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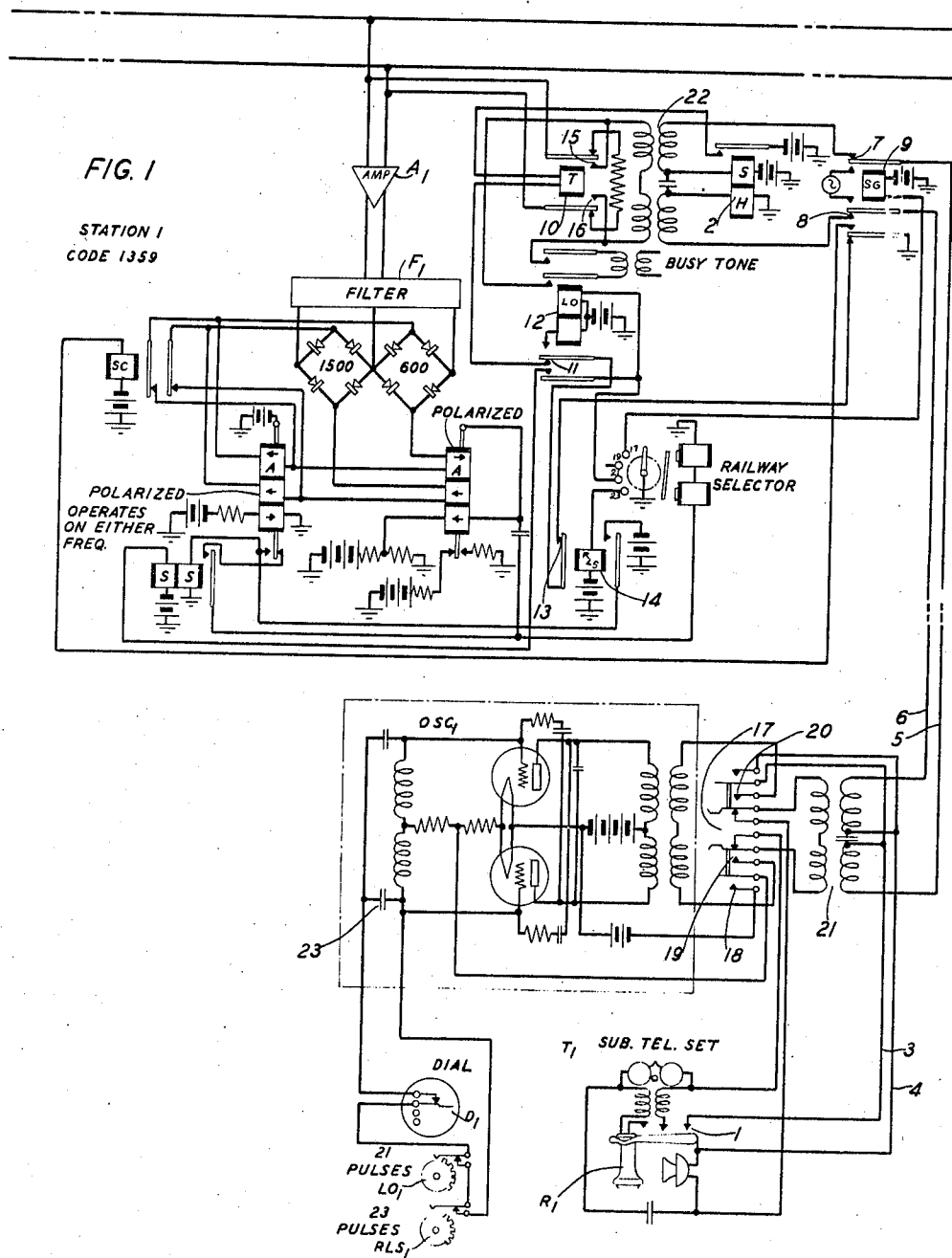
F. S. ENTZ

2,346,420

SELECTIVE SIGNALING AND LOCK-OUT SYSTEM

Filed April 7, 1943

3 Sheets-Sheet 1



INVENTOR
F. S. ENTZ
BY *A. S. Krigman*
ATTORNEY

April 11, 1944.

