPLETE SPECIFICATION.

Improvements in and relating to Ciphering and Deciphering Machines.

I, HUGO ALEXANDER KOCH, of 92. van Boetzelaerlaan, The Hague, Holland, Mechanical Engineer, 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:—

This invention relates to ciphering and deciphering machines of the type in which the ends of the transmitter paths and receiver paths are arranged in two rows and mounted on stationary members and intermediate movable path carriers, having a series of rows of contacts, corresponding to the ends of the transmitter and receiver paths arranged on each side and irregularly connected together, are disposed between the ends of the said transmitter and receiver paths, the contacts on each side of the intermediate path carrier contacting respectively with the ends of the transmitter and receiver paths.

In machines of the above type as hitherto proposed the intermediate path carrier is in the form of a rotatable cylinder with contacts on its surface and each transmitter contact is only capable of contacting with the number of contacts in one particular row of contacts on the circumference of the cylinder which is rotated one step when the transmitter contact is key actuated, the arrangement being such that when, for instance, the key for letter A is depressed, the letter G is recorded, and as the key returns the cylinder is turned one step so that on the next operation of the same key the letter F is, for instance, recorded.

Thus the number of contacts in this particular row on the cylinder circumference must be equal to the number of signs or letters it is required to substitute for the sign represented by this transmitter key actuated contact. Hence the total number of contacts on the cylinder is equal to the number of substitutions it is required to make for any sign *i.e.* the number of contacts in a circumferential row multiplied by the number of transmitter contacts. By this arrangement when any contact of a longitudinal row is in action it is connected to a similar contact in another row, thus two rows only can operate at a time, the remaining rows being incapable of action until the cylinder is rotated.

It has been proposed in Specification of Patent No. 12,001 of 1915 to provide a cylinder bearing a series of studs or contacts in circumferential and longitudinal rows, each circumferential row embracing all the symbols it is desired to employ, a key to each circumferential row, when actuated, not only making contact with a particular stud in one row and corresponding to the letter it is desired to substitute but also electrically energizing the stud corresponding to the same letter in all the other rows owing to an electrical lead connecting the same letter in all the various rows.

According to this invention an intermediate separate path carrier or valve which is capable of being bodily and freely adjusted between a stationary transmitter and receiver element and which is formed with a number of paths, is provided in which at any moment for any desired transmission of energy the whole number of such paths in the intermediate path carrier or valve is available and the intermediate path carrier moves in the direction of an imaginary line joining the successive ends of the transmitter paths or an imaginary line joining the successive ends of the receiver paths, the arrangement being such that each intermediate path has only two orifices or con-

[*Price* 1/-].

tacts, one on each side of the intermediate path carrier so that the total number of contacts on the intermediate path carrier is equal to twice the number of paths in the intermediate path carrier.

It has been proposed to employ in a ciphering and deciphering machine two disks, each having a single row of contacts joined respectively to the ends of the transmitter and receiver paths and adapted to move bodily over one another, but in this case one disk was fixed and the other rotatable and there was no intermediate path carrier containing paths arranged in an irregular manner moving between the stationary ends of the transmitter and receiver paths.

The number of key settings made when one intermediate path carrier, according to the present invention, is used is only equal to the number of intermediate paths and in order to increase these key settings, a plurality of intermediate path carriers or valves may be provided, so that with two intermediate path carriers or valves the key settings will be equal to the square of the number of intermediate paths in any one intermediate path carrier, whilst the contacts on the intermediate path carriers will only be four times the number of intermediate paths in any one path carrier. Figure 1 shows a tube system consisting of the three parts 63, 64 and 65 the parts 63 and 65 being stationary elements with the ends of the transmitter and receiver paths mounted thereon. In the two outer parts 63 and 65 the tubes are parallel, while in the intermediate path carrier or valve 64 they connect a series of orifices arranged on opposite side of 64, said orifices connect in any desired way the apertures of the tubes of 63 and 65. Starting *e.g.* from 4 on part 63, the path leads by way of the part 64 to 72 on part 65. Similarly 2 3 4 5 6 7 8 9 on part 63 lead to 73 70 72 75 78 74 76 77 on part 65. If in front of all the tubes on part 63 valves or small cylinders are fitted, which each bear for instance, one letter of the alphabet (as shown in Fig. 4 to the left hand) and behind each tube on part 65 there is fitted a small cylinder with a piston, each of which for example bears a letter, and exposes this letter, when the piston is forced out (in the manner shown in Fig. 4 to the right hand), it is possible to cipher with such a device. In place of each letter depressed at the left hand piston a certain other letter will appear under the slides of the right hand pistons (Fig. 4). Such ciphering can, however, easily be discovered. For the purpose of making the ciphering more difficult to discover, the key must be made capable of being repeatedly altered in a simple manner. With this object the intermediate path carrier 64 is made displaceable, and moves in the direction of an imaginary line connecting the successive ends of the transmitter paths on an imaginary line connecting the successive ends of the receiver paths. In Fig. 1 this part is shown as having been displaced by one division.

In a similar manner the ciphering key is altered by each further displacement of the intermediate path carrier 64.

For the purpose of de-ciphering, the tubular paths in Fig. 1 need only be connected to the valves and pistons in such a manner that the two are exchanged the one for the other. The numeral 4 was for instance changed to the numeral 72. Taking the latter number and following the path in the reverse direction, the original numeral 4 is obtained. If the intermediate part was displaced, it must be moved in the same way for deciphering.

