Declassified and approved for release by NSA on 01-26-2015 pursuant to E.O. 13526

REF ID:A39568

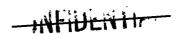
The first test of the second

March 12, 1936

Modification in Converter Type M-134-T1

(U. S. Patent 2,028,772 of January 23, 1936)

- 1. In U. S. Patent 2,023,772 the ciphering commutator is started and stopped, as controlled by the opening and closing of the comparing circuit (composed of the set of ten contact levers and associated twenty contact points). Since the latter is controlled by the cipher-key tape, the action of the commutator is very irregular. Since the inertia of the commutator is considerable, it is difficult to speed up the operation of the system and still be able to stop the commutator rapidly and accurately in its displacements.
- 2. When the indicating devices are glow lamps it is of course essential either to stop the commutator long enough for the eye to perceive the character illuminated on the indicating bank or to provide a system of self-locking relays in series with each glow lamp so that if a glow lamp receives a momentary impulse through it, the self-locking relay acts to keep the lamp illuminated long enough to permit of noting the character illuminated. In either case this would complicate the mechanism.
- 3. I have conceived of a method of operation which not only over-comes the foregoing objections and disadvantages, but also simplifies the system considerably and at the same time simplifies automatic recording of the resultants.
- 4. The basic principle of the modification is as follows: Instead of employing the comparing circuit to control the starting and stopping of the commutator wheel, let the wheel be kept in constant, regular rotation, and let the comparing circuit merely determine when electric potential is applied at the keyboard. Thus, when a key of the keyboard is depressed no current reaches the indicating bank through the cipher commutator until the comparing circuit is completed. Since the latter event is controlled by the cipher-key transmitter, it is obvious that a result will be indicated on the indicating bank once per revolution of the commutator, but the exact instant when it will be indicated is a function of the character on the cipher-key tape. If the time required for one complete revolution of the cipher commutator is regarded as being divided up into 26 equal intervals, the cipher-key tape merely determines at which of the 26 intervals the comparison circuit will be completed and therefore which of the 26 possible equivalents will be



-CONFIDENTIAL

indicated for the key being depressed during that revolution of the commutator. Since this action can take place instantaneously, the commutator can be rotated quite rapidly, and though the ciphering action is irregular in that successive encipherments take place at irregular instants of the cycle of rotation within successive revolutions of the commutator, the action is so rapidly performed that the operator does not notice the irregularity, and a cadence in keyboard operation is perfectly possible.

- 5. The modified circuit arrangements are shown in accompanying Fig. 1.
- 6. Obviously, for this type of control, glow lamp indications are not suitable because the action is too rapid; or if it is slowed down, one loses most of the advantages of this modification. The system is much more suited to automatic recording, by controlling the keyboard of an associated typewriter, or the printing action of a rotating type wheel.
- 7. If a rotating type wheel is used, the comparison circuit, in addition to including in series with it the tape-stepping magnet, would also include the relay controlling the time of delivery of the printing impulse. The type wheel would have to be rotated synchronously with the cipher wheel.

William F. Friedman.

Modefication in Converter Type M-134-T1 (U.S. Patent 2,028,772 of January 28,1936)

. .

the mechanism

1. Du U.S. Patent 2,028,772 the eighering commutator is started and stopped, assortialled by the comparing screent (composed of the set of ten contact levers and associated twenty contact points). Since thereties is controlled to the appear-bentape, of the commutator is the for very magular. and Dence the mentra of the commutator is considerable, it is difficult to speak up the operation of the system and still be able to stop The commutator, accurately in its displacements. 2. When the udicating denies are glowlamps it is of cruse essential either to stop the commutator long enough for the eye to perceive the character provide a system of self-locking relays, so that of a glow lamp receives a summentary impulse through it the relay acts to keep the lamp lluminatel long enough to permit of noting the claracter Mummated. In other case this would compliate

3. There conceived of a mather of operation which not only overcomes the frequing



Otypetrois and disadvantages, but also simplifies the moteur considerably and at the same time automatic relanding of the resultants. 4. The basic principle of the modification is to follows. Instead of employing the comparing circuit to an control the starting and stopping of the commutator wheel, let the wheel be paper in pondant, regular rotation, and let the companing circuit merely determine when the electric to Carpenson will be country to Buttern. Thus, when and former through the company of the keyboard is depressed no circuit is school that thingh the cipher commutator until a completed is sected britished through the companing county deine the latter avoit by the cepber-leg transmitter it is obvious that a result on the medicating bank and take catury bank to will take place once per serolution of the commutator, accordance with the search but the exact and short when it will stake pla is a function of The character on the supher- pay tape. If the

3

Formulated can be rotated rapidly surright to that the wavelenty in the cupher commitator is complete revolution of the cupher commitator is regarded as being devided up into 26 equal infants, the cupher bey tope marely controls the so the so In the time of morning and aloweder completed and therefore which of the 26 possible equevalents will be industed for the key being depressed the duning that revolution of the commutator. Suce this auten can take place instantaneously, the commutator can be retated quite rapidly, and though the applering setting is usedular in that I taken place at irregular unterpressive revolutions of the explicit operation.

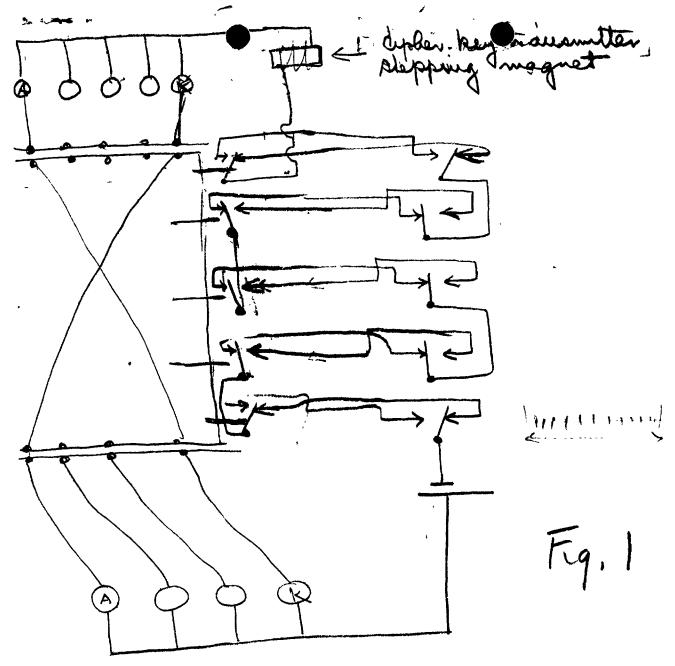
The successive revolutions of the contents of the successive revolutions of the contents within successive revolutions. commutator, the action is so rapidly performed that the operator does not notice the megularity and a radeuce in beyboard operation is parfaitly possible 5. He modified circuit arrangements are shown in accompanying tig. 1.

· 45356

four lamp undurations are not suitable blevause the action is too rapid; or if it is plowed down, one losses, the serve advantages of this modification. The system is much more souted to automatic recording, by controlling the keyboard of an associated typewhiter, or the printing action of a Trotating type wheel. used, the composison circuit, in addition to containing in series with it the tape-stepping reconstruction of also the delivery of the would be partied to be rotated symphonically with the cipler wheel

March 12, 1936

William F. Fredenm



1) anougements for looking up so that i action takes place
per 1 depression if key

1) no ball bearing contacts, but impuny contacts

3) Receptocal