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POLAR RELAY STORAGE SYSTEM

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Fig. 2.

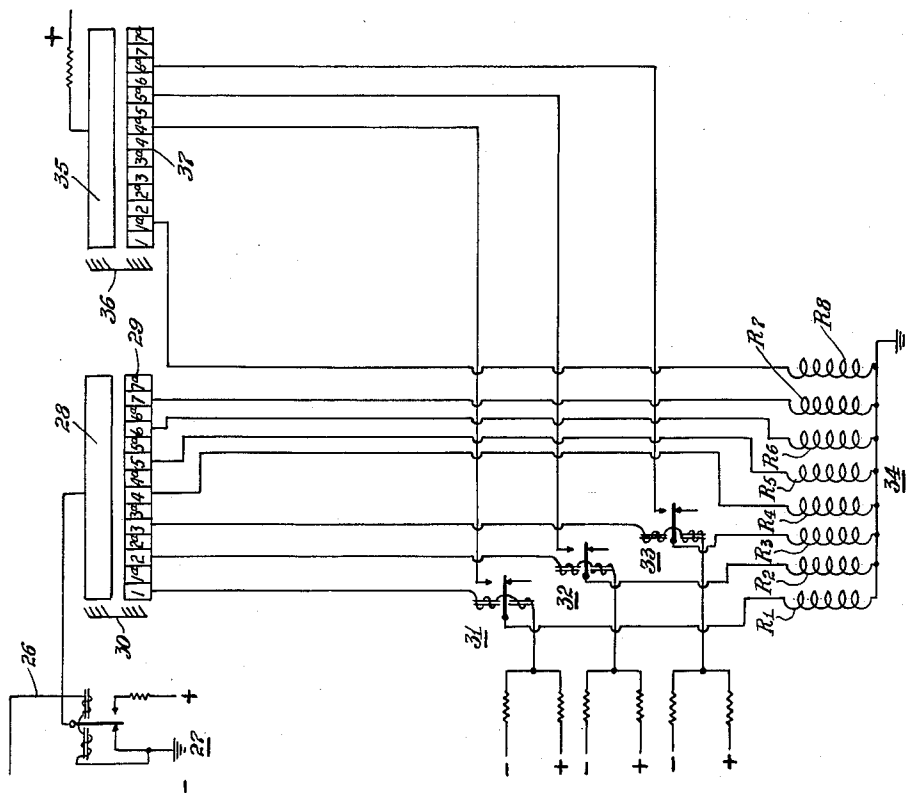
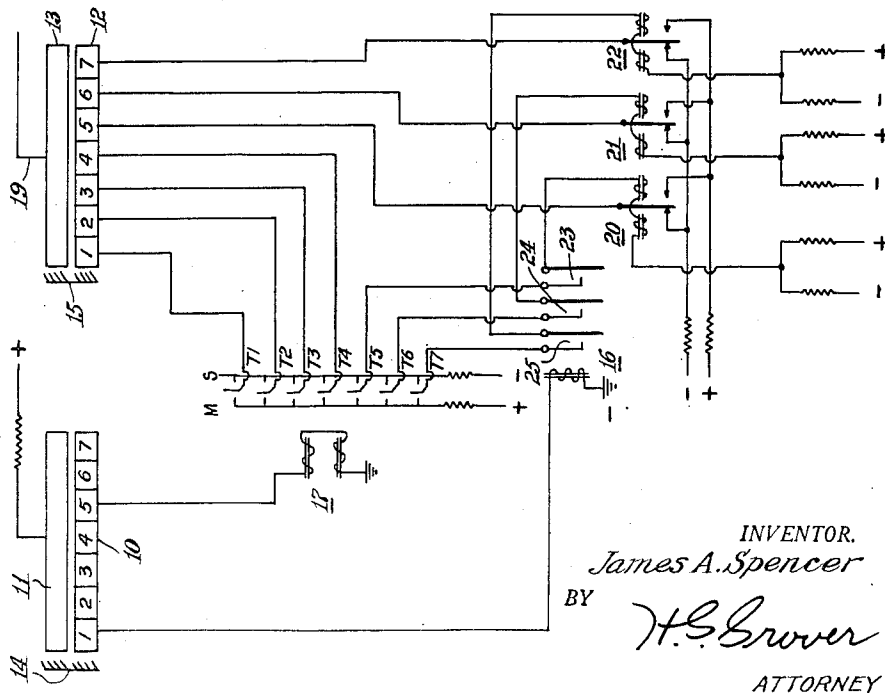


Fig. 1.



