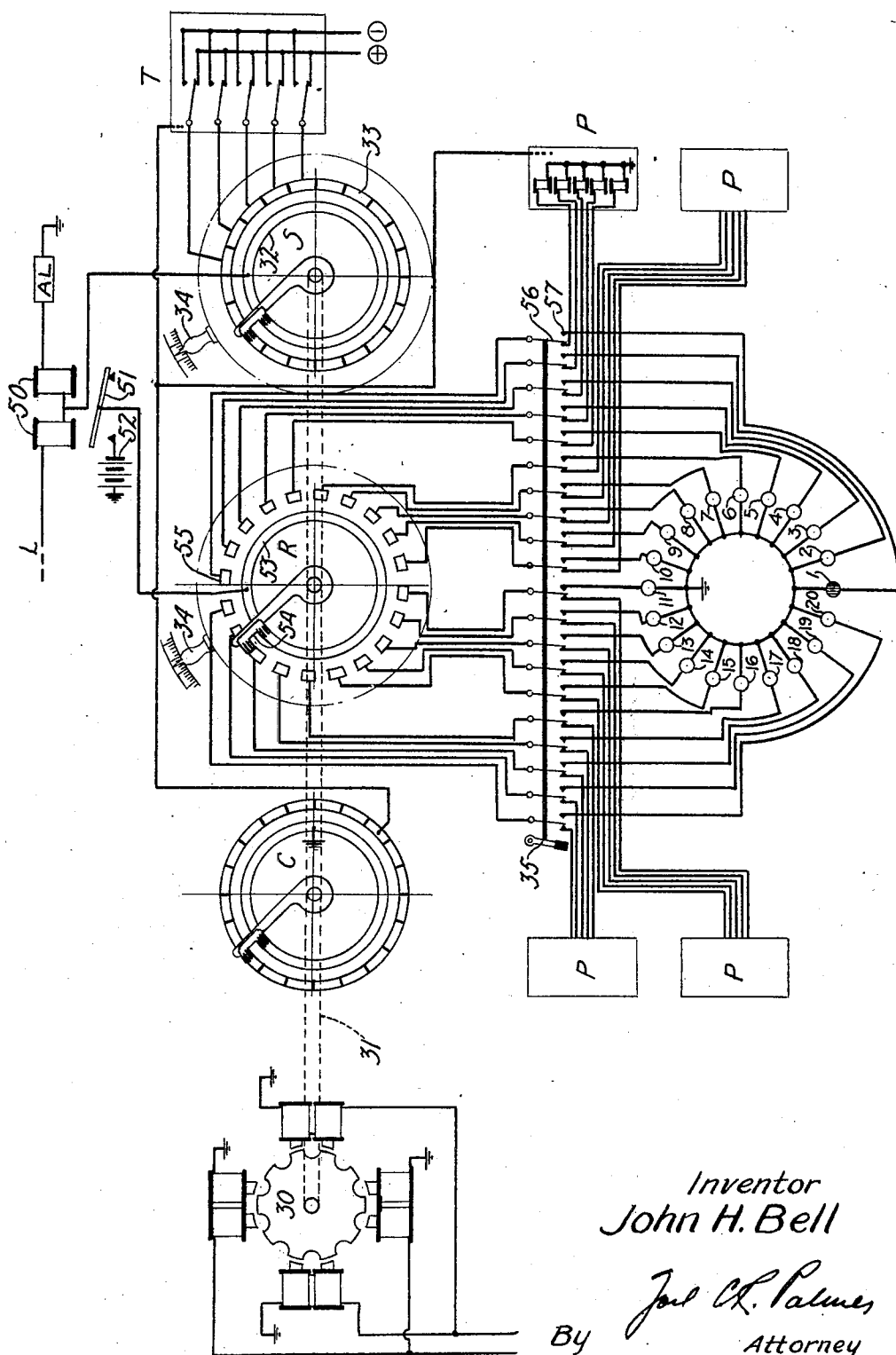


J. H. BELL.
 SYNCHRONIZING SYSTEM.
 APPLICATION FILED MAY 1, 1920

1,388,507.

Patented Aug. 23, 1921.



UNITED STATES PATENT OFFICE.

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SYNCHRONIZING SYSTEM.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHN H. BELL, a citizen of the United States, residing at South Orange, in the county of Essex, State of New Jersey, have invented certain new and useful Improvements in Synchronizing Systems, of which the following is a full, clear, concise, and exact description.