In order not to leave some of the tube paths unconnected, various methods may be adopted, thus in Fig. 1 in 63 and 65 similarly marked tubes are connected together, so that at any moment for any desired transmission of energy the whole number of such paths in the intermediate path carrier is available. The tube 1 on 63 is connected with the tube 79 on 65 and the tube 10 on 63 with the tube 71 on 65 so that no tube is without a connection, even if the intermediate carrier be displaced still further to the right. If part 64 be assumed to have got to the end to the left, it must in the arrangement according to Fig. 1 be slid back again.

In Fig. 2 the parts 63, 64 and 65 are constructed as circular discs. With this arrangement the displacement may be continuous in one direction and is in the direction of an imaginary line connecting the successive ends of the transmitter paths or an imaginary line connecting the successive ends of the receiver paths so that on parts 63 and 65 there need only be the same number of tubes as on the intermediate tube carrier.

Instead of the tube system, as in Fig. 2, being constructed in the form of discs, it may be arranged, as in Fig. 3 on the mantle of a cylinder, in which case the intermediate path carrier still moves along the same imaginary line. In all these three modifications, since each intermediate path has only two orifices or contacts, the total number of orifices or contacts on the intermediate

path carrier is equal to twice the number of paths in the intermediate path carrier.

In order to increase the number of key-settings, preferably several intermediate carriers are fitted one behind the other, as is shown in Figs. 4 and 5. In this case two such intermediate tube carriers are fitted one behind the other with their paths on a cylinder. By displacing one or more intermediate tube carriers the key is changed. If on parts 63 and 65 there are, for instance, 10 tubes corresponding to the 10 numerals, with one intermediate carrier 10 key settings are possible, while with two intermediate tube carriers there will be $10 \times 10 = 100$ and with three intermediate carriers $10^3 = 1000$ key settings *etc.* Ten intermediate path carriers would give $10^{10} = 10$ milliard key settings.

The construction indicated has a number of advantages, the combination of which results in an apparatus particularly suitable for ciphering. The most important advantage consists in a number of key settings being obtainable, that may be increased to an extent. The re-arranging apparatus is exceedingly simple, as the tubes are not movable singly and the re-arrangement of all the tubes is effected in one movement.

It is particularly important for the re-arrangement to be easily effected for the reason, that it is necessary, in order to make an undecipherable script to change the key during ciphering very frequently, and preferably after each letter.

A very important advantage of the multiple-path re-arrangement device resides in the fact, that, besides the enormous number of possible settings of the separate machines, there is such an enormous number of possibilities for the construction of each separate machine. Even if only machines with exactly the same operation of the multiple-path re-arrangement devices were constructed, the enormous possibilities of variation, according to which the separate tubes may be connected in the intermediate path carriers, would provide an enormous variation. But even if in one machine a single intermediate path carrier only differs from that of another machine, there is no possibility of an unauthorized de-ciphering, even if all the key-settings are known. With path systems of 25 paths and 10 intermediate path systems, no fewer than about $2.10^{31} = 20$ quintillion machines of different construction may be built.

The initial position of the intermediate path carriers 66, 67, *etc.* is preferably made so that it may be set optionally. Hence with 10 intermediate carriers, each with 10 tubes, it is possible to choose from among 10 milliard possibilities.

It is however pointed out particularly, that the above arrangements are only to be regarded as examples. For instance, it is immaterial, as regards the nature of the invention, which substance flows in the tubes, whether it is air, water, oil, or the like. The use of tubes is also not essential as regards the invention. In the end plates or the like and in the intermediate plates or the like it is only necessary for there to be conductors or paths of energy in the manner shown above for use with electricity, in which case electro-magnets or the like will be operated.

Hence the paths of energy are not shown in Figs. 1 to 3 as tubes, but as simple lines, in order to indicate, that the paths of energy may be of any kind, the form of energy or the means of transmission of the energy and the construction of the paths of energy being quite immaterial. The substance of the invention is formed in the drawings by the geometrical arrangement of the paths of energy and carriers of energy, as described.

The same applies to all the following arrangements which are given as examples.

In Figs. 4 and 5 a complete ciphering apparatus is shown. 63 and 65 are the stationary elements carrying the ends of the transmitter and receiver paths whilst 66 and 67 are the intermediate tube carriers (intermediate path carriers) of the cylindrical type. *d* are the transmitting cylinders and *e* the receiving cylinders. When, for instance, the transmitting cylinder *y* in Fig. 4 is depressed, the receiving cylinder *v* is pushed. To the receiving cylinders are fitted discs *f* having each a window *g*, which displays the corresponding letter. Between the transmitting and receiving cylinders there is also a change-over valve *h*, which has the purpose of effecting the following two tube connections. 1. The transmitting cylinders *d* are connected to the tube carrier 63 and the receiving cylinders *e* to the tube carrier 65, as shown in Fig. 4. 2. The transmitting cylinders *d* are connected to the tube carrier 65 and the receiving cylinders *e* to the tube carrier 63, as shown in Fig. 5. Thus Fig. 4 represents the ciphering and Fig. 5 the corresponding de-ciphering position. By

following the connections it will be seen that, on depressing the transmitting cylinders *v* in Fig. 5, the letter *y* will appear at the receiving cylinder *e* in Fig. 5, in the reverse manner to Fig. 4.

The provision of the change-over device *h* is only required in cases where more than two machines have to work together. When, however, only two machines have to work together, it is sufficient to connect in one of them the transmitting cylinders *d* to 63 and the receiving cylinders *e* to 65, and in the other apparatus *d* to 65 and *e* to 63, in which case either apparatus is the de-ciphering apparatus for the other.