F. S. ENTZ

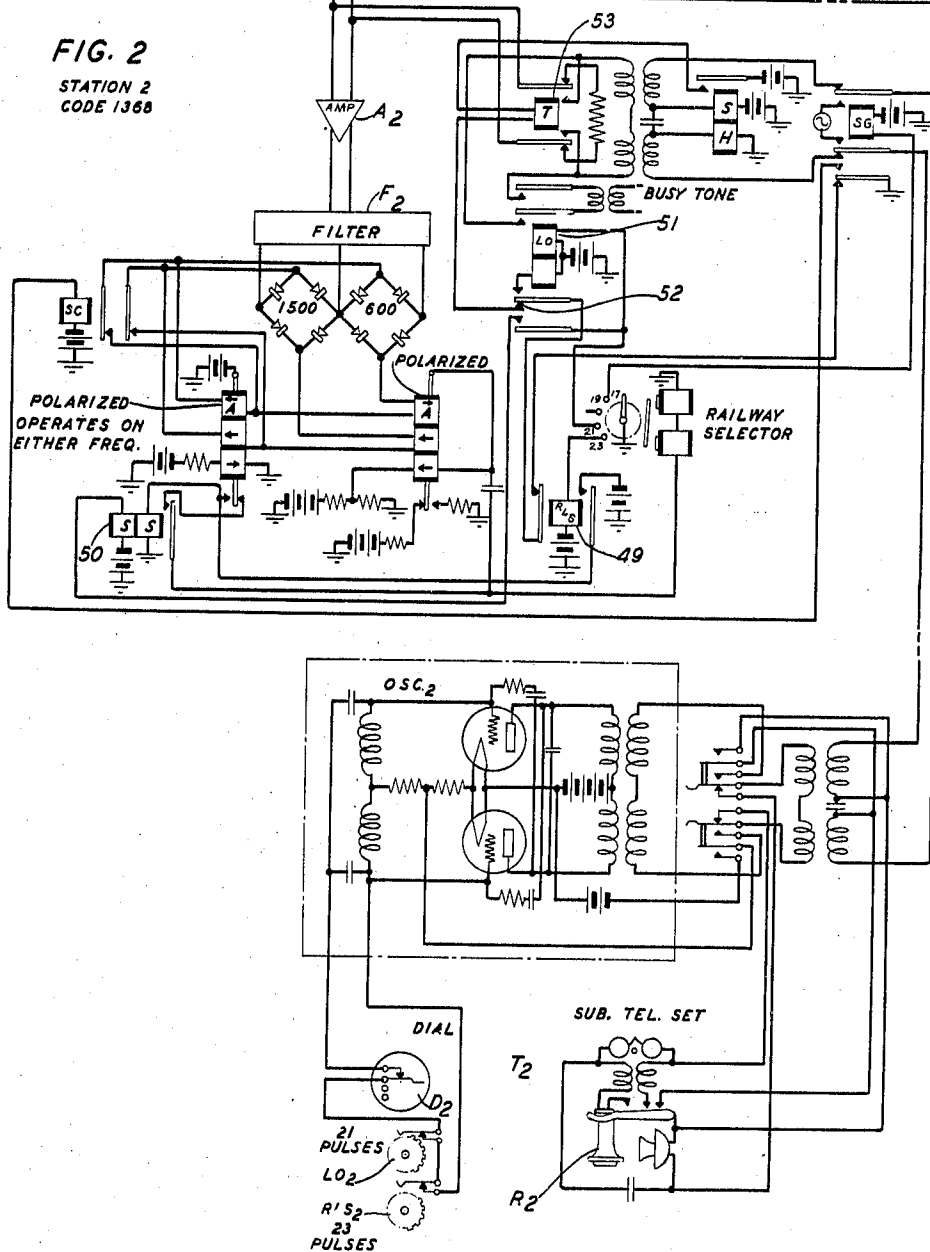
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3 Sheets-Sheet 2

FIG. 2
STATION 2
CODE 1388



INVENTOR
F. S. ENTZ
BY *A. J. Kingman*
ATTORNEY

April 11, 1944.

