

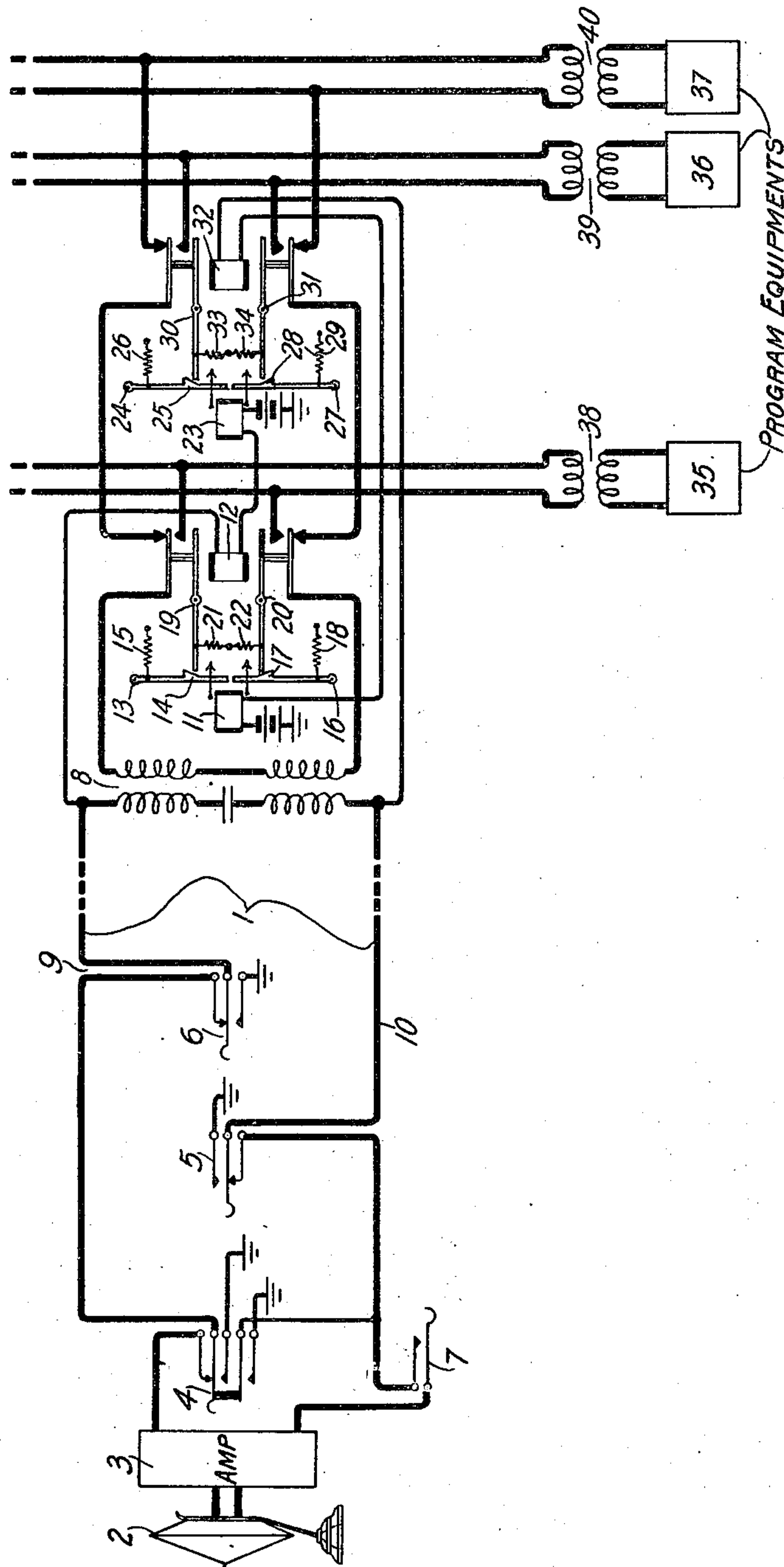
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TRANSMISSION SYSTEM

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TRANSMISSION SYSTEM.

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This invention relates to transmission systems for distributing programs over physical lines and particularly to switching arrangements for the selection of the programs.