This invention relates to synchronizing systems and particularly to synchronizing indicating means for use in printing telegraph systems.

The principal object of this invention is the provision of efficient and reliable indicating means which will give an indication when two or more rotatable objects are in synchronism, or, if out of synchronism, will give an indication of the relative phase displacement of such objects.

The present methods of determining synchronism and of observing the difference in speed between the driving motors at two stations of a multiplex printer installation, require the utilization of one or more receiving printers. It is customary in securing synchronism of two or more driving motors in a multiplex printer installation, to use one station as the pace-setting station and transmit from that station to another, a group of signaling impulses representing a particular character and observe at the receiving station whether the character transmitted is recorded at the receiving station, or whether another or other characters are recorded. For example, the operator at the sending or pace-setting station, may transmit signals representing the character C, which, according to the Baudot code, is represented by five impulses — + + + —. If the printer at the receiving or corrected station records the character C repeatedly, then it is clearly evident that the sending and receiving distributors are in synchronism. However, if the receiving printer records, instead of the character C, the character M, which is represented by five impulses of — + + +, then it will be evident that the receiving distributor is traveling in advance of the sending distributor the equivalent of one segment. On the other hand, if the receiving printer records, instead of the character C, the character U, which is represented by five impulses of + + + — —, it will indicate that the receiving distributor is lagging with respect to the sending dis-

tributer the equivalent of one segment. The operator at the receiving station must then adjust the receiving distributor face or brushes so that the transmitted impulses are properly received. However, the receiving distributor may be so far out of synchronism with respect to the sending distributor that it may be difficult to tell the relative phase displacement and it may be impossible to tell which way the distributor face or brushes should be shifted or oriented in order to bring the distributors in synchronism with the least possible delay. Furthermore, it is sometimes desirable to have the operating tables on which the receiving printers are placed some distance from the distributor tables on which the driving motor and impulse distributors are located. Under such conditions it is difficult and at times practically impossible to observe the difference in speed of the sending and receiving distributors by means of the characters recorded by the receiving printer and at the same time adjust the receiving distributor in order to bring it into synchronism with the sending distributor at the pace-setting station.

It is the purpose of this invention to overcome such difficulties by providing suitable indicating means associated with the distributing apparatus without relying upon the receiving printers so that the difference in speed of the distributors at the correcting and corrected stations may be observed and adjusted with a negligible amount of delay.

The above and other objects of this invention will be fully set forth in the following description and claims and will be more readily understood by reference to the accompanying drawing in which the preferred embodiment of the invention is disclosed diagrammatically. In the attached drawing, the sending, receiving and local distributor brush arms are shown mounted on a single shaft 31 driven by a synchronous motor or phonic wheel 30. While a phonic wheel of the La Cour type is shown, it is to be understood that any other suitable driving means may be provided. The sending distributor S is illustrated as comprising a continuous ring 32 and a segmented ring 33 of which the segments are arranged in four groups of five segments each. In the drawing the segments of one quadrant only are shown connected to the contacts of a trans-

mitter T, which may be of the keyboard or automatic type, both of which are well known in the art. It is to be understood that similar transmitting means may be connected to each of the other distributor quadrants. The receiving distributor R, like the distributor S, is illustrated comprising a continuous ring and a segmented ring of which the segments are arranged in four groups of five segments each. The segments of each quadrant of the receiving distributor are normally connected to receiving magnets in suitable recording instruments, for example printers as indicated by the character P. Included in the circuits extending from the receiving distributor segments are switch members controlled by a gang switch 35, whereby the receiving circuits may be disconnected from the selecting magnets of the recording device P and connected to contacts controlling circuits through a bank or group of lamps numbered 1 to 20 inclusive, one lamp of which may be distinguished from the remaining 19 by any suitable means such as a red or green reflector cap. In the drawing this special lamp is indicated at 1. Both the sending and receiving distributors are provided with a handle or extension 34 by means of which either distributor face or distributor brush arm may be shifted or oriented in order to bring the said distributor into synchronism with the distributor at the pace-setting station. The local distributor C is provided with a continuous ring and a segmented ring commonly employed for the purpose of controlling local operations, as for instance, the operation of a printing magnet in the receiving printers P, or the operation of a tape-feeding magnet of the transmitters T.