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POLAR RELAY STORAGE SYSTEM

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6 Claims. (Cl. 178—17)

This invention relates to polar storage systems for telegraph signals.

In my patents, 2,274,103, February 24, 1942, and 2,327,075, August 17, 1943, I disclosed systems for storing telegraph signals with relays of the non-polar type and while these have been successful, a comparatively large number of relays is used and each relay controls a comparatively large number of contacts. This invention has been devised as an improvement on those systems.

An object of the invention is to provide signal storage with a reduced number of relays and relay contacts.

Another object is to provide signal storage with polar type relays for reducing the number of relays, as well as the number of contacts controlled thereby.

Other objects of the invention will appear in the following description, reference being had to the drawing, in which:

Figure 1 is a circuit diagram of the transmitting system.

Figure 2 is a circuit diagram of the receiving system.

Referring to Fig. 1, the transmitting system is shown as adapted for seven-unit code signals, but this is by way of example and it could be used for a code system of five or any other number of units. The distributor consists of a segmented ring 10 and solid ring 11 for controlling local operations and another segmented ring 12 and a solid ring 13 for transmitting the code signals. Brushes 14 and 15 are rotated in unison by a motor maintained at the desired constant speed. The motor and speed control devices are not shown, as they, per se, are old in the art and no particular type is required for operation of this invention.

Brush 14 connects solid ring 11 to the seven segments of ring 10 in succession and brush 15 connects solid ring 13 to the seven segments of ring 12 in synchronism and in phase with the connections of the seven segments of the local function ring by brush 14.

The local function ring 11 is connected to the positive terminal of the voltage source and segment No. 1 of ring 10 is connected through the coil of master relay 16 to ground, which may be the negative terminal of the voltage supply. Segment No. 5 of the ring 10 is connected to ground through the coil of the tape transmitter 17. This tape transmitter may be any of the standard forms and has been diagrammatically illustrated as of the type disclosed in more or

less detail in my said Patent 2,327,075. The remaining segments 2, 3, 4, 6 and 7 of ring 10 are not required for carrying out this invention and have no electrical circuit connections.

The solid ring 13 is connected to the outgoing line 19, which may be a telegraph wire extending to the receiver at any distance or it may be a connection to a radio station for radio transmission to a distant point. Amplifiers would ordinarily be used in the transmission system, but they, per se, form no part of the invention and they have not been illustrated.

Segments 1, 2, 3 and 4 of ring 12 are connected respectively to tongues T1, T2, T3 and T4 of the tape transmitter 17. Segments 5, 6 and 7 of the ring 12 are connected respectively to the tongues of polar relays 20, 21 and 22. These relays are so constructed that their tongues have sufficient mechanical banking force to remain firmly banked against their contacts when once thrown, without further aid of current in the coils. This is a well-known feature and has not been shown. To cause operation by "plus" and "minus" currents, one terminal of the coil of relay 20 is connected through appropriate resistances to both the positive and the negative terminals of the source of supply and the other terminal is connected through the make contacts 23 of relay 16 to tongue T5 of the tape transmitter 17. One terminal of relay 21 is likewise connected through appropriate resistances to the positive and negative terminals and the other terminal is connected through the make contacts 24 to the tongue T6 of the tape transmitter. Likewise, one terminal of the coil of relay 22 is connected to the positive and negative terminals through the make contacts 25 to tongue T7 of the tape transmitter.

The two contacts of each of the polar relays 20, 21 and 22 are connected to the positive and negative terminals of the source of supply. The mark and space bus bars are connected respectively to the positive and negative terminals of the supply source.

In Fig. 2 the incoming line 26 is connected to one terminal of the coils of polar relay 27 and the other terminal of this relay is connected to ground, which, as before, may be considered as the negative terminal of the source of supply. One contact of this polar relay is also connected to ground through an appropriate resistance and the other terminal is connected through a resistance to the positive terminal. The tongue of relay 27 is connected to solid signal ring 28, which is connected to the contacts of the segmented

ring 29 by brush 30 in synchronism and phase with the brushes at the transmitter. The segmented ring 29 has fourteen contacts so that this brush sweeps over two of the contacts for each one contact at the transmitter. Reference character *a* has been appended to the figures designating the segments. These "*a*" segments are not shown connected to electrical circuits, as they have no particular function in the operation of this improvement other than to indicate the relative time of connection of relays at the receiving station, as will later become apparent.

