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CONCENTRATION CIRCUIT FOR SIMPLEX PRINTERS

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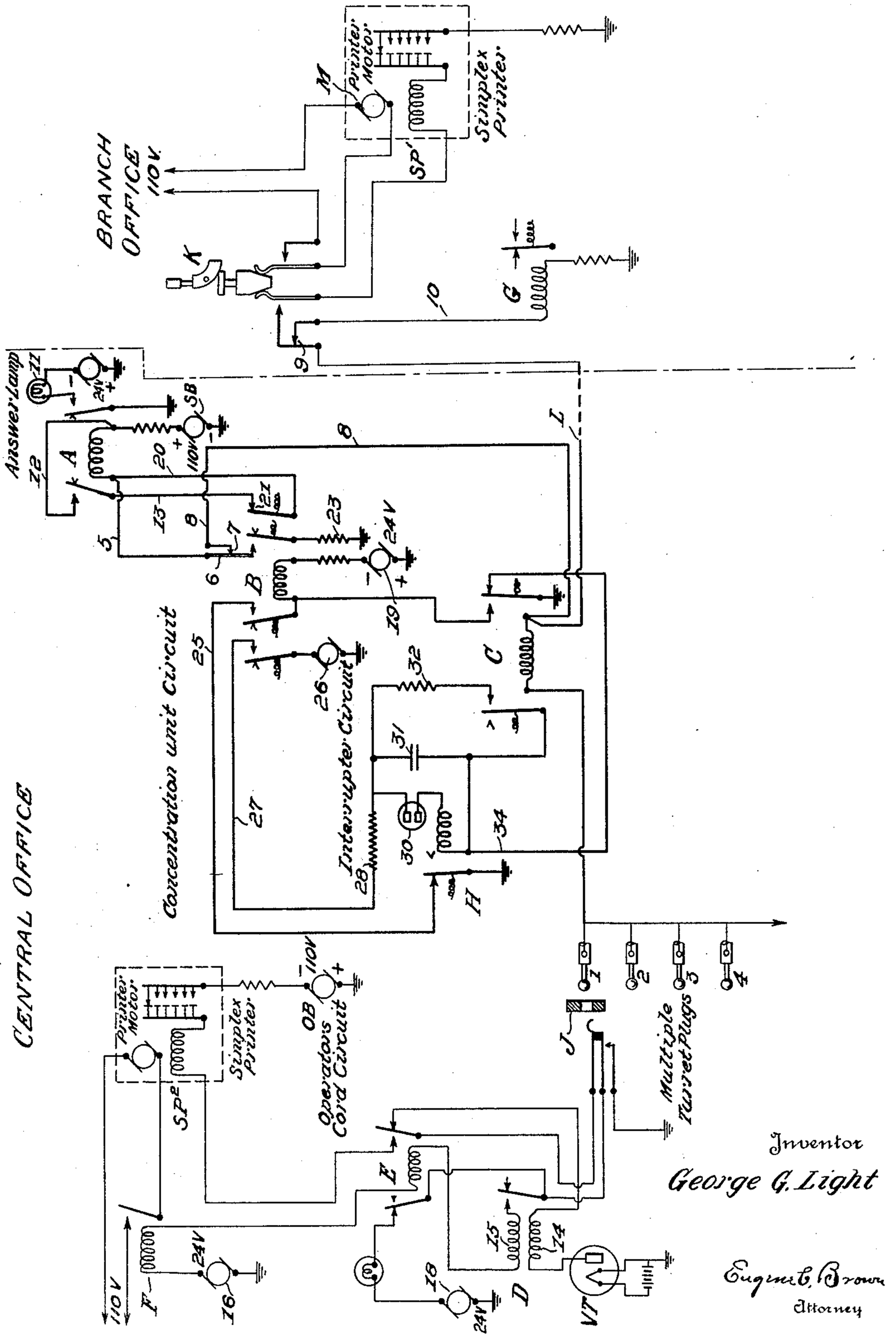

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CONCENTRATION CIRCUIT FOR SIMPLEX PRINTERS

Application filed June 19, 1931. Serial No. 545,556.

This invention relates to the handling of traffic to and from subscribers' lines at a concentration or central station where a large number of lines are terminated before a small number of operators and is an improvement upon the circuit arrangement disclosed in Patent 1,804,327 dated May 5, 1931. This improvement relates mainly to the manner in which the signal battery and line relay are removed from the line circuit upon answering a call and again inserting said relay and signal battery in the line when the message is concluded. In said patent this is accomplished by means of two holding circuits which are interrupted periodically by a mechanical interrupter.

