J. A. LIGHTHIPE.

HARMONIC SELECTIVE SIGNAL FOR PARTY TELEPHONE LINES.

No. 550,982.

Patented Dec. 10, 1895.

Witnesses:

By Wilt C. Smith,

W. Clyde Jones.

Inventor:

James A. Lighthipe,

By Burton & Brown

Attorneys.
HARMONIC SELECTIVE SIGNAL FOR PARTY TELEPHONE-LINES.

To all whom it may concern:

Be it known that I, JAMES A. LIGHTHIRE, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented a certain new and useful Improvement in Harmonic Selective Signals for Party Telephone-Lines, (Case No. 1,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to a harmonic selective signal apparatus for party telephone-lines, its object being to provide means whereby any one of a number of subscribers connected with a common or party telephone-line may be called by a selective signal sent from the central office.

In accordance with my invention a receiver in the form of a mechanically-vibrated reed is provided at each of the several sub-stations connected with the party-line, each of the reeds having a different and characteristic pitch, while at the central station the operator is provided with a number of transmitters adapted to throw upon the line pulsating or alternating currents of a pitch corresponding with the pitch of any one of the receivers, whereby the reed belonging to the particular receiver is thrown into vibration to ring a bell or actuate other signal, and thereby call the attention of the subscriber.

Referring to the accompanying drawings, Figure 1 is a diagram illustrating my invention in connection with two party-lines connected together at the central station. Fig. 2 is a modification of the transmitting apparatus at the central station.

The apparatus at the sub-stations C and B are connected with the limbs a a' of a party-line extending to the central station and terminating in the line-springs d d' of a spring-jack.

At the central station I have indicated a usual form of individual-indicator b, in circuit with a battery b', between contact-avails b' and b, adapted to normally rest in contact with the line-springs d and d', respectively. At sub-station A the receiver c and transmitter c' are included between the limb a of the line and contact-avails c, against which the telephone-hook c is adapted to rest when the telephone is removed therefrom, the telephone-hook being connected with the limb a' of the line. When the receiver is hung up, the hook c rests upon a contact c', connected through an electromagnet d and condenser d' with the limb a. In front of the electromagnet d is supported a reed d', having a characteristic number of vibrations, the reed carrying upon its end a hammer e, adapted to strike against the gongs e' e' when the telephone is removed therefrom. The electromagnet of the signaling device is in this instance connected directly between the two limbs a and a' of the telephone-line, being included in circuit with the condenser e'. A reed e', having a characteristic number of vibrations different from that of the reed d', is supported in front of the magnet e and carries upon its end a hammer e', adapted to sound the gongs e'.

I have shown a plug f' inserted into the spring-jack at the central station, thus looping the operator's cord-connections into circuit with the line. A battery g has one pole connected with the strap f of the cord-connections, while the other pole is connected with anvils or contact-points h and i, adapted to be engaged, respectively, by the levers of keys h' and i when depressed. The key h' is connected through the electromagnet h' with the strap f' of the cord-connections, while the key i is connected through the electromagnet i' with the strap f' of the cord-connections, while the key i' is connected through the electromagnet i' with the strap f' of the cord-connections, while the key i' is connected through the electromagnet i' with the strap f' of the cord-connections, while the key i' is connected through the electromagnet i' with the strap f' of the cord-connections.
key 'k' is depressed, the circuit of battery 'g' is closed through electromagnet 'h' over the limb 'a' of the telephone-line through the electromagnets 'd' and 'e' at the sub-stations and back by the limb 'a' to the opposite pole of the battery. The magnet 'h' is thus excited and attracts the reed armature 'h', thus causing the same to make contact with the contact or anvil 'k', thus short-circuiting the battery 'g' through conductors 'h' 'h', and de-energizing the magnet 'h', thus causing the same to release reed 'h', which falls back, opening the circuit between contact 'h' and the reed 'k' permitting another impulse to be sent through the magnet and out over the line. The reed 'h' is thus vibrated at a rate dependent upon the characteristic vibration of which the reed is capable, while a corresponding number of impulses are sent through the electromagnets 'd' and 'e' at the sub-stations. As the reed 'h' is pitched to vibrate in harmony with the impulses thus sent over the line, the bell at sub-station 'A' will be rung, while the bell at sub-station 'B' will remain quiescent, since the number of vibrations is not in harmony with the pitch of the reed 'h'. The reed 'h' is adapted to vibrate at the same rate as the reed of the sub-station 'B', so that when the key 'i' is depressed impulses will be thrown upon the line having the number of vibrations of the reed 'h', and in consequence the bell at sub-station 'B' will be sounded.  