Segment No. 1 of ring 29 is connected to one terminal of the coil of polar relay 31, the other terminal of this coil being connected to the positive and negative terminals of the source of supply through appropriate resistances. Segments 2 and 3 are connected through the coils of polar relays 32 and 33, respectively, to the positive and negative terminals through appropriate resistances. The tongues of relays 31, 32 and 33 are connected respectively through the first, second and third relays of the printer 34 to ground. The printer with its relays has been indicated only diagrammatically herein, but a description of such a printer may be found in my said Patent 2,274,103.

Segments 4, 5, 6 and 7 of segmented ring 29 are connected respectively through the coils of the fourth, fifth, sixth and seventh relays of the printer 34 to ground.

Local function ring 35 is connected to the positive terminal and this ring is connected by brush 36 with the fourteen segments in succession of segmented ring 37. In this ring segments 1 to 7 are not connected to any electrical circuits, but certain of the "*a*" segments are thus connected. The brush 36, of course, is mechanically connected to, or otherwise constructed to rotate in unison with, the brush 30, so that when the latter is on an *a* segment of a certain reference character, the former is on an *a* segment of a similar reference character.

Segment 1*a* of ring 37 is connected to the so-called eighth pulse magnet of printer 34, its function as described in my said patent being to start the operation of the printer after selection has been made by selection and operation of three of the signal relays therein.

Segment 4*a* of segmented ring 37 is connected to the upper contact of relay 31 and segments 5*a* and 6*a* are connected respectively to similar contacts of relays 32 and 33. The lower contacts on these three relays are blank.

The operation of my invention will now be described:

Let it be assumed that the letter Y is to be transmitted. This, in accordance with the usual seven-unit code, consists of mark signals in the first, third and sixth time positions and space signals in the second, fourth, fifth and seventh time positions.

When the brushes reach the fifth segments, the coil of tape transmitter 17 will be energized by the engagement of brush 14 with segment No. 5. This will move the tape transmitter so that tongues T1, T3 and T6 engage the mark contacts M and tongues T2, T4, T5 and T7 engage the space contacts S.

Disregarding the previous signal that is being completed at this time and describing only the transmission of the new combination, nothing happens until the brushes next reach segments No. 1. At such time the coil of relay 16 is energized and contacts 23, 24 and 25 are "made." This

causes current to flow from the positive bus bar through make contact 23, tongue T5 and the coil of relay 25 to the negative terminal. Relay 25 will therefore throw its contact to the negative terminal, where it will remain banked. Simultaneously, current will flow from the positive bus bar of the tape transmitter through tongue T6, make contact 24, the coil of polar relay 21, to the negative terminal. This will cause the tongue of relay 21 to engage its positive contact. Also, simultaneously, current will flow from the positive terminal through the coil of relay 22, make contact 25 and tongue T7 to the negative bus bar of the tape transmitter. This will cause the tongue of relay 22 to be thrown against its negative contact. Thus, when the brushes reach segments No. 1 after the tape combination has been set up, the fifth, sixth and seventh combinations of the letter Y have been stored because the tongues of relays 20, 21 and 22 remain banked after the relay 16 is de-energized by the brush 14 leaving segment No. 1. Also, when the brushes first reached segments No. 1, current flowed from the positive bus bar through tongue T1, segment No. 1 of ring 12, brush 15, solid ring 13 and outgoing link 19. This current, suitably amplified when desired, energizes the receiving relay 27 so that its tongue is thrown against the positive contact. Current then flows from the positive terminal through this tongue, solid ring 28, brush 30, segment No. 1 and through the coil of relay 31 to the negative terminal. The tongue of this relay is thrown to its upper contact, where it remains banked. The first received signal is thus stored.

When brushes 30 and 36 reach contact 1*a* on segmented rings 29 and 37, brushes 14 and 15 are on the latter half of their segments No. 1. Nothing happens at any of these positions except at ring 37, where current flows from the positive terminal through the brush and segment 1*a* to ground through eighth pulse relay R8. This starts the printing operation of the previous combination, which need not be described.

When the brushes first engage segments No. 2, a space signal is transmitted from the negative bus bar through tongue T2, segment 2, brush 15, ring 13 and outgoing link 19. This space current throws the tongue of relay 27 to the ground minus contact and current flows from the positive terminal through the coil of polar relay 32, segment 2, brush 30 and ring 28 to ground. This throws the tongue of polar relay 32 to its blank contact.

When the brushes reach segments 2*a* nothing happens.

When segments No. 3 are reached, current flows from the positive bus bar of the tape transmitter through tongue T3, segment 3, brush 15 and ring 13 to the outgoing link 19 and this throws the tongue of relay 27 to the positive contact. Current now flows through ring 28, brush 30, segment 3 and the coil of relay 33 to the negative terminal, which throws its tongue to its upper contact.