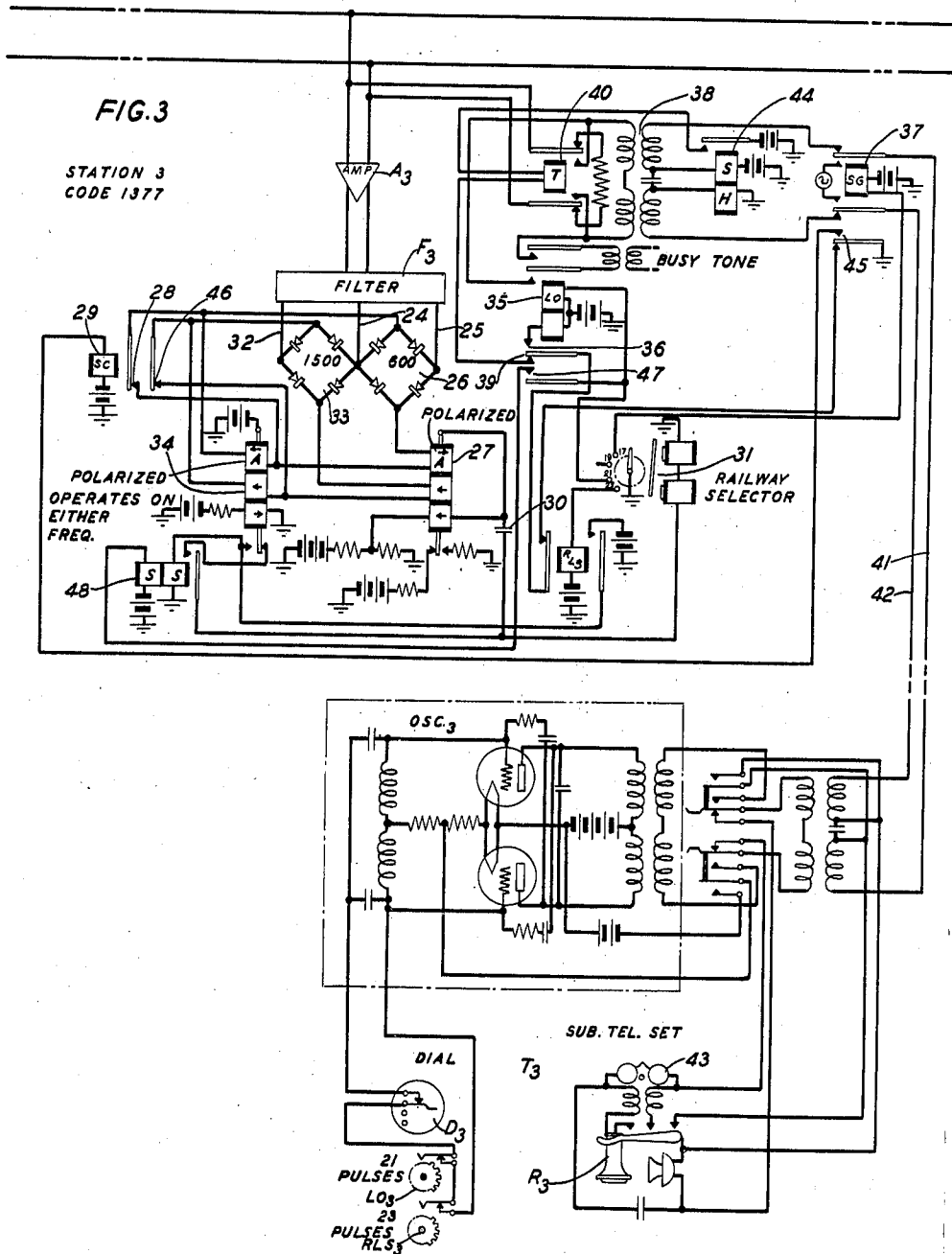
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INVENTOR
F. S. ENTZ

BY

ATTORNEY

UNITED STATES PATENT OFFICE

2,346,420

SELECTIVE SIGNALING AND LOCKOUT
SYSTEM

Ferdinand S. Entz, Mount Kisco, N. Y., assignor
to Bell Telephone Laboratories, Incorporated,
New York, N. Y., a corporation of New York

Application April 7, 1943, Serial No. 482,095

1 Claim. (Cl. 179—31)

This invention relates to selective signaling party line telephone systems arranged to "lock out" all stations other than the calling and called stations and contemplates the use of two different alternating current frequencies within the voice range, for example, 600 and 1500 cycles, respectively, alternately applied to a line under control of an impulse transmitter to selectively operate step-by-step circuit controlling devices of the type disclosed in United States Patent 1,343,256 to J. C. Field and commonly referred to as railway train dispatching selectors.

In a specific embodiment of the invention each station on the line is provided with an audio frequency tone oscillator, impulse transmitters of the make and break type and a step-by-step selector of the before-mentioned type whose operation is effected by causing the oscillator at a calling station to transmit to the line under control of an associated impulse transmitter alternate pulses of first one frequency and then another, i. e., when the pulsing contacts of the transmitter are closed one frequency (600 cycles) is generated and applied to the line and when the contacts are opened the tuning of the oscillator is changed so that it generates another frequency (1500 cycles). This alternate changing of the line frequency back and forth between 600 and 1500 cycles in accordance with predetermined codes is translated to all the stations, other than the calling station, into direct current impulses which cause the selectors thereat to advance in the manner previously described in the Field Patent 1,343,256, which selectors, depending on the setting thereof as determined by the code transmitted, control circuit means to prevent (i. e., lock out) the subscribers at such station from gaining access to the line, to selectively signal and unlock the called station to the exclusion of the others or to remove the lock-out condition at all stations.

