

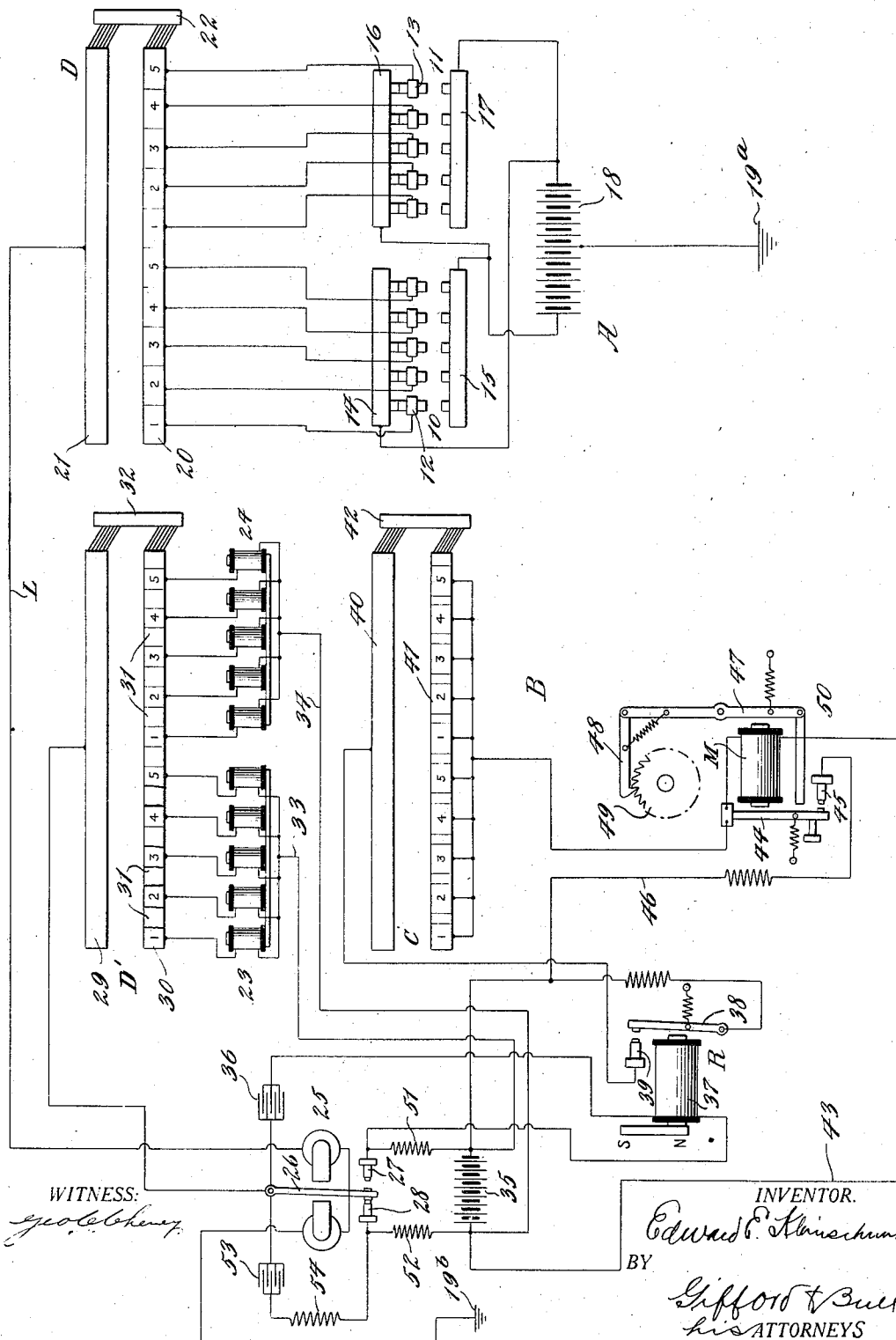
Feb. 8, 1927.

1,616,808

E. E. KLEINSCHMIDT

SYNCHRONIZING SYSTEM

Filed Oct. 20, 1919



Patented Feb. 8, 1927.

1,616,808

UNITED STATES PATENT OFFICE.

EDWARD E. KLEINSCHMIDT, OF BROOKLYN, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO MORCKRUM-KLEINSCHMIDT CORPORATION, OF CHICAGO, ILLINOIS, A CORPORATION OF DELAWARE.

SYNCHRONIZING SYSTEM.

