

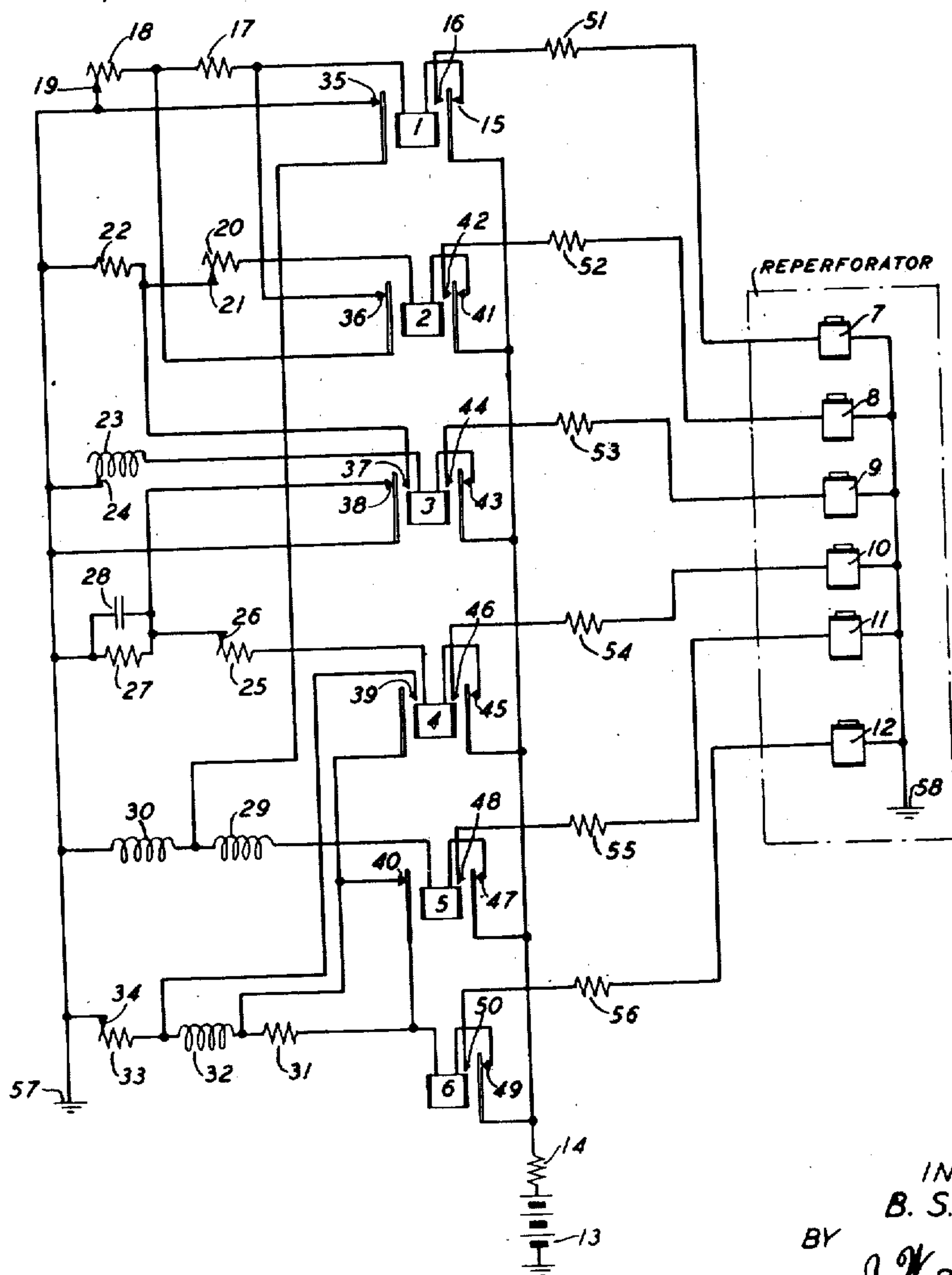
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TELEGRAPH SIGNAL ENCIPHERING KEY TAPE PRODUCING DEVICE

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TELEGRAPH SIGNAL ENCIPHERING KEY
TAPE PRODUCING DEVICEBurdette S. Swezey, Floral Park, N. Y., assignor to
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1

This invention relates to secret telegraph transmission systems. More particularly, this invention relates to the preparation of key tape for use in enciphering and deciphering permutation code telegraph signals.