When segment 3*a* is reached nothing happens.

When segment 4 is first engaged, negative current flows from the negative bus bar of the tape transmitter through tongue T4 to the outgoing link 19 in a way that will now be apparent and the tongue of relay 27 will be thrown to the ground contact by the space signal. This will not energize selector relay R4 of the printer 34 by engagement of the brush 30 with the fourth segment, because both terminals are now grounded. This will cause a space selection at the printer.

When segments No. 4a are reached, the stored signal of the first unit of the letter Y will be selected at the printer because current will flow from the positive terminal through ring 35, brush 36, segment 4a, upper contact of polar relay 31 and selector relay R1 to ground.

When the brushes reach No. 5 segments, the coil of tape transmitter 17 will be energized and a new combination will be set up. The old combination for the letter Y is thus destroyed, but it will not affect further transmission of the letter Y because the fifth, sixth and seventh units have already been stored in the relays 20, 21 and 22. As soon as segments 5 were thus engaged by the brushes, current flowed at the transmitter from the negative terminal through the tongue of relay 20, segment 5 of ring 12, brush 15 and ring 13 to the outgoing link 19. This throws the tongue of relay 27 to the ground contact and selector relay R5 will not be operated by engagement of brush 30 with the fifth segment.

When the segments 5a of rings 29 and 37 are reached, no current flows from ring 35, brush 36 and segment 5a of ring 37 because the tongue of relay 32 is engaging its blank contact through the storing of the second unit of the signal, which is a space. Therefore, at this time the selector relay R2 is not operated.

When the brushes reach the 6th segments, current flows from the positive terminal through the tongue of relay 21, the sixth segment of ring 12, brush 15 and ring 13 to the outgoing link 19. This throws the tongue of relay 27 against its positive contact, which energizes selector relay R6.

When segments 6a are engaged by the brushes, nothing happens except at segmented ring 37, where current flows from the positive terminal through ring 35, brush 36, segment 6a, upper contact of relay 33 to selector relay R3. This stored unit of the signal makes a mark selection at the printer.

When segments No. 7 are reached, a space signal will be transmitted from the negative terminal through the tongue of relay 22, segment No. 7 of ring 12, brush 15 and solid ring 13 to outgoing link 19. This will throw the tongue of relay 27 to ground and selector relay R7 will not be energized because both its terminals are at ground potential.

When the brushes reach segments 7a nothing happens at any of the four segmented rings, but the printer now has stored mark signals through operation of selector relays R1, R3 and R6 and space signals through non-operation of selector relays R2, R4, R5 and R7.

When the brushes leave segments No. 7 and engage segments No. 1, the relay 16 is energized and contacts 23, 24 and 25 are made for the new combination set up in the tape transmitter, but this will not be described as it will be sufficient to trace through the operation for the one letter Y.

When the brushes reach segments 1a nothing happens except at the segmented ring 37, where current will flow from the positive terminal through ring 35, brush 36, segment 1a and the eighth pulse relay R8 to ground. This will start the printing operation and letter Y will be printed from the selection made, as already described. Due to storage of the first, second and third signals of the new combination at the receiver, ample time is given for the printing operation and it is set for receipt of the fourth impulse acting upon selector relay R4.

From the description given, it will be apparent how the signals are stored by the polar relays so that the signal units can be transmitted and received, while permitting the operation of the tape transmitter and the printer. Further description is therefore unnecessary.

Various modifications may be made in my improvement without departing from the spirit of the invention.

The receiving system is not claimed herein, but is claimed in my divisional application, filed September 30, 1944, Serial No. 556,614.

Having described my invention, what I claim is:

1. In a multi-unit signaling system, an outgoing line, a distributor having a segment for each unit of the code character, means for connecting the segments of said distributor in succession to said line, a master relay having its coil connected to a predetermined one of said segments, polar relays having switch tongues and contacts of different potentials for storing each of the signal units of a code character after said predetermined signal unit thereof, each of said switch tongues being connected to one of the segments of said distributor, a signal transmitter having a switch arm and a pair of contacts of different potentials for each unit of the code character, means for connecting the switch arms of said transmitter for the stored signal units to the coils of said polar relays through the contacts of said master relay and each of the other of said switch arms to one of the segments of said distributor and means for moving the switch arms of said signal transmitter into another signal code position after the last one of said remainder of switch arms of the previous code combination has been connected through its distributor segment to the outgoing line.