The invention will be best understood from the following description of the system which is shown on the accompanying drawings Figs. 1, 2 and 3 which represent three stations 1, 2 and 3 on a line L whose individual or selective codes are 1359, 1363 and 1377.

Let it be assumed that the line is idle and that station 1 desires to communicate with station 3, with which line is also associated other stations, one of which, station 2, is also shown. To originate a call, the subscriber at station 1 removes his receiver R₁ from the hook, thereby

closing contact 1 of his switchhook to operate relay 2 over conductors 3, 4, 5, 6 and contacts 7, 8 of relay 9. Relay 2, in operating, closes a circuit to operate the telephone connecting relay 10 which can be traced from battery, contact of relay 2, winding of relay 10, contact 11 of relay 12, contact 13 of the release relay 14, and lower contacts of ringing relay 9 to ground. Relay 10, in operating, closes its contacts 15, 16 thereby connecting the telephone T₁ to the line L in an obvious manner. The subscriber at station 1 then operates the dial key 17 associated with his telephone thereby closing its contacts 18 to light the filaments of the vacuum tubes of the oscillator OSC₁ thereat which starts to generate a frequency within the voice range (600 cycles) in a well-known manner which generated frequency passes to the line L over contacts 19 and 20 of key 17, transformer 21, conductors 5 and 6, contacts 7 and 8 of relay 9, transformer 22, and contacts 15, 16 of relay 10. If the calling subscriber desires to communicate secretly with the subscriber at station 3 to the exclusion of station 2 and any others on the line, he operates the pulse transmitting device LO₁ which in returning to normal, in a well-known manner, alternately opens and closes its contacts twenty-one times, thereby alternately changing the tuning of OSC₁ between its normal frequency of 600 cycles and 1500 cycles, which latter frequency is produced when the short-circuit around condenser 23 is removed.

When the 600 cycles was first connected to the line it was received at all the other stations, station 3, for example, amplified by amplifier A₃ and passed into the 600-cycle filter F₃ where it was passed out over conductors 24 and 25 to the rectifier bridge 26 and translated into direct current and applied to the upper winding of polar relay 27 over contacts 28 of relay 29, thus causing the relay 27 to operate and move its armature into contact with its grounded right-hand contacts, thus causing the charged condenser 30 to discharge through the winding of selector 31 and move it one step and immediately drop back to normal where it remains as long as the 600 cycles remains on the line. When the lock-out key LO₁ at station 1 is operated, and starts to return to normal, the first open pulse removes the short-circuit from condenser 23 of the oscillator which changes the frequency thereof to 1500 cycles which passes over the line to the filter F₃ and out over leads 24 and 32 to the rectifier bridge 33 where it is also trans-

lated to direct current and applied to the middle winding of relay 27 in a direction to move its armature to the left in contact with battery instead of ground, thereby causing a charging current to flow through condenser 30 and selector 31 to again cause the selector to take a step.

It will be noted that regardless of the direction in which the armature of relay 27 is moved, the bias current in its lower winding is always in a direction to hold it in the position to which it was moved by either its upper or middle winding. It will also be noted that both the upper and middle windings of relay 34 are normally short-circuited at the back contacts of relay 29.

As the locking key L_O continues to transmit alternate pulses of 600 and 1500 cycles, relay 27 will move its armature back and forth between its contacts to cause the selector 31 to step ahead and at the end of the twenty-one pulses it will rest at its twenty-first step and remain there by well-known means as described in the Field patent previously referred to.

Movement of the selector 31 to its twenty-first terminal closes a circuit from ground to energize lock-out relay 35 which locks over its lower winding and contact 36 to ground at the lowermost contacts of ringing relay 37. As all selectors connected to the lines move in synchronism and stop on contacts 21 the lock-out relay of station 2 which corresponds to relay 35 of station 3 will be operated.

Operation of relay 35, and all other corresponding relays at the other station, opens its contacts 39, thereby preventing all relays corresponding to relay 10 at station 1 (such as 40 and 53) from operating and connecting the associated telephones with the line in case the subscriber removes his receiver from the hook. Also the operation of all relays, such as 35 and 51, close their lowermost inner contacts, such as 47, thereby operating relays, such as 48 and 50, over their left-hand winding, which relays, in operating, close at their right contacts a circuit to apply another direct current pulse to the associated selector, such as 31, at that station which is effective to restore it to normal, in the usual manner.