It is at times important that telegraph signals transmitted over telegraph lines be enciphered to prevent the disclosure of confidential messages to unauthorized parties. One system which is probably most satisfactorily used at present in enciphering Baudot code telegraph signals involves the use of what is known in the art as a key tape. Frequently more than one key tape will be employed in enciphering and deciphering. As the number of teletypewriter stations is increased and as the need for secrecy becomes more important it is necessary to provide a larger number of key tapes. It is desirable to produce such tapes automatically. Preferably, the system of producing tapes should be completely automatic and should not require any manual manipulation. It is an object of this invention to produce random key tapes entirely automatically by means of comparatively inexpensive equipment.

Reference is made to D. B. Perry Patent 2,265,120, December 2, 1941 which discloses an arrangement wherein a group of polar relays, one corresponding to each signal element of the Baudot code signals to be enciphered are arranged to vibrate, each at a different speed. Periodically a key is operated manually. Dependent upon the position assumed by the various relay armatures associated with the relays at the moment when the key is operated, positions corresponding to the relays in a key tape will be punched or remain unpunched. The invention herein represents an improvement over the arrangement disclosed in Patent 2,265,120 in that the manual operation of a key is unnecessary. The circuit is entirely automatic.

The invention may be better understood from the following description when read with reference to the single figure of the drawing which shows an entirely automatic arrangement for controlling the perforation of a key tape by a group of vibrating relays.

Refer now to the drawing. Five vibrating relays, numbered 1 to 5, control the operation of five punch-selecting magnets, numbered 7 to 11. Vibrating relay 6 controls the operation of punching magnet 12. The armatures of relays 1 to 5 are all vibrated at different rates of speed. The rates at which the relays vibrate are manually adjustable by means of rheostats 18, 21, 25, and 33 and variable inductance 23 which may be set in

2

position prior to the start of operations and varied from time to time as desired by means of their respective sliding switches 19, 21, 26, 34, and 24. The rates of vibration of the different relays are also changed automatically as the relays vibrate by changing the impedance of the path through the winding of each relay in response to the operation of other relays. From time to time, at random intervals, relay No. 6 operates. Dependent upon the positions of the right-hand armatures associated with relays 1 to 5, magnets 7 to 11 will be energized or deenergized and the corresponding perforating punches, not shown, will be selected or remain unselected in a well-known manner. When the armature of relay 6 engages its left-hand contact, punching magnet 12 will be energized and the tape will be punched in positions where the punches have been selected.

The circuit will now be described in detail. It will be assumed that all of the armatures associated with relays 1 to 6 are in the position indicated. A circuit may be traced from battery 13 through resistance 14, contact 15, winding of relay 1, contact 36 of relay 2 which shunts resistance 17, variable resistance 18 and sliding contact 19 to ground 57 which energizes the winding of relay 1. Contact 16 is closed and contact 35 is opened.

A circuit may also be traced from battery 13 through resistance 14, contact 41, winding of relay 2, variable resistance 20, sliding contact 21 and resistance 22 to ground 57, energizing winding 2. Contacts 41 and 36 are opened. Contact 42 is closed.

A circuit may be traced from battery 13 through resistance 14, contact 43, winding of relay 3, variable inductance 23 and sliding contact 24 to ground 57 energizing relay 3. Contacts 44 and 37 are closed. Contacts 43 and 38 are opened.

A circuit may also be traced from battery 13 through resistance 14, contact 45, winding of relay 4, variable resistance 25, sliding contact 26, contact 38, which shunts resistance 27 and condenser 28 connected in parallel with resistance 27, to ground 57 energizing the winding of relay 4. Contacts 46 and 39 are closed and contact 45 is opened.

A circuit may be traced from battery 13 through resistance 14, contact 47, winding of relay 5, inductance 29 and contact 35, which shunts inductance 30, to ground 57. Contact 48 is closed and contacts 47 and 40 are open.

A circuit may be traced from battery 13 through resistance 14, contact 49, winding of relay 6, contact 40, which shunts resistance 31, inductance

3

32, variable resistance 33 and sliding contact 34 to ground 57 energizing relay 6. Contact 50 is closed and contact 49 is opened.