2. In a multi-unit signaling system, an outgoing line, a distributor having a segment for each unit of the code character, means for connecting the segments of said distributor in succession to said line, a master relay having its coil connected to a predetermined one of said segments, polar relays having switch tongues and contacts of different potentials for storing each of the signal units of a code character after said predetermined intermediate signal unit thereof, each of said switch tongues being connected to one of the segments of said distributor, a signal transmitter having a switch arm and a pair of contacts of different potentials for each unit of the code character, means for connecting the switch arms of said transmitter for the stored signal units to the coils of said polar relays through the contacts of said master relay and each of the other of said switch arms to one of the segments of said distributor and means for moving the switch arms of said signal transmitter into another signal code position after the last one of said remainder of switch arms of the previous code combination has been connected through its distributor segment to the outgoing line.

3. In a multi-unit signaling system, an outgoing line, a distributor having a segment for each unit of the code character, means for connecting the segments of said distributor in succession to said line, a master relay having its coil connected to a predetermined one of said segments, polar relays having switch tongues and contacts of different potentials for storing each of the signal units of a code character after said predetermined signal unit thereof, each of said switch tongues being connected to one of the segments of said distributor, a signal transmitter having a switch

arm and a pair of contacts of different potentials for each unit of the code character, means for connecting the switch arms of said transmitter for the stored signal units to the coils of said polar relays through the contacts of said master relay and each of the other of said switch arms to one of the segments of said distributor, means for banking the switch tongues of said polar relays on their contacts when moved thereagainst and means for moving the switch arms of said signal transmitter into another signal code position after the last one of said remainder of switch arms of the previous code combination has been connected through its distributor segment to the outgoing line.

4. In a multi-unit signaling system, an outgoing line, a distributor having a segment for each unit of the code character, means for connecting the segments of said distributor in succession to said line, a master relay having its coil connected to a predetermined one of said segments, polar relays having switch tongues and contacts of different potentials for storing each of the signal units of a code character after said predetermined intermediate signal unit thereof, each of said switch tongues being connected to one of the segments of said distributor, a signal transmitter having a switch arm and a pair of contacts of different potentials for each unit of the code character, means for connecting the switch arms of said transmitter for the stored signal units to the coils of said polar relays through the contacts of said master relay and each of the other of said switch arms to one of the segments of said distributor, means for banking the switch tongues of said polar relays on their contacts when moved thereagainst and means for moving the switch arms of said signal transmitter into another signal code position after the last one of said remainder of switch arms of the previous code combination has been connected through its distributor segment to the outgoing line.

5. In a multi-unit signaling system, an outgoing line, a distributor having a segment for each unit of the code character, means for connecting the segments of said distributor in succession to said line for the transmission of a code character, a master relay having its coil connected to a predetermined one of said segments, polar relays having switch tongues and contacts of different potentials for storing each of the signal units of a code character after said predetermined intermediate signal unit thereof, each of said switch tongues being connected to one of the segments

of said distributor, a signal transmitter having a switch arm and a pair of contacts of different potentials for each unit of the code, the switch arms of said transmitter for the stored signal units being connected to the coils of said polar relays through the make contacts of said master relay and each of the other of said switch arms being connected to one of the segments of said distributor, means for energizing said control relay before the outgoing line is connected through a segment of said distributor to any of the switch tongues of said polar relays during the transmission of a code character and means for moving the switch arms of said signal transmitter into another signal code position after the last one of said remainder of switch arms of the previous code combination has been connected through its distributor segment to the outgoing line.

6. In a multi-unit signaling system, an outgoing line, a distributor having a segment for each unit of the code character, means for connecting the segments of said distributor in succession to said line for the transmission of a code character, a master relay having its coil connected to a predetermined one of said segments, polar relays having switch tongues and contacts of different potentials for storing each of the signal units of a code character after said predetermined intermediate signal unit thereof, each of said switch tongues being connected to one of the segments of said distributor, a signal transmitter having a switch arm and a pair of contacts of different potentials for each unit of the code character, the switch arms of said transmitter for the stored signal units being connected to the coils of said polar relays through the make contacts of said master relay and each of the other of said switch arms being connected to one of the segments of said distributor, means for energizing said control relay before the outgoing line is connected through a segment of said distributor to any of the switch tongues of said polar relays during the transmission of a code character, means for banking the switch tongues of said polar relays on their contacts when moved thereagainst and means for moving the switch arms of said signal transmitter into another signal code position after the last one of said remainder of switch arms of the previous code combination has been connected through its distributor segment to the outgoing line.

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