The driving motor 30 may, if desired, be operated and controlled by line current impulses as disclosed in Patent #1,185,712, dated June 6, 1916. Since the driving mechanism forms no part of the present invention, a detailed description thereof is unnecessary.

Now let it be assumed that a distant station is acting as the pace-setting station and that there is provided at the distant station suitable transmitting and sending apparatus such, for example, as illustrated at T and S of the attached drawing; also assume that the operator at the distant station sends repeatedly the character E which is represented by five impulses of + — — — — current, from a single transmitter until the operator at the receiving or corrected station has brought his distributor into synchronism with the distant station. Therefore, the first impulse received over the line L being a positive impulse, will operate the line relay 50 to move its armature 51 into engagement with the lower contact connected to grounded battery 52, and if the gang

switch 35 is now thrown to connect the lamp circuits to the segments of the receiving distributor and if the receiving distributor is in synchronism with the sending distributor an energizing circuit will be completed from grounded battery 52, armature 51, receiving ring 53, distributor brush 54, segment 55, switch member 56, contact 57, through the especially designated lamp 1 to ground. If the two distributors are in exact synchronism, the lamp 1 will be lighted intermittently or once for each revolution of the distributor brush arm. On the other hand, however, if the receiving distributor is not in synchronism with the distributor at the pace-setting station, then one of the other 19 lamps will be lighted during each revolution. If the corrected and correcting distributors are traveling in unison or in synchronism, and not in synchronism, then a particular lamp will be lighted intermittently or once during each revolution of the receiving distributor. However, if the receiving distributor is not rotating in synchronism with the sending distributor and is either lagging or leading with respect to the other distributor, then a different lamp may be lighted at each revolution and an indication will thereby be given whether the receiving distributor is running faster or slower than the sending distributor, that is, the direction in which the lamps are sequentially lighted will indicate which distributor is running the faster of the two. If any one particular lamp other than the especially designated lamp is lighted repeatedly, it will indicate the degree of orientation through which the receiving distributor should be turned in order to bring the two stations in synchronism. Assuming that the lamp 5 is lighted repeatedly instead of lamp 1, then the receiving operator will, by means of the handle 34, orient the receiving distributor the extent of five segments or until the especially designated lamp is repeatedly lighted and then by operating or shifting the gang switch 35, the character signals may be directed to the selecting mechanism of the receiving recorders and both stations may then send and receive at will.

It will be readily understood that the group or bank of lamps indicated in the attached drawing, may be located or positioned on the distributor table in close proximity with the synchronous distributors, and the receiving printers may be disconnected from the line and be disregarded entirely until the distributors are brought into synchronism, as indicated by the signal-indicating means.

What is claimed is:

1. A synchronizing system comprising a correcting station and a corrected station, a current impulse distributor at said correcting station, a current impulse distributor at the corrected station, a recording mechanism

at the corrected station adapted to be associated with the said current impulse distributor, means at the corrected station for indicating the relative phase displacement of said current impulse distributors, and means for connecting the indicating means to and disconnecting the recording mechanism from the current impulse distributor.

2. A synchronizing system comprising a correcting station and a corrected station, a current impulse distributor at said correcting station, a line circuit, a current impulse distributor at the corrected station, recording mechanism at the corrected station adapted to be connected to the said current impulse distributor, a group of lamps responsive to line signals for indicating the relative phase displacement of said current impulse distributors, and means for connecting the group of lamps to and disconnecting the recording mechanism from the current impulse distributors.

3. A synchronizing system comprising a correcting station and a corrected station, a current impulse distributor at said correcting station, a line circuit, a current impulse distributor at the corrected station, record-

ing mechanism at the corrected station adapted to be connected to the said current impulse distributor, a group of lamps responsive to line signals for indicating when the said current impulse distributors are in synchronism, and means for connecting the group of lamps to and disconnecting the recording mechanism from the current impulse distributor.

4. A synchronizing system comprising a correcting station and a corrected station, a current impulse distributor at said corrected station, recording mechanism at the corrected station normally associated with the said current impulse distributor, means at the corrected station for indicating the relative phase displacement of said current impulse distributors, switching means for connecting the indicating means to and disconnecting the recording mechanism from the current impulse distributor, and means for orienting the distributor at the corrected station for bringing said distributors into synchronism.

In witness whereof, I hereunto subscribe my name this 17th day of April, A. D. 1920.

JOHN H. BELL.