It is specially pointed out that it is immaterial as regards the nature of the invention, whether the transmitters and receivers bear letters or numerals. The arrangement might, for instance, be such that the transmitters bear letters and the receivers numerals. The tube or path carriers may be constructed with 10 tubes corresponding to the 10 numerals, or with 25 tubes corresponding to the 25 letters, or with 35 tubes corresponding to numerals plus letters or with 90 tubes corresponding to large plus small letters plus numerals plus punctuation signs plus spacing signs or with any other number of tubes. For special purposes both transmitters and receivers may be marked with syllables words or short sentences. Covering sheets may also be employed, for instance in the modification shown in Figs. 4 and 5 with numbers or words or other signs written thereon for changing the letters on both the receivers and the transmitters for making it possible to use the same apparatus for instance both for the ciphering of letters and for the transposition of whole words.

The multiple valve described above or the multiple path controller for ciphering purposes or for the construction of a ciphering machine can be used both as regards its technical aspect and as regards its construction in various totally different ways.

Several constructional examples are given below.

In Figure 6. 63. 66, 67, 68. 69, 65 show a multiple valve *o* as described above. Leading-in tubes *i* and leading-out tubes *k* are connected to this multiple valve. There are 10 each, for instance, of the tubes *i* and *k*. In order that the drawing may be clear only one of each is shown. *l* is a vessel filled with compressed air. *m* is a valve, of which there are also ten, which admits air from the vessel *l* into the tube *i* by depressing the knob *n*. The air enters through the multiple valve *o* to any one of the ten cylinders *f* which thereby operates its type lever *p* (of these levers there are of course also ten) and strikes the corresponding letter on the paper roller *q*. In order that, on the next letter valve being depressed, the same key will not be set by the multiple controller *o*, all ten valves *m* act on the lever *r*, and the latter acts by means of the pawl *s* on the toothed wheel *t*. This wheel is fixed along with the toothed wheel *u* on the same shaft. The toothed wheel *u* engages with the toothed wheels 11 and 12, and the latter drive the shafts 13 and 19. On these latter shafts are fitted the wheels 14 and 15 and the wheels 20 and 21, respectively. The toothed wheels 11 and 12 have different numbers of teeth, so that the shafts 13 and 19 have a different number of revolutions. The wheels 14 15, 20 and 21 are provided with drivers 16, 18, 17, 22 and 23, respectively. The number of drivers fitted to the wheels can be different for each wheel, and their distribution around the circumference can be arranged in any manner and can be different on the various wheels. Intermediate tube carriers 66 to 69 are rotatably fitted on one shaft and are provided with teeth 24. The intermediate tube carriers are displaced by means of the drivers. The mode of operation described has a number of advantages. In the first place, the de-ciphering by unauthorized persons is made still more impossible by the completely irregular method of drive. By the provision of two actuating shafts (13 and 19) having different numbers of revolution the period after which the same setting again occurs is considerably lengthened, so that even in a long telegram the same key is not repeated. The wheels 14, 15, 20 and 21 are preferably mounted so as to be rotatable on their shafts (13 and 19). By this means the manner in which the intermediate tube carriers are displaced can be considerably varied. For de-ciphering correctly it is then necessary to known the relative setting of the driver wheels. By this means the number of adjustable key-settings may be increased to 100,000 times and the deciphering by unauthorized persons made correspondingly more impossible. For setting the keys it is of course necessary to provide marks on the driver wheels 14, 15, 20 and 21 and on the intermediate tube carriers 66 to 69, which marks are not shown in Figure 6.

The drive shown in Fig. 6 is only given by way of example and can be effected in a totally different manner. Only the

following is of importance for this kind of drive. It must be such that it can be varied in very many ways, and besides this the ciphering of as great a number of signs as possible is necessary in order to arrive at the initial setting, that is, at the same key.

In the apparatus shown in Fig. 7, the multiple valve described above is used technically for quite a different method of ciphering. In this case the separate letters are not replaced by others, but the letters remain as such and are only changed about as regards their sequence. The fundamental part of the invention, the multiple valve (the multiple path controller) on the other hand does not change its form in any way and the displacement of this controller can be effected in a similar manner, as shown for instance in Fig. 6.

In Fig. 7, *o* (62, 66, 67, 68, 65) again represents the multiple valve. In this case the intermediate tube carriers 66 and 68 are rotated automatically, while 67 remains stationary unless moved by hand and only serves for setting the key. On the receiver side six cylinders with pistons are shown at 25. When air is admitted through one of the tubes *k* into one of the cylinders 25, the mark 27 appears. On the transmitter side a single valve *m* is fitted, which receives air from the compressed air vessel *l*. By depressing the knob *n* (compare the position shown) compressed air is supplied to the middle part 29 of the ring valve 28. On the knob *n* being released, the spring 30 pulls by means of the pawl 31 and the ratchet wheel 32 the inner part 29 of the ring valve 28 forward by one division so that, on the knob *n* being again depressed the compressed air from the vessel *l* travels by way of valve *m*, conductor 34, and the valve channel 33 to that one of the tubes *i* which is the next on the periphery. The ciphering is carried out as follows: The knob is depressed, whereupon the compressed air follows the direction of the arrows. Should the plain script commence with the letter *r*, then this letter is written by hand as shown in the figure under the mark 27 on the paper 26 stretched in front of these marks. *n* is then depressed for the second time. The second letter of the plain script is then written below the mark now appearing, and so on until the first six letters fill the first row. On releasing the knob *n*, after these six letters have been written, the shaft 35 has revolved once completely. The driver of the wheel 37 then engages the toothed wheel 38 and rotates the shaft 39, thus causing the driver wheels 40, the intermediate tube carrier 66 or 68, or both to be rotated in any manner. This causes the complete re-arrangement of the connections between the tubes *i* and *k*, so that when writing the next line containing the 7th to the 12th letters, the arrangement of the letters is a totally different one to that in the first row. The second row is written accurately behind the first, and so on. 41 and 42 represent counting mechanisms. The counting mechanism 41 counts the number of ciphered letters. The counting mechanism 42 counts the number of ciphered lines. The counting mechanism serves a double purpose.