5 The objects are simplicity of operation from the subscriber's view point, low first cost, reliable, positive and non-marginal operation, low current consumption, and no impairment of line transmission qualities.

10 According to the invention there is provided a locking relay arrangement at the central office which can be operated from the subscriber's station by the momentary actuation of one of several simple keys to select a
15 desired program.

The drawing illustrates a subscriber's line equipped with a program receiving set and controlling keys and a central station having three program distributing equipments together with relays for associating said equipments with the subscriber's line. The receiving set consists of a loud speaking receiver 2 and an amplifier 3. The subscriber controls the selection of the programs by three keys,
20 4, 5, and 6, one for each program. The line 1 extends to the central office and terminates in a repeating coil 8.

The selecting mechanism at the central office consists of two sets of relays, relays 11 and 12 comprising one set and relays 23 and 32 the other set. The relay 12 is equipped with two armatures 19 and 20 which are held in their normal positions by the springs 21 and 22 respectively. The ends of these armatures engage cam shaped latches 14 and 17
35 respectively of armatures 13 and 16 of the relay 11. With both relays deenergized and with the armatures 19 and 20 in their normal position, as shown in the drawing, the ends of these armatures are free from the latches
40 14 and 17. When, however, the relay 12 is energized and the armatures 19 and 20 rotate, they pass over the cam surfaces and are held by the latches 14 and 17 after the coil 12 is deenergized. To release the armatures
45 19 and 20 it is necessary to energize the coil 11 to attract the armatures 13 and 16. The armatures 13 and 16 are held in their normal positions by the springs 15 and 18, respectively.
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The construction of the pair of relays 23 and 32 is exactly the same; the armatures 30 and 31 being normally held by the springs 33 and 34 and in their alternate positions being
55 locked by the latches 25 and 28 of the arma-

tures 24 and 27, respectively. The armatures 24 and 27 are similarly held in their normal positions by springs 26 and 29.

By energizing the relay 32 and the relay 11, the armatures of the relay 32 are locked in their alternate positions, and the armatures of relay 12, if they have been previously locked, are now unlocked. On the other hand, if relays 23 and 12 are energized simultaneously the armatures 19 and 20 are locked in their alternate positions while armatures 30 and 31 are released provided they have been previously locked in their alternate positions. If all four relays, 11, 12, 23 and 32, are operated simultaneously, and released, all
60 65 70 armatures are restored to their normal positions.

Assume that the subscriber wishes to listen to the program being sent out from the equipment 35. To do this he operates the non-locking key 6 for a brief interval. The key 6 disconnects the tip conductor 9 from the receiving set and applies ground potential thereto. This results in the closure of a circuit through the windings of relays 12 and 23 to battery. Relay 23 operates and unlocks the armatures 30 and 31 which may have been operated on a previous occasion. Relay 12 attracts its armatures 19 and 20 against the tension of springs 21 and 22, respectively, and these armatures are locked by the latches 14 and 17. After the key 6 is released, the tip conductor is restored and the relays 12 and 23 become deenergized. Although the relay 12 is deenergized, its armatures remain in their
75 80 85 90 operated position since they are now latched.

The subscriber may now close the control key 7 which completes a transmission circuit from the program set 35 to the receiving amplifier 3. The transmission circuit may be traced from the right terminal of the transformer 38 through the upper front contact of relay 12, through the right windings of repeating coil 8, lower front contact of relay 12, to the other terminal of the transformer. The left windings of the repeating coil 8 are extended over the tip and ring conductors 9 and 10, through contacts of the keys 6, 5, 4, and 7 to the amplifier 3.
95 100

Should the subscriber wish to listen to the program distributed by the equipment 36, he momentarily depresses the non-locking key 5. Key 5 opens the lower side of the line and applies ground potential on the conductor 10. This results in the closure of a circuit through
105 110

the windings of relays 11 and 32. Relay 11 unlatches the armatures 19 and 20, permitting them to restore. Relay 32 attracts the armatures 30 and 31 and they become latched by the armatures 24 and 27, respectively. When the key 5 is restored, relays 11 and 32 deenergize and with key 7 closed, the transmission circuit is completed to the subscriber's station. The transmission circuit in this case may be traced from one terminal of the transformer 39 through the upper front contact of relay 32, upper back contact of relay 12, through the right windings of the repeating coil 8, lower back contact of relay 12, lower front contact of relay 32 to the other side of the transformer 39.