Application filed October 20, 1919. Serial No. 331,970.

This invention more particularly relates to a system for synchronizing the speeds of the distributors at two different stations in a printing telegraph system, or other apparatus. In the Baudot system of printing telegraphy, rotatable members or distributors are used at the stations between which intelligence is to be communicated, and in order properly to transmit the signals, it is necessary that the distributors rotate substantially in synchronism.

The present invention provides novel means for synchronizing the rotation of these rotatable members, in a simple and effective manner.

The accompanying drawing is a diagrammatic view illustrating one embodiment thereof in connection with a multiplex printing telegraph of the Baudot type. The details of the apparatus not shown in the drawing are well understood and old in the art.

A and B indicate the transmitting and the receiving stations, respectively, of a multiplex printing telegraph system, the two stations being connected by line L. At the transmitting station A are located any desired number of transmitters, here shown as two in number, 12 and 13, corresponding in this case to two channels, which may be constructed as shown in the Patent No. 1,460,357, issued June 26, 1923. Briefly, it may be stated that each transmitter comprises sets of movable contact tongues 12 and 13, which are vibrated between stationary contact points electrically connected together by conductors 14, 15 and 16, 17, respectively, it being understood that a signal in the Baudot system comprises five electric impulses, the impulses being of opposite polarities and arranged sequentially in various combinations. A line battery 18 is connected at its middle point to ground at 19^a, one pole of the battery being connected to conductors 14 and 17 of the two transmitters, while the other pole is connected to contacts 15 and 16. The movable contact tongues 12 and 13 are connected to line L through distributor D, which is, as well as the distributor at station B, shown developed. The movable contact tongues 12 and 13 are connected to contact segments 1, 2, 3, 4 and 5, respectively, of ring 20 of distributor D, the other ring 21 of which may

be continuous, as shown, and connected to line L, the two rings being bridged by rotating brush 22. The selector magnets at the receiving station, corresponding in number to the sets of contacts at the transmitting station, are represented by the numerals 23 and 24.

A polarized relay 25 is included in line L at station B, it being understood that a similar line relay, which is not here illustrated, is located at station A, the line circuit being grounded at 19^b at station B. Armature 26 of polarized relay 25 vibrates, in response to reversals of current coming over the line, between contacts 27 and 28, and is connected to solid ring 29 of distributor D' at station B. The various magnets of each of the groups 23 and 24 are connected to alternate segments 1, 2, 3, 4 and 5 of ring 30 of distributor D', which segments correspond in number to those of ring 20 of distributor D at station A and are correspondingly numbered, the intervening segments being indicated at 31, the two rings 29 and 30 being bridged by rotating brush 32. One set of terminals of the magnets of each of the groups 23 and 24 are electrically connected together and are connected by conductors 33 and 34 to contact points 27 and 28, respectively, and also to the opposite poles of local battery 35 at station B, while the opposite terminals of these magnets are connected to the respective segments of ring 41.

A condenser 36 for bringing about the actuation of the correcting mechanism for the distributor at station B is provided, one terminal of the condenser being connected to armature 26 while the other terminal is connected to winding 37 of a relay, indicated, in general, by the letter R, and which controls the operation of the correcting mechanism, armature 26 thus controlling both the receiving circuit, and the correcting circuit through the same contacts. The other terminal of winding 37 is connected directly to contact point 27 and through battery 35 to contact point 28, so that when the armature is moved into engagement with contact 28 as shown in the drawing, condenser 36 is charged by battery 35, and when moved against contact 27, the condenser is discharged, the charge and discharge taking place at the moment of reversal of the line impulses. Relay R is preferably polarized

by the provision of a permanently magnetized core, the yoke for which is indicated at N S. Relay R is provided with an armature 38 connected to battery 35 and contact 39 which is engaged by the armature.