The object of my invention is to simplify the circuit arrangement, eliminate the mechanical interrupter and effect the re-insertion of the signal battery and line relay by means of a relay conrolled by the breakdown of a neon lamp in association with a slow-acting charging circuit which is alternately charged and discharged.

My invention will be understood from the following detailed description in connection with the accompanying drawing.

The operator's cord circuit and its associated equipment at the central office and also that at the branch office are identical with the corresponding parts in said patent. The equipment at each branch station comprises a simplex printer SP′, a key switch K, and a signal relay G. The branch station is connected by a line L to the central station. With the key K in the position illustrated, the line L is grounded through the signal relay G and in the other position of the key, the relay G is disconnected, the line is grounded through the simplex printer and the energizing circuit of the printer operating motor M is completed.

At the central station, the line L is connected through the winding of relay C to the line plugs 1, 2, 3, 4, etc. rigidly located in front of the respective operators. A circuit is normally closed over each line from the central office to the branch offices from the signal battery or generator SB through the winding of line relay A over conductor 5, spring contact arm 6 and contact 7 of relay B, conductor 8, line L, contacts 9 of key switch K, conductor 10 and winding of relay G to ground. When the operator at the branch office sends a call by first shifting the key K to connect the printer and then depressing any key on the printer, thereby momentarily opening the line, the relay A will be deenergized and will remain in that condition because of a short circuit which is completed around its winding through the conductor 12 and its left hand armature, conductor 13, back contact and right hand outer armature of relay B and conductor 20. The right hand armature of line relay A closes a circuit through the "answer" lamp 11. The lighting of this lamp indicates to any idle concentrator operator that this call may be answered by attaching her printer cord circuit to the corresponding line plug at her position.

The operator's cord circuit comprises the circuit arrangement interconnecting the jack J with relays D, E and F and with the simplex printer SP^2. The tip contact in the jack J is connected to the right-hand tongue of relay E, and the back contact cooperating with this tongue is connected through winding 14 of relay D to the plate element of a two-electrode vacuum tube VT; the filament of the tube being grounded. One of the extra contacts on jack J is connected to ground, and the other cooperating extra contact is connected to the tongue of relay D. Winding 15 of relay D and the windings of relay E and F are connected in series in a circuit extending from the contact of relay D to ground, including a source of current 16. The left-hand tongue of relay E is connected to the tongue of relay D, and the back contact cooperating with this tongue is connected through a busy lamp 17, and a source of current 18, to ground. The contact of relay F is included in the motor operating circuit of simplex printer SP^2. The operating circuit for this printer extends from the front contact of the right-hand tongue of relay E through the printer to the source of operating current OB.

The operation is as follows:—

With the printer at the branch office idle,

the circuits are as shown in the drawing, with positive potential normally impressed upon the line L through the winding of line relay A from the signal generator SB. When the operator at the branch office wishes to transmit to the central office she operates the key K, to connect the printer and presses a key on the printer to momentarily interrupt the line, thereby deenergizing the line relay A and lighting the answer lamp 11 as previously described. When the central office operator connects her jack J to one of the plugs, the line L is connected through the right-hand back contact of relay E, winding 14 of relay D, and vacuum tube VT to ground. At the same time the extra contacts of jack J are closed and complete a circuit from ground through the tongue and coil 15 of relay D, and through the coils of relays E and F. The current flowing through the vacuum tube VT from the line L is sufficient to operate relay D but is not sufficient to operate relay C. Operation of relay E connects the printer SP^2 to the line through its right-hand armature and disconnects vacuum tube VT. Operation of relay F completes the circuit to the operating motor of the printer SP^2. The increased current due to the series connection of generators OB and SB is sufficient to operate relay C, which in turn will operate relay B. The operation of lock-out relay B breaks the connection through the conductor 8 at the contact 7, thereby disconnecting the line relay A and signal generator SB from the line. It also opens the short circuit around the winding of relay A previously established at the contact 21 and establishes another circuit for the relay A from the generator SB through the inner right-hand armature of relay B and resistance 23 to ground. Relay A will operate and thereby extinguish the answer lamp 11.

It is essential that relay B shall remain in operated position during the entire time that the branch office is connected to the central office. This is accomplished in the following manner:—When the relay B is energized by a circuit established through the right-hand armature and front contact of relay C, a holding circuit is established for the relay B from generator 19 through the winding and inner left-hand armature of relay B, conductor 25 and back contact and armature of relay H to ground.