The calling subscriber at station 1, after having locked out all stations by transmitting the twenty-one lock-out pulses proceeds to transmit, by means of the dial D₁, the desired subscriber's code which we have assumed is 1377. In this case the first digit 1 is common to all the other codes of the line and is for the purpose of releasing any selectors which may not have released when the lock-out relay, such as 35, operates, as above described, or in case one or more of the selectors becomes advanced and locked by voice currents which may be present on the line between the time the lock-out pulses are transmitted and the station code dialing commences. The remaining three digits 377 when added together total 17 and when transmitted, one digit at a time, only the selector 31 at station 3 will reach and hold on its seventeenth contact. The means whereby this is accomplished forms no part of the invention and is disclosed in the previously mentioned Field patent.

When the first digit 1 of the code is transmitted, the line frequency is changed momentarily from 600 to 1500 cycles, thereby momentarily energizing all the selectors which release, if they have not already done so, and return to normal, but it will be noted that relay 35 which was oper-

ated at the end of the twenty-one lock-out pulses remains locked under control of relay 37 and consequently does not release at this time. The next three digits transmitted, i. e., 377, which are characteristic of station 3 only, advance selector 31 at that station to its seventeenth terminal where it locks in the well-known manner but the selectors at all other stations, not being adjusted to this code, drop back at the end of each digit and hence do not reach their seventeenth terminal. When selector 31 stops on terminal 17 it closes a circuit to operate the ringing relay 37 which opens its lowermost contacts, thereby removing the locking ground of relay 35, which relay releases, thus removing, at its upper contacts, the busy tone from the left winding of the repeating coil 38 and at its contacts 47 also releases relay 48. Relay 35, in releasing, also recloses its contacts 39, thereby placing relay 40 in conditions for operation when the telephone receiver at this station is removed from the hook. Relay 37 also closes its inner alternate contacts, thus connecting ringing current to conductors 41 and 42 extending to the telephone set T₃ to actuate the ringer 43 thereat. Operation of relay 37 also closes its contacts 45, thereby operating relay 29 which opens its contacts 28 and 46 which remove the short-circuits around the upper and middle windings of relay 34 which relay operates to move its armature to the left due to the frequency present on the line. Operation of relay 34 energizes slow-release relay 48 again, now over its right winding, to prepare a circuit to give the selector a release impulse when the dial key at the calling station is released.

When the calling subscriber concludes dialing the code of the called station, he releases dial key 17, thereby stopping and disconnecting the oscillator; thereby permitting relay 34 of the called station to move its armature to the right under the influence of its lower or bias winding, thereby opening the circuit of the right winding of relay 48, but before this relay which is slow to release breaks its contacts the right-hand contact of relay 34 makes, thereby causing a momentary impulse to be transmitted to the selector 31 which releases as before mentioned. When the selector restores, the circuit of ringing relay 37 is opened and the bell at the called station is silenced. When the called subscriber removes his receiver from the switch-hook, relay 44 operates, thereby connecting the telephone set through to the line by operating relay 40, whereupon conversation between the calling and called parties takes place to the exclusion of all the other stations which are locked out.

At the conclusion of the conversation the calling, or called station, actuates the respective dial key, such as 17, thereby energizing the oscillator. He then actuates the release pulse transmitter, such as RLS₁, thereby sending twenty-three pulses to the line which steps all the selectors to the twenty-third terminal whereupon an associated release relay, such as 49 at the locked-out station 2, operates to close its right-hand contacts, thus again operating relays, such as 50, to apply a single current impulse to the selector thereat to cause its release. Relay 49, in operating, also opens its left-hand contacts to open the holding circuit for the lock-out relay, such as 51, which releases and closes its contacts, thus conditioning the telephone connecting relay 53 for operation whenever its associated telephone set is taken for use. When the dial key is released the sys-

tem is in normal condition and ready for another call.

What is claimed is:

In a selective signaling system, a line, a plurality of stations associated therewith, means at each station for selectively transmitting over said line different groups of code impulses of electrical oscillations within the voice frequency range, other means comprising a step-by-step switching device at each station for receiving and translating said transmitted code impulses, all of said switching devices being adapted to take a common setting in response to a first predetermined code transmitted, a different common setting in response to another code, and each device being

5 adapted to take still another setting in response to a predetermined individual code, a telephone set including a signal device at each station, means responsive to taking any one of said telephone sets for use to connect it to the line, means at all stations responsive to a said first common setting of the switching device thereat to disable the associated connecting means, other means at each station responsive to an individual 10 predetermined setting of the switching device to enable the line connecting means at that station, and still other means responsive to said second common setting of said switching device to enable the connecting means thereat, if disabled.

15 FERDINAND S. ENTZ.