When it is desired to check, if one of the ciphered letters has been ciphered correctly after the ciphered matter is complete, the shaft 35 is rotated backwards until the number of the line appears at 42 and the number of the letter in the line at 41. The knob *n* is then depressed, and the position of the doubtful letter will be recognised in the cipher script.

The counting mechanism may also be used for setting a key, by first setting the key for 66, 67 and 68 and by a numeral being given which indicates, that, after the setting of the said keys, the shaft 39 must be rotated until the counting mechanism 41 indicates this numeral. This setting will then be the initial setting.

In Fig. 7 only 6 tubular conductors *i* and *k* are shown. Of course considerably more, for instance 20 or 40 tubular conductors, can be used, in which case the ring valve 28 must naturally have a corresponding number of connecting points 43, and the number of cylinders 25 must be correspondingly increased.

In Fig. 8 a further example of a ciphering machine is given, which from a technical point of view represents another system, in so far as it shows a combination of the ciphering system of Figure 6 and that of Figure 7. In the machine according to Figure 8, the separate signs as such are interchanged, while the signs thus interchanged are also mixed up as regards their sequence in the text. These two functions are effected by the machine by a simple depression of a finger key. The machine prints the ciphered matter directly on paper as in a normal typewriter. In Fig. 8 two separate multiple valves *o* and 44 are used. *o* serves for mixing up the sequence of the signs, and 44 for interchanging

the signs. *m* are valves, each of which is provided with a sign. *q* is a roller carrying the paper, and 45 is a type-wheel bearing the same number of types as there are valves *m*. The type-wheel is mounted on the shaft 47 in such a manner that it must rotate with this shaft, but that it can be displaced relatively to the shaft by means of the piston 46 against the spring 48. The shaft 47 is rotated by depressing the cross-bar 52 by means of the spring 49, and the cord pulley 51. In the cord pulley 51 there is a spiral spring, the one end of which is fixed to the bearing 53 and causes the shaft 47 to rotate backwards when the pull on the cord 50 is released. The step-wheel 54 is keyed to the shaft 47. Near the step-wheel there are cylinders 56 with pistons, which have stops 57. On the step-wheel being rotated by means of the cord 50 it will strike against one of the stops 57, shown in a perspective view in Fig. 9, thus causing the shaft 47, and along with it, the type-wheel 45 to be rotated more or less. This causes one of the signs of the type-wheel to come into position opposite the roller *q*, when it can be printed on the paper. The cylinders 55 with stops 58 regulate the axial displacement of the type-wheel and thereby the sequence of the printed signs.

The ciphering of a letter is effected as follows:—The knob *z* is depressed. This causes compressed air to flow from the vessel *l* by way of 44 to the cylinder 62. The piston rises and with it the stop 57. The cross-bar 52 is depressed by the extension piece 59. The valve 60 allows compressed air to pass into the ring controller 28, the air passes in the direction of the arrows to the cylinder 61, and raises the stop 58. The shaft 47 revolves and at the same time by the opening of the valve 60 the piston 46 is displaced to the right and with it the type-wheel 45, only one of the steps of the stepped wheel 54 striking against the stop 57 and the type-wheel against the stop 58. The paper roller *q* is pressed by a cylinder, not shown, against the type-wheel, thus causing the coded letter to be impressed on the paper at a certain point. The multiple valves can be set in a similar manner as was described above in connection with Figs. 6 and 7. The paper can be advanced automatically after a line has been finished, whereupon writing can proceed without interruption. When the same machine has to de-cipher something ciphered by itself, two change-over valves according to Figure 4 must be provided, one for the multiple valve *o* and one for the multiple valve 44. The machine can, however, work with a correspondingly set machine without change-over valves, according to Fig. 8.

It has been particularly pointed out that the machines shown in Figures 6 to 8 are only examples, and that for obtaining the same result generally and in detail different means can be used. It may be mentioned in this connection that in Figure 8, in place of the type-wheel, type levers may of course be used, and that in place of the type-wheel, the paper roller can be axially displaced, or rotated, and that in carrying out the method the only important point is the relative movement between the place where the type is impressed and the paper.

The complication of the ciphering could be taken one step further, by at the same time displacing the type-wheel axially and rotating the paper roller by a similar method, whereby not only a mixing up of the separate signs within one line would be obtained, but also of one line with regard to another.

The advantage of the ciphering machine described, especially that according to Figs. 6 to 8, resides, besides in other points, in the enormous increase of the speed of ciphering as compared with methods worked out entirely by hand. When telegraphing texts in cipher this time can be considerably reduced by building the ciphering apparatus into the transmitting and receiving apparatus of the telegraphic apparatus with or without wires. At the transmitting station this may be done in a most simple manner by substituting for the type levers (*p* Figure 6) perforating rods which bear the finished Morse perforations for a certain Morse sign. When in this case any letter is depressed, the Morse sign of another letter will appear in the paper strip to be perforated. At the receiving station the writing can be normally de-ciphered with an ordinary ciphering apparatus according to Figure 6, but the de-ciphering can also in this case be done automatically by building in a correspondingly set apparatus in the receiving apparatus.