Relay R controls the actuation of operating magnet M which actuates the correcting arrangement for the distributor at B. Magnet M is also controlled by a member indicated, in general, by the character C, comprising a continuous ring 40 connected directly to contact 39 of relay R and a segmented ring 41, the two rings being bridged by rotating brush 42. Ring 41 is provided with a plurality of segments, the alternate ones of which correspond in number and in position to those of segmented ring 30 of distributor D', and which are electrically connected together and to one terminal of operating magnet M, the intervening contacts being dead. For each of the segments 1, 2, 3, etc. of the ring 20 at station D there are thus two segments on the ring 41 at station D', one of which is included in the local circuit of the operating magnet M and the other of which is a blank or dead contact. The other terminal of operating magnet M is connected by conductor 43 to one terminal of battery 35. In order to prolong the energization of magnet M, a locking circuit is provided, including an armature 44, a contact 45, which the armature engages, and conductor 46, which is joined to the conductor extending from armature 38 to the battery 35. Magnet M actuates an armature 47 to the end of which armature is pivoted pawl 48 which engages ratchet wheel 49, the movement of which corrects the speed of distributor D' and synchronizes the movement thereof with that of distributor D. To the opposite end of the armature is connected an arm 50 which opens the locking circuit of magnet M when the armature has completed the movement necessary to actuate the correcting wheel 49.

Suitable resistances, such as 51 and 52, between contacts 27, 28, and the respective poles of battery 35, are provided.

A second balancing condenser 53 equivalent to condenser 36, and a resistance 54 equivalent to the resistance of winding 37 of relay R, are preferably provided and are connected to armature 26 and to contact 28. The purpose of the condenser and the resistance is to maintain the circuit conditions of the selector magnets 23 and 24 the same under all conditions.

The operation of the system embodying the present invention is as follows:

Brush 22 at station A, which may be termed the correcting distributor, is rotated at substantially constant speed, and brushes 32 and 42 at station B, at which the correction takes place, and which may be termed the corrected distributor, also rotate at sub-

stantially constant speed, but at a speed which is slightly greater or slightly less, than that of distributor D. During the normal operation of the system, signals consisting of current impulses of different polarity are being sent from station A to station B, which impulses vibrate armature 26 between contact points 27 and 28. When brush 22 is in engagement with segment 1 shown at the left of distributor D, in case the distributors at the two stations are in synchronism, brush 32 of distributor D' will be in engagement with segment 1 at the left of distributor D', and assuming that a positive impulse is sent over the line, at the time brush 22 engages segment 1, armature 26 will be moved into engagement with contact point 28 and a circuit will be closed through the magnet at the left of group 23 through segment 1 of the distributor, armature 26, contact point 28 and battery 35. Thereupon, condenser 36 will be charged through a circuit including armature 26, contact point 28, battery 35 and winding 37 of relay R. Correspondingly, when a negative impulse is sent over the line, armature 26 will be moved against contact point 27, and condenser 36 will discharge through winding 37, contact point 27 and armature 26. Condenser 36 is, therefore, charged or discharged, and winding 37 energized on each charge or discharge of the condenser at each reversal of the line current, the armature being attracted, however, only at the charge or discharge, preferably discharge, because of the polarized core. The claims refer to condenser current, and intend to cover the current both at charge and discharge.

Now, when distributor D' is in synchronism with distributor D, brush 42 is in engagement with one of the intervening dead segments of ring 41 and brush 32 in engagement with one of the intervening dead segments of ring 30 at the moment of reversal of the line impulses, it being understood that the blank or dead segments of segmented ring 41 are sufficiently wide to insure the magnet 37 being energized and deenergized and the circuit closer comprising the armature 38 being closed and again opened, during normal operation, while the brush 42 is passing over one of the blank segments of the ring 41. The distributor at station B, however, is running at a slightly greater speed than that at station A, with the result that the position of the brushes on the distributor at station B, is gradually advanced with reference to the brushes at station A and brush 42 will eventually be in contact with one of the numbered segments when the reversal takes place. A circuit is then closed through magnet M, distributing member C, contact 39, armature 38 and battery 35, and the correcting device actuated to bring the brushes at

the receiving station into synchronism with the brushes at the transmitting station. As soon as magnet M is energized, a locking circuit for magnet M is closed through armature 44, contact 45, conductor 46 and battery 35, to prolong the energization of magnet M until the movement of pawl 48 and ratchet wheel 49 through armature 47 is completed in a direction to correct the positions of the brushes at the receiving station. As soon as armature 47 has completed such movement, arm 50 pushes back armature 44 and thus opens the locking circuit of the magnet and restores the parts to normal position.

What I claim and desire to secure by Letters Patent of the United States is:—

1. In a telegraph system, two stations, a rotatable member at each of said stations, a line conductor connecting said stations, means for transmitting over the line impulses of reverse polarity, a condenser located at one of said stations and arranged to be charged and discharged in response to the reversals of said impulses, a polarized relay included in the circuit of said condenser, a magnet controlled by said polarized relay for synchronizing the speed of the associated rotatable member with that of the other, and a locking circuit for said magnet for prolonging the energization thereof.