If the subscriber wishes to listen to the third program the momentary operation of non-locking key 4 opens the circuit to the receiving set and places a ground potential on both the tip and ring conductors of the line 1. This results in the momentary energization of all four relays 11, 12, 23 and 32. The relays 11 and 23 attract their armatures to allow the release of any armatures that may be latched at the time. When the energizing circuits are again opened, all four relays release leaving the armatures 19, 20, 30 and 31 in their normal positions. To insure that these armatures have time to release under this condition, the releasing operation of relays 11 and 23 may be made somewhat slower than that of relays 12 and 32. With all armatures in their normal positions, the transmission circuit may be traced from one winding of the transformer 40 through the upper back contacts of relays 32 and 12 to the right windings of coil 8 thence through the lower back contact of relays 12 and 32 to the other terminal of the transformer 40. The program from the equipment 37 is transmitted over this circuit.

The receiver 2 and amplifier 3 at the subscriber's station may be of any suitable types.

It will be seen from the foregoing description that the switching system disclosed provides a simple means for enabling a subscriber to select one of a few programs. By having the relays 11, 12, 23 and 32 symmetrically connected to the two sides of the line, the transmission qualities are not impaired, and by using the novel latching arrangement between the armatures the necessity of marginal operation is avoided which simplifies the subscriber's equipment. Another obvious accomplishment of this arrangement is the low current consumption of the selecting mechanism since current is required only during the short intervals when the selecting keys are depressed.

What is claimed is:

1. In combination, a central office, a subscriber's line extending thereto, trunks at the central office, a pair of relays, each having a winding and an armature, means at the sub-

station for closing an energizing circuit over one side of the line through one of said windings and for closing a circuit over the other side through the other winding, means including the armature of one relay for locking the armature of the other relay in operated position during the period said circuits are open, and switching contacts actuated by said latter armature for selectively connecting the subscriber's line to one of said trunks.

2. In combination, a central office, a subscriber's line extending thereto, trunks at the central office, a relay having a winding and armatures, a key at the substation for closing a circuit over one side of the line through the winding of said relay to operate its armatures, a second relay having armatures arranged to lock and hold in operated position the armatures of said first relay during the period said circuit is open, contacts on the armatures of said first relay for connecting the subscriber's line to one of said trunks, and a key at the substation for closing a circuit over the other side of the line to energize said second relay to unlock said armatures.

3. In combination, a central office, a subscriber's line extending thereto, trunks at the central office, a pair of relays, locking means for holding the armatures of said relays in actuated position, keys at the substation, a circuit rendered effective by the operation of one of said keys for causing said locking means to lock the armatures of one relay and unlock the armatures of the other relay, and contacts closed by the armatures of said relays for selectively connecting the subscriber's line to one of said trunks.

4. In combination, a central office, a subscriber's line extending thereto, trunks at the central office, a pair of relays, locking means for holding the armatures of said relays in actuated position, a pair of keys at the substation, means rendered effective by closure of one key for causing said locking means to lock the armatures of the first relay and unlock those of the second relay, means effective by the closure of the other key for causing the locking means to lock the armatures of the second relay and unlock those of the first relay, and contacts controlled by said armatures for selectively extending the subscriber's line to one of said trunks.

5. In combination, a central office having a plurality of program equipments, a subscriber's line leading to said office, two pairs of relays, one relay of each pair having locking armatures, locking mechanism controlled by the other relay of each pair, non-locking keys at the substation for energizing said relays momentarily to lock one set of armatures and unlock the other, and contacts closed by said relays for selectively connecting the subscriber's line to one of said equipments.

6. In combination, a central office having a plurality of program distributing equipments, a subscriber's line leading to said office, a program receiving set at the substation, a relay, a key at the substation for closing a momentary energizing circuit causing the relay to attract its armatures, locking means for holding said armatures in attracted position independently of the energized condition of the relay, and contacts controlled by said armatures for selectively extending the subscriber's line to one of said equipments. 10

In witness whereof, I hereunto subscribe my name this 1 day of August A. D., 1927.

JACOB R. FRY.