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 and deciphering machine of the type hereinbefore referred to having an intermediate separate path carrier or valve which is capable of being bodily and freely adjusted between a stationary trans-

mitter and receiver element and which is formed with a number of paths in which at any moment for any desired transmission of energy the whole number of such paths in the intermediate path carrier or valve is available and the intermediate path carrier moves in the direction of an imaginary line joining the successive ends of the transmitter paths or an imaginary line joining the successive ends of the receiver paths, the arrangement being such that each intermediate path has only two orifices or contacts, one on each side of the intermediate path carrier so that the total number of contacts on the intermediate path carrier is equal to twice the number of paths in the intermediate path carrier.

2. A ciphering and deciphering machine as claimed in Claim 1 in which a plurality of intermediate path carriers or valves are disposed between the ends of the transmitter paths and the ends of the receiver paths.

3. A ciphering and deciphering machine as claimed in Claim 1 or 2, in which the movement of the intermediate path carrier or carriers is effected automatically on any key of the transmitter being depressed.

4. A ciphering and deciphering machine according to Claim 3, in which the movement of one or more of the intermediate path carriers is effected irregularly both with respect to one another and to time.

5. A ciphering and deciphering machine according to Claim 4 in which the kind of movement of the intermediate path carriers may be varied in a variety of ways by the setting of the actuating means.

6. A ciphering and deciphering machine according to Claim 5 in which the actuation of the intermediate path carriers is effected by one or more shafts, which may run at different speeds, and by means of driver wheels fitted on these shafts either solidly or rotatably, said drivers being disposed irregularly both as regards their distribution on the periphery and relatively to one another.

7. A ciphering and deciphering machine according to Claim 6, in which one or more of the intermediate path carriers may remain stationary or be moved if desired.

8. A ciphering or deciphering machine according to Claim 7, in which the initial setting of the intermediate path carriers may be set in any manner.

9. A ciphering and deciphering machine as claimed in Claim 1, characterised in that change-over means are provided for exchanging the paths of the transmitter and the paths of the receiver the one for the other for the process of deciphering.

10. A ciphering and deciphering machine as claimed in Claim 1 in which a ring valve, which advances step by step after each depression of the key, is disposed between the transmitter key and the ends of the transmitter paths for the purpose of operating a device for indicating the alteration in sequence of the signs for translating the plain script into the cipher script.

11. A ciphering and deciphering machine as claimed in Claim 10 in which for the purpose of printing the signs in the altered sequence, the ring valve and the intermediate path carriers operate means whereby a relative displacement of the printing type and the paper is effected, the relative displacement being different for each letter so that the letters are printed in quite a different sequence to that of the plain script.

12. A ciphering and deciphering machine according to Claim 11, in which the letters transposed in their sequence are replaced by other letters.

13. A ciphering and deciphering machine according to Claims 1—12, in which after the writing of every line there is effected automatically a re-arrangement of the multiple path controller which causes the mixing up.

14. A ciphering and deciphering machine according to Claims 1—13, in which the number of coded signs and lines is counted by a counting device.

15. The improved ciphering and deciphering machine of the type herein-before referred to substantially as herein-before described with reference to the accompanying drawings.

Dated this 10th day of November, 1920.

MARKS & CLERK.

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[Wt. 37A.—125/3/1934.]

Fig. 1.

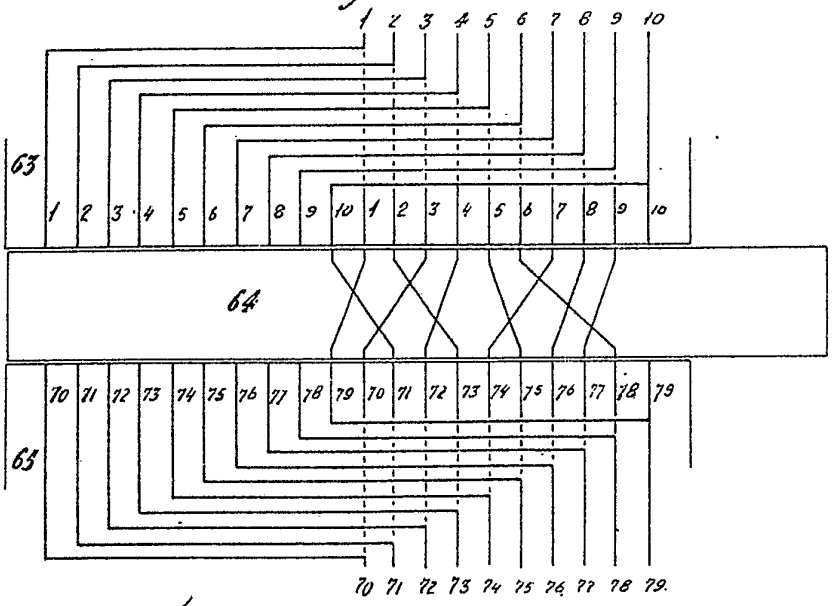

Fig. 2.

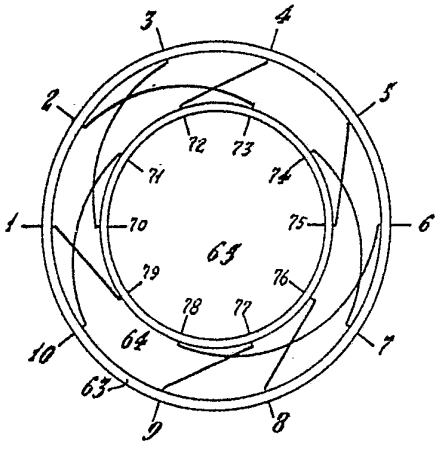

Fig. 3.

