

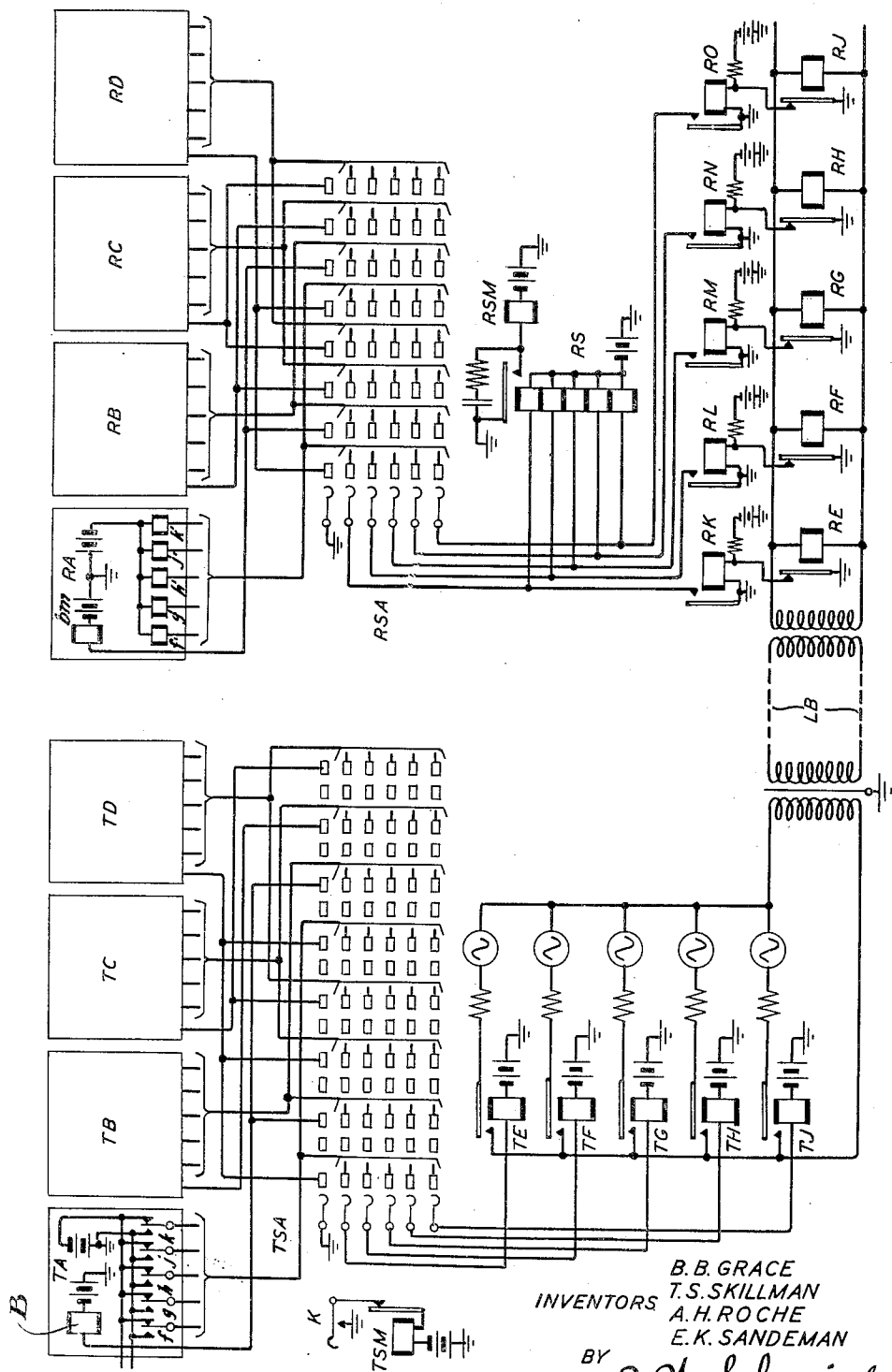
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FREQUENCY DISCRIMINATION SIGNALING SYSTEM

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B. B. GRACE  
T. S. SKILLMAN  
A. H. ROCHE  
E. K. SANDEMAN

BY *J. W. Schmied*  
ATTORNEY

# UNITED STATES PATENT OFFICE

BERTRAM BARNETT GRACE, THOMAS SAMUEL SKILLMAN, ALLEMAN HOLLY ROCHE, AND EDWARD KENNETH SANDEMAN, OF ALDWYCH, LONDON, ENGLAND, ASSIGNORS TO WESTERN ELECTRIC COMPANY INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

## FREQUENCY DISCRIMINATION SIGNALING SYSTEM

Application filed October 25, 1930, Serial No. 491,158, and in Great Britain November 5, 1929.

This invention relates to printing telegraph systems and apparatus and more particularly to such as use an equal letter code such as the Baudot or five unit code. Each element consists of current or no-current (for single current working) or of either positive or negative current (for double current working).

According to one feature of this invention the elements of a signal of an equal letter code are sent simultaneously and consist of different frequencies, while the signals themselves control the conditioning of the receiving apparatus to receive successive signals.

This conditioning of the receiver apparatus may be the operation of the re-setting magnet usually provided in five-magnet printers, or it may be the stepping of a distributor.