2. In a printing telegraph system, a rotary correcting distributor, a rotary corrected distributor, means comprising an electro-magnetic operating device for correcting the angular position of said corrected distributor to bring the same into step with the other, an electric circuit including said electro-magnetic device, a circuit-closer included in said circuit, said corrected distributor comprising segments included in said circuit and blank segments over which, during normal operation, the brush of the corrected distributor passes during the time of closure of said circuit-closer, and means comprising a condenser included in the circuit of said magnet for momentarily energizing the same on changes of line impulses.

3. In a printing telegraph system, a rotary correcting distributor, a rotary corrected distributor, means comprising an electro-magnetic operating device for correcting the angular position of said corrected distributor to bring the same into step with the other, an electric circuit including said electro-magnetic device, a circuit-closer included in said circuit, a polarized relay for actuating said circuit-closer, and means for momentarily operating said circuit-closer in response to changes in line impulses comprising a condenser included in circuit with said polarized relay, said corrected distributor comprising segments included in said circuit and blank segments over which, dur-

ing normal operation, the brush of the corrected distributor passes during the time of closure of said circuit-closer.

4. In combination, two stations, a line connecting the same, impulse transmitting means at one station, impulse receiving means at the other station, a polarized relay in said line, circuit closing means controlled by said relay, a circuit including said circuit closing means, a second polarized relay in said circuit responsive to line impulses received by said first polarized relay, a second circuit controlled by said second polarized relay, and an operating magnet in said circuit adapted to establish synchronism between said transmitting and receiving means.

5. In combination, two stations, a line connecting the same, impulse transmitting means at one station, impulse receiving means at the other station, a polarized relay in said line, circuit closing means controlled by said relay, a circuit including said circuit closing means, a condenser in said circuit adapted to be charged and discharged according to the closing and opening of said circuit through said circuit closing means, a second polarized relay in said circuit responsive to line impulses received by said first polarized relay, a second circuit controlled by said second polarized relay, and an operating magnet in said circuit adapted to establish synchronism between said transmitting and receiving means.

6. In combination, two stations, a line connecting the same, impulse transmitting means at one station, impulse receiving means at the other station, a polarized relay in said line, circuit closing means controlled by said relay, a circuit including said circuit closing means, a second polarized relay in said circuit responsive to line impulses received by said first polarized relay, a second circuit controlled by said second polarized relay, an operating magnet in said circuit adapted to establish synchronism between said transmitting and receiving means, and a locking circuit for said operating magnet for prolonging the energization of said magnet until synchronism between said stations is established.

7. In combination, two stations, a line connecting the same, impulse transmitting means at one station, impulse receiving means at the other station, a polarized relay in said line, circuit closing means controlled by said relay, a circuit including said circuit closing means, a condenser in said circuit adapted to be charged and discharged according to the closing and opening of said circuit through said circuit closing means, a second polarized relay in said circuit responsive to line impulses received by said first polarized relay, a second circuit controlled by said second polarized relay, an operating magnet in said circuit adapted to establish

synchronism between said transmitting and receiving means, and a locking circuit for said operating magnet for prolonging the energization of said magnet until synchronism between said stations is established.

5 8. A synchronizing system comprising a transmitting distributor, a receiving distributor, selective mechanism controlled from said receiving distributor, correcting means
10 for said receiving distributor to maintain substantial synchronism thereof with said transmitting distributor, and means to produce substantially the same electrical conditions in said selective mechanism when said
15 correcting mechanism is not in operation, as when said correcting mechanism is in operation.

9. A system comprising apparatus for
20 transmitting code combination of electrical conditions, a rotary distributor for said

transmitting apparatus, a rotary receiving distributor, receiving apparatus controlled by said receiving distributor and selectively responsive to said conditions, correcting means operative only on the reception of certain of said conditions, and means operative on the reception of the remaining ones of said conditions to produce substantially the same electrical conditions in said receiving apparatus as when said correcting mechanism is operative.

10. Receiving apparatus comprising a line relay, a distributor, a correcting magnet for said distributor, an electro-magnet coacting with said distributor to control said correcting magnet, and a condenser charged and discharged continuously by the operation of said relay independently of said correcting means.

EDWARD E. KLEINSCHMIDT.