When the right-hand armatures of relays 1 to 6, inclusive, engage their respective left-hand contacts 16, 42, 44, 46, 48, and 50 parallel circuits are established from battery 13 through resistance 14, through the respective left-hand contacts of relays 1 to 6, through resistances 51 to 56, through the windings of punch-selecting magnets 7 to 11 to ground 58. Each of the right-hand armatures of relays 1 to 5 which is in engagement with its left-hand contact when the armature of relay 6 engages its left-hand contact 50 will close its respective circuit through its punch-selecting magnet and when magnet 12 is energized the corresponding selected punches will be operated to punch the tape in corresponding positions in a well-known manner.

The opening of the right-hand contacts associated with the right-hand armatures of relays 1 to 6 deenergize the windings of relays 1 to 6. The armatures are restored to reengage their right-hand contacts. Then the operation is repeated.

Attention is particularly directed to the fact that as the left-hand armatures of relays 1 to 5 are attracted and released they vary the energizing paths of other relays of the group. This changes the rate of vibration of the armatures of the various relays. In the case of relay 1, the opening of contact 35 removes a shunt from around inductance 30. This will effect a momentary change in the rate at which the armature of relay 5 vibrates. The operation of relay 2, by opening contact 36, inserts resistance 17 in series with the winding of relay 1. This effects a change in the speed of operation of relay 1. The operation of relay 3, by opening contact 38, removes a short circuit from around resistance 27 and condenser 28 which are connected in parallel. This effects a change in the rate of vibration of the armature of relay 4. By the closing of contact 37 of relay 3, resistance 22 is short-circuited momentarily causing a variation in the current of relay 2 and an irregularity in its rate of vibration. The operation of relay 4, by closing contact 39, connects a short circuit around inductance 32. This effects a change in the rate of vibration of the armature of relay 6. The operation of relay 5, by opening contact 40, removes a short circuit around resistance 31. This likewise effects the rate of operation of relay 6. Sliding contacts 19, 21, 24, 26, and 34 may be adjusted manually to vary the amount of resistance or inductance of the apparatus unit with which each is associated. This will provide an additional adjustment in the rate of vibration of each of the associated relays.

It will be realized that proper adjustments may be required so that magnets 7 to 12 will be fast enough to follow their respective relays 1 to 6 and fully perform their operations. Also relay 6 and magnet 12 should be slow enough to allow changes in the punch selections to take place (where such changes are being called for by the vibrating relays) between successive operations of the punching magnet 12.

It is pointed out, that even though a definite

4

arrangement of circuit elements is shown as being established by the left-hand armatures of relays 1 to 6, the actual arrangement employed may be any desired combination of apparatus units. Also where a single armature or a make or a break contact is shown, the arrangement may provide for more than one armature and for front and back contacts each controlling the disposition of additional circuit elements which may be momentarily connected into or removed from the circuits, to further complicate the erratic vibrating action of the relays 1 to 5 for setting up a random selection, and to cause relay 6 to vibrate in an erratic manner to cause perforating of the tape by magnet 12 in a random manner.

The manner in which the punched tape is advanced after it has been punched is well known in the art.

What is claimed is:

1. In a mechanism applicable for enciphering multielement permutation code telegraph signals, a group of vibrating relays for determining the individual marking and spacing elements in the multielement cipher code and a single vibrating relay for automatically controlling the registering of the elements determined by said group.

2. A mechanism in accordance with claim 1 in which the rate of vibration of the vibrating relays is varied in response to the vibration of said relays.

3. In a mechanism applicable for enciphering multielement permutation code telegraph signals, a vibrating relay, automatic means for varying the frequency of operation of said relay, and means dependent upon the operation of said relay for energizing a punch magnet.

4. In a mechanism applicable for enciphering multielement permutation code telegraph signals, a vibrating relay and a tape punching magnet controlled by said relay.

5. In a mechanism applicable for enciphering multielement permutation code telegraph signals, a relay conditioned to vibrate automatically to determine the nature of a particular signal element in the cipher code, and means connected to said relay for automatically varying the period of vibration of said relay.

6. In a mechanism applicable for enciphering multielement permutation code telegraph signals, a plurality of vibrating relays for determining the character of signal elements in an enciphering code, and means responsive to the operation of certain of said relays for varying the frequency of vibration of others of said relays.

7. An electromechanical mechanism for producing enciphering key tape for permutation code telegraph signals comprising a plurality of relays having means for mutually varying their rate of operation automatically, and means connected to each of said relays for controlling an individual signal element recording device.

8. In a mechanism for producing enciphering key tape for permutation code telegraph signals, a plurality of relays arranged to vibrate at different rates, each relative to the other, and means responsive to the operation of said relays for varying the rate of vibration of said relays.

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