The operation of relay B also establishes a circuit from generator 26 through the outer left-hand armature of relay B, conductor 27, high resistance 28 and thence through the three parallel branches of the interrupter circuit, the first consisting of the neon lamp 30 and the winding of relay H, the second consisting of the condenser 31 and the third consisting of the resistance 32 and the left-hand contact and armature of relay C. These three branches are connected through the conductor 34 to the right-hand back contact of relay C which is grounded through the right-hand armature when the relay C is deenergized.

When the relay C is energized during the transmission of marking signals over the line, the circuit from generator 26 is opened at the right-hand back contact of relay C; but during spacing signals relay C is deenergized, thereby closing the circuit from generator 26 which begins to charge the condenser 31. The relay C is energized upon the transmission of the next marking signal, thereby interrupting the circuit of generator 26. Any charge accumulated on the condenser 31 will be immediately dissipated through the circuit including the resistance 32 and left-hand armature of relay C.

The values of the high resistance 28 and capacity of condenser 31 are so designed that a definite predetermined time is required to charge the condenser to a potential sufficient to break down the neon lamp and permit a current to flow through the winding of relay H. During normal transmission of signals over the line, the condenser will be alternately charged and discharged but without causing the operation of the neon lamp, the spacing signals being of such short duration that the condenser is never charged to a potential sufficient to break down the gap in the lamp.

At the termination of the transmission over the line, the operator at the central office removes her printer cord circuit so that current ceases to flow through relay C. When a sufficient interval has elapsed for the condenser 31 to be charged to the potential of the generator 26, or to the predetermined value, the gases in the neon lamp 30 will break down and permit a current to flow through the winding of relay H. As the armature of relay H moves from its back contact, the holding circuit through conductor 25 is broken, thereby deenergizing relay B. As the armatures of the relay B move to their back contacts, a circuit is established through conductor 8 to connect the line relay A and signal generator SB to the line. The interrupter circuit from the generator 26 is also opened at the outer left hand armature and contact of relay B. The line is thus restored to its normal condition and the concentration unit circuit at the central station is in readiness to receive an incoming call.

For the purpose of illustration I have only shown one branch office and the corresponding equipment for one line at the central office but it will be understood that in practice there are numerous branch offices with lines entering the central office, each through a concentration unit circuit each of which is multipled to the plugs at the various turrets or operator's positions.

I claim:

1. In an intercommunicating system of the character described wherein a plurality of branch stations are connected to a central station, a receiving equipment at the central station for each line, comprising a line signaling device and a source of signaling current, means actuated by the seizure of the line for disconnecting said signaling device and said current source, and means directly effective upon the release of the line for restoring said signaling device and current source to the line, said restoring means embodying a source of potential, a potential storing device, and a potential-controlled gap.

2. In an intercommunicating system of the character described wherein a plurality of branch stations are connected to a central station, a receiving equipment at the central station for each line, comprising a line signaling relay and a source of signaling current, a lock-out relay under control of a holding circuit for disconnecting said relay and signaling current source when the line is being operated, and means controlled directly by the line operating current for opening said holding circuit.

3. In an intercommunicating system of the character described wherein a plurality of branch stations are connected to a central station, a receiving equipment at the central station for each line, comprising a signaling device normally connected to the line, means actuated by the seizure of the line by the central station operator to disconnect said signaling device from the line, a potential controlled device operating to restore said device to the line, and means controlled by the intelligence signals for preventing the operation of said potential controlled device.

4. In an intercommunicating system of the character described wherein a plurality of branch stations are connected to a central station, a receiving equipment at the central station for each line, comprising a line signaling relay and a source of signaling current, a lock-out relay under control of a holding circuit for disconnecting said relay and signaling current source when the line is being operated, and interrupter mechanism for opening said holding circuit embodying a circuit provided with a potential storing device and a potential controlled gap.

5. In an intercommunicating system of the character described wherein a plurality of branch stations are connected to a central station, a receiving equipment at the central station for each line, comprising a line signaling relay and a source of signaling current, a lock-out relay under control of a holding circuit for disconnecting said relay and signaling current source when the line is being operated, means controlled by the intelligence signals for opening said holding circuit, said opening means embodying a relay and series-connected gaseous gap, and a potential accumulator in shunt to said relay and gap operating to break down the gap and form a path for current through the relay.

6. In combination, a printer line terminating at a central station, a signaling relay normally in said line, a second relay provided with a holding circuit and operating to disconnect said signaling relay from the line, means actuated upon the seizure of the line to cause the operation of said second relay, and an electromagnetic interrupter for said holding circuit, said means also causing the operation of said interrupter when the line is released.

In testimony whereof, I affix my signature.

GEORGE G. LIGHT.