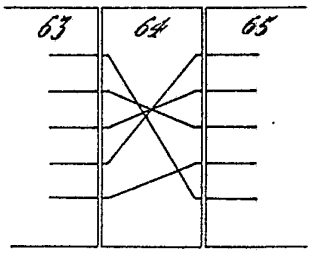

Fig. 4.

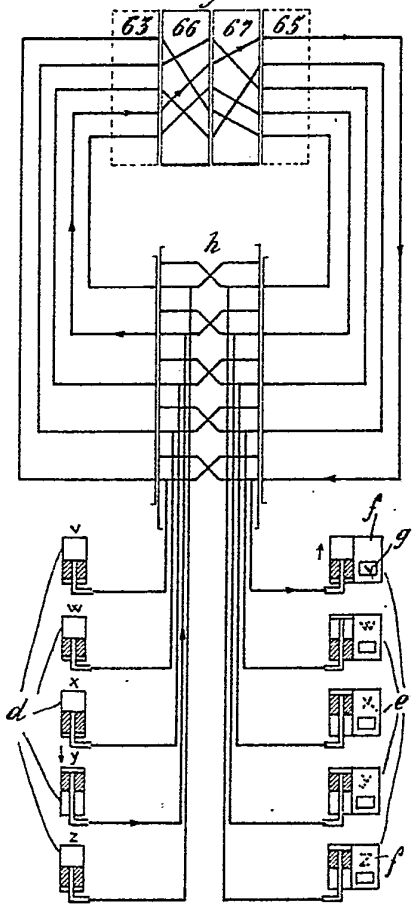

Fig. 5.

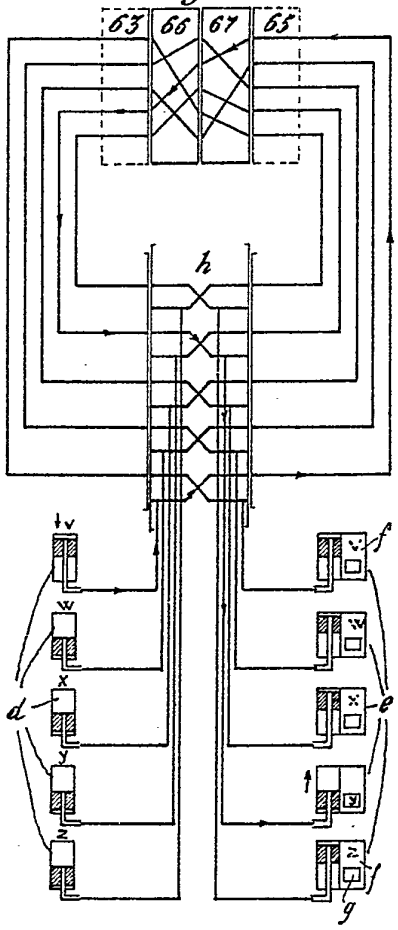

Fig. 6.

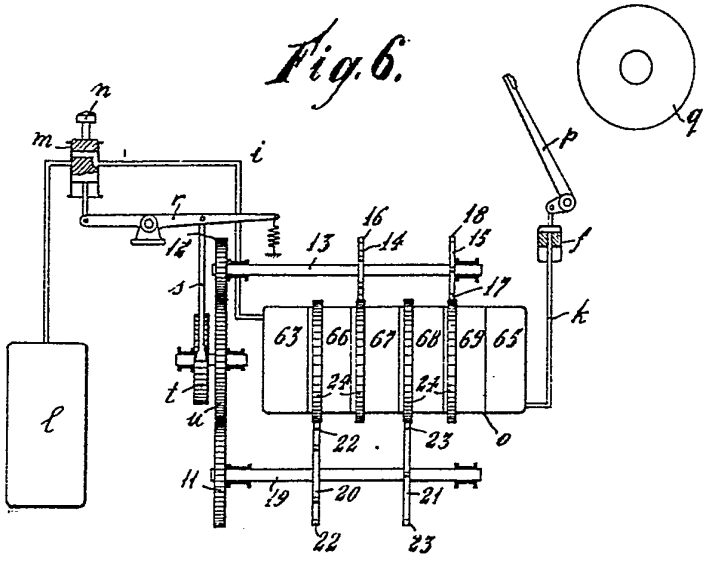

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Fig. 1.

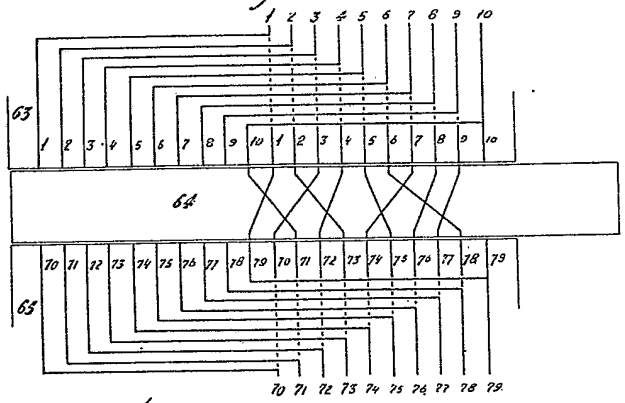


Fig. 2.

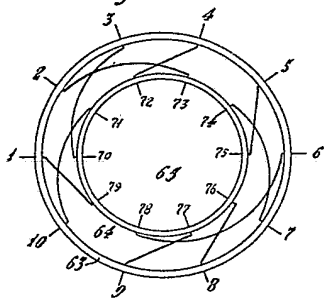


Fig. 3.