The re-setting magnet or the stepping magnet of a distributor is energized under control of the received signals.

Either of two arrangements for causing this energization may be used in accordance with the invention.

In one arrangement a pause or period of no-current is created between successive signals, and the magnet energized each time a signal is received.

It will be observed that this invention is particularly useful as applied to a system of combined telephony and telegraphy in which the direction of transmission of both speech and telegraph signals is reversed under control of the speech.

With this invention the telegraph signals are not in any way mutilated or divided, and the ordinary synchronized distributors which would be difficult to control in such a system, are avoided.

The features of this invention so far described may be used in connection with multiplex distributors, as above pointed out, but when so used six segments of the distributor must be wiped over simultaneously by six brushes. At the transmitting end the sixth segment and brush are used in accordance with a feature of this invention, to energize the stepping magnet of a tape transmitter

belonging to a channel, the five segments of which have already been wiped over.

At the receiving end the sixth segment is used to energize the re-setting magnet of the receiving apparatus of a preceding channel.

The invention will now be described as illustrated on the attached drawing which shows one specific embodiment of the invention.

Referring now to the drawing, a number of automatic tape controlled transmitters, TA, TB, TC, TD, etc. are each provided with contacts *f, g, h, i* and *k* controlled by the tape, and a stepping magnet B.

A distributor TSA in the form of a step-by-step switch is used. This distributor has six banks of contacts and six brushes as shown, and the brushes are stepped over the contacts by a stepping magnet TSM connected in a self interrupting circuit. The upper brush is connected to ground and the other five brushes are connected to battery through five relays TE, TF, TG, TH and TJ as shown. The contacts *a, b, c, d, e* of each transmitter when operated serve to connect earth to the five contacts over which brushes simultaneously wipe.

The contacts of transmitter TA are shown connected to the contacts in the first set, those of TB to the contacts of the third set and so on. The uppermost brush when passing over its contact in the third set connects ground to the stepping magnet B of the first transmitter which serves to advance the tape for the next signal from that transmitter. The alternate sets of contacts on the distributor TSA are left unconnected so that a pause or periods of no current occur between successive signals.

Five sources of alternating current, each of a different frequency, are provided and each of the relays TE—TJ serves to connect a particular source to the line LB.

The different frequencies may be produced in any convenient manner, as by thermionic oscillators or by rotating commutators on a common motor shaft.

It will be understood that if this invention is employed in a combined telephone and tele-

graph system, all five frequencies lie below the voice frequency range.

At the receiving end relays RE, RF, RG, RH and RJ tuned to the different frequencies are connected to the line. These relays operate direct current relays RK, RL, RM, RN and RO. These latter relays connect earth to the contacts of the receiving distributor RSA and also to five windings of a relay RS, so that the relay RS is operated each time one of the relays RK—RO is operated.

A number of receivers RA, RB, RC and RD, corresponding to the transmitters TA, TB, TC and TD are each provided with a re-setting magnet *bm* and five selecting magnets *f'*, *g'*, *h'*, *j'* and *k'* corresponding to transmitter contacts *f*, *g*, *h*, *j* and *k* respectively. These magnets are connected to the contacts of receiving distributor RSA.

When a combination of signals is received by the relays RK—RO, relay RS energizes and closes a circuit for the stepping magnet RSM of the distributor RSA. This circuit is opened when the relays RK—RO release in response to a pause of no current between successive signals. Thus the frequency of operation of the stepping magnet RSM corresponds to the speed of the transmitting distributor TSA.

Although the invention has been described with reference to a code in which the signals are represented by combinations of five impulses, it is to be understood that a code combination in which the signals are each made up of four, or six, or any other number of impulses may also be employed without departing from the spirit of this invention.

What is claimed is:

1. A communication circuit comprising means for transmitting successive signal characters, each character being represented by code combinations of impulses, the impulses of each combination being transmitted over the same line simultaneously and at different frequencies, a receiving mechanism having a plurality of recording devices adapted to be actuated by the respective impulses in each code combination of impulses for recording the transmitted characters, a stepping device for distributing said code combinations of impulses to said recording devices in sequence, and means under control of the received impulses effective to control the operation of said stepping device and to condition the receiving mechanism for the reception and the recording of the succeeding character.

2. Transmitting apparatus for multiplex printing telegraph apparatus comprising a distributor having a plurality of contacts moved over simultaneously by a set of brushes and a stepping magnet for advancing said brushes with respect to said contacts, certain of said contacts included in circuits from the contacts of an automatic telegraph trans-

mitter and another of said contacts included in a circuit leading to the stepping magnet of another such transmitter.

3. Receiving apparatus for multiplex printing telegraph apparatus comprising a distributor with a plurality of contacts moved over simultaneously by a set of brushes, certain of said contacts being included in circuits of the selecting magnets of a printing telegraph receiver and another of said contacts in a circuit of the re-setting magnet of another receiver.

In witness whereof, we hereunto subscribe our names this 9th day of September, 1930, and by ALLEMAN H. ROCHE on the 14th day of October, 1930.

BERTRAM BARNETT GRACE.  
THOMAS SAMUEL SKILLMAN.  
ALLEMAN HOLLY ROCHE.  
EDWARD KENNETH SANDEMAN.

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