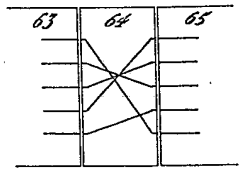
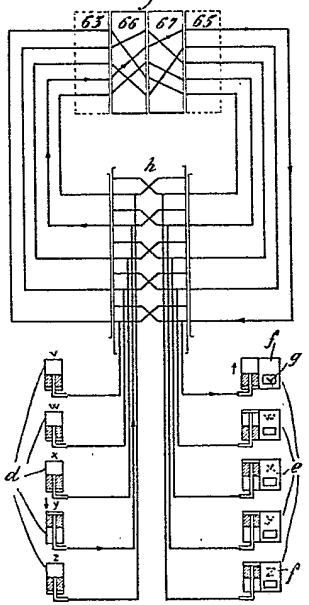


Fig. 4.



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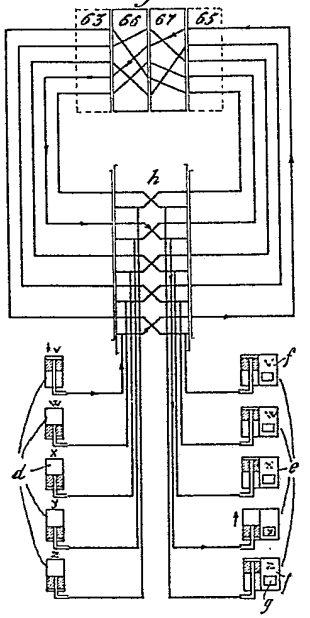

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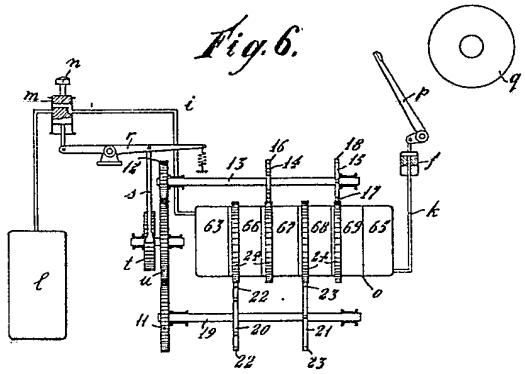

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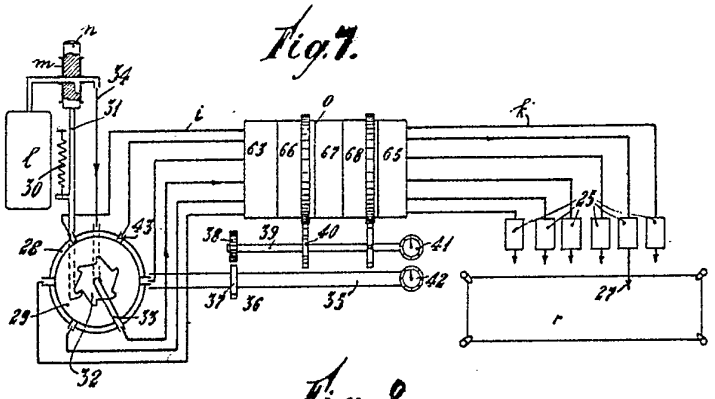
Fig. 7.



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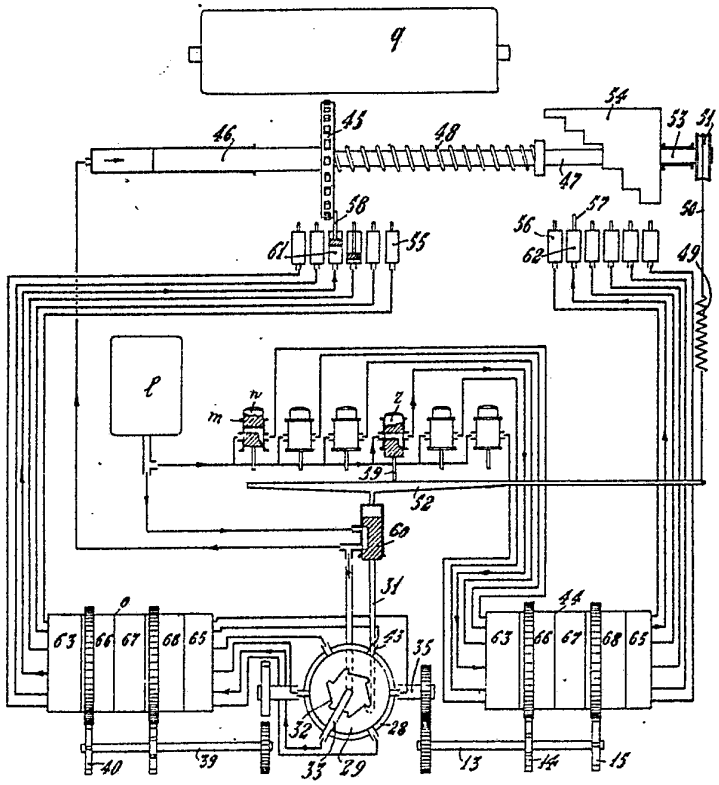

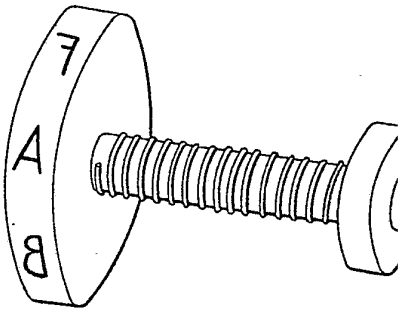

Fig 9.

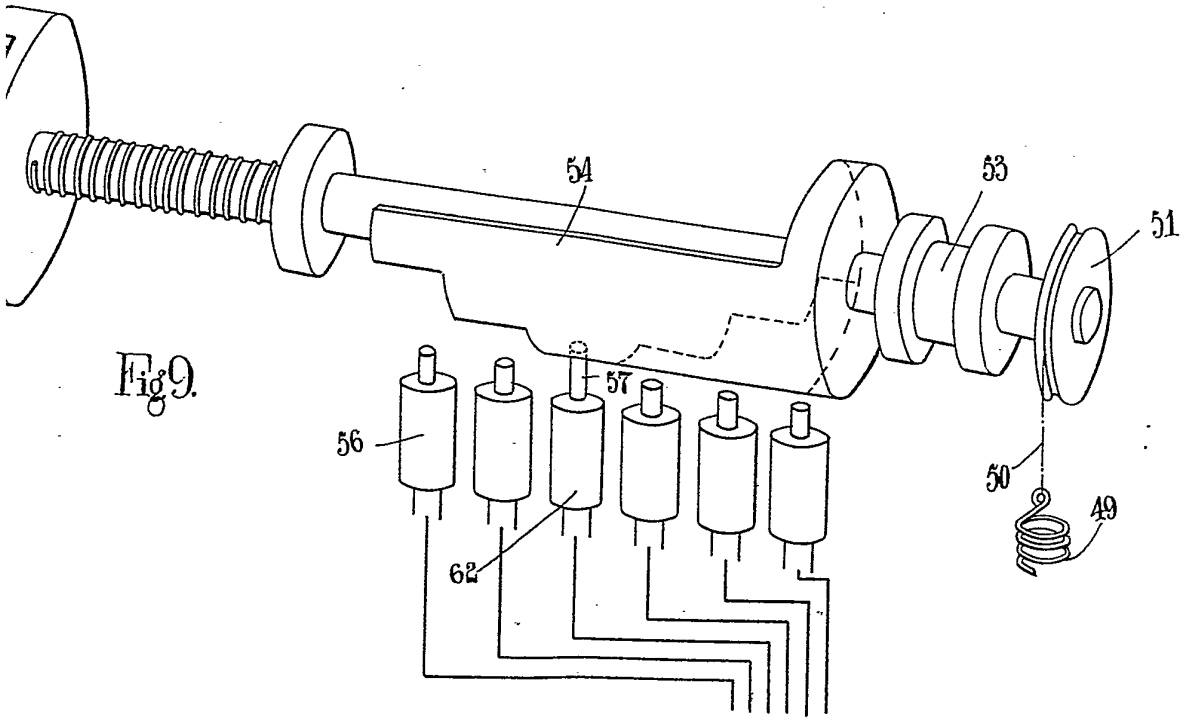

Fig 9.

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Fig. 7.

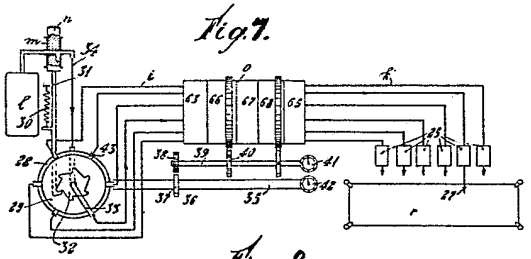
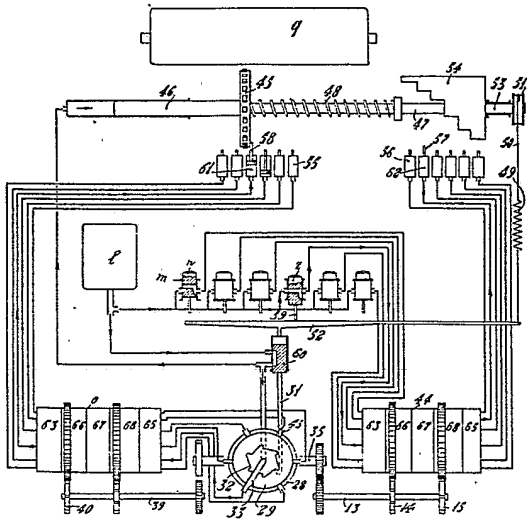


Fig. 8.



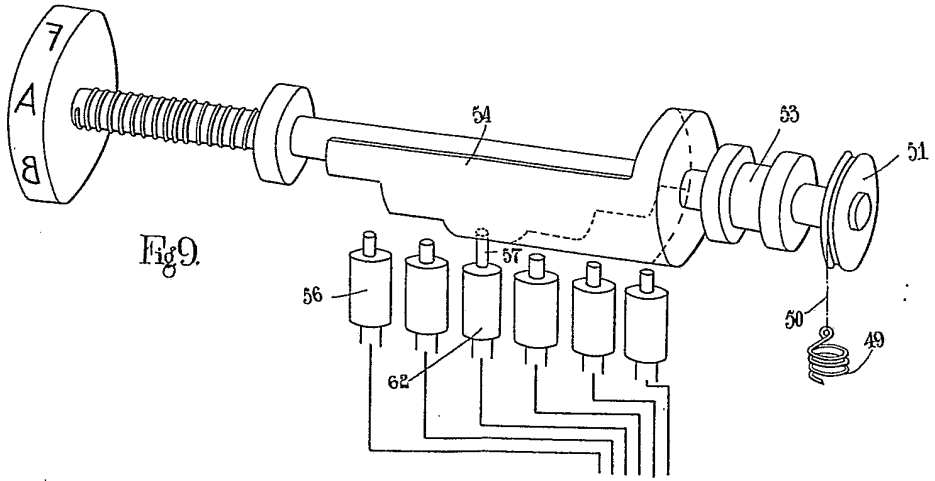


Fig. 9.

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