Upon the right of Fig. 1 I have illustrated two additional sub-stations 'C' and 'D', in which the electromagnets 'k' and 'l', respectively, of the signal devices are included between the limb 'm' of the line and ground, while at the central station the electromagnets 'o' and 'p' of the transmitting devices and battery 'g' are included between the strand 'q' and ground, the circuit-connections being otherwise the same, so that the calling-currents are sent out of the limb 'm' of the telephone-line with a ground return instead of returning over the other limb of the metallic circuit, as shown upon the left. This arrangement of the calling system is also applicable to grounded telephone-lines.

Suppose, for illustration, subscriber 'A' is desirous of conversing with subscriber 'B'. He removes his telephone-receiver 'c' from its hook, permitting the hook 'c' to come in contact with anvil 'c' and closing together the two limbs 'a' of the telephone-line at the sub-station. The circuit of battery 'b' is thus closed through indicator 'b', calling the attention of the operator, who inserts the plug 'f' into the tuning-jack and telephones as to the number of the called subscriber by bridging the telephone set between the two strands of the cord-conductors, the telephone set being omitted in the drawings, as it forms no part of the present invention. Learning that subscriber 'A' desires to converse with subscriber 'B', he depresses the key 'i', thus throwing impulses upon the line adapted to vibrate the reed 'h' and ring the bell of subscriber 'B'. Should subscriber 'A' desire to converse with subscriber 'C', she would depress key 'o', thus vibrating the reed 'l' at sub-station 'C', while if connection were desired with subscriber 'D' she would depress key 'p', thus vibrating the reed 'q' at sub-station 'D'.

In Fig. 2 I have illustrated an arrangement of the transmitting apparatus to be employed when it is not desired to connect the battery 'g' directly in circuit with the transmitter 'h'. In this instance the magnet is wound with two coils 'r' and 'r', the windings being in opposite directions, so that when current traverses both windings the magnet remains neutral. The telephone-line 's' is connected with the secondary 's' of an induction-coil provided with two primary windings 's' 's', one in circuit with each of the windings 'r' 'r'. The winding 's' is connected directly to one pole of the battery 'g', while the winding 's' is connected with the reed 'r'. The contact 'r', against which the reed is adapted to strike, is connected directly to the pole of the battery. Between the opposite pole of the battery and the windings 's' 's', the magnet is included the key 'i'. When the key 'i' is depressed, current from battery 'g' flows through the winding 'r' of the magnet and the primary 's' of the transformer, and thence to the opposite pole of the battery, the magnet being thus energized and attracting the reed 'r'. As soon as the reed strikes the contact 'r', the winding 's' is closed through the winding 'r' and the primary 's' of the transformer. Current thus simultaneously traverses the two windings of the electromagnet and the two primary windings of the transformer, which respectively neutralize one another, causing the magnet to release its reed 'r', neutralizing the current in the secondary of the transformer. The release of the reed 'r' opens the circuit through the windings 'r' and 's' and the reed is again contracted, the reed thus producing its characteristic vibration and causing impulse to be sent over the telephone-line.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of a telephone line connected with the secondary of a transformer, of a local circuit containing a source of electricity and two parallel circuits or paths, an electro-magnet provided with two opposed windings one winding being included in each of said parallel paths, two primary windings for said transformer one included in each of said paths, a reed adapted to vibrate in front of the poles of said electro-magnet, and contacts controlled thereby for intermittingly opening and closing the circuit through one of said paths whereby intermit-
tent or vibratory currents are produced in
the telephone line; substantially as described.

2. The combination with a source of elec-
tricity of an electro-magnet provided with
two opposed windings said windings being
included in parallel paths of the circuit, a
reed adapted to vibrate in front of the pole
of said electro-magnet, and contact points
controlled by the vibration of said reed for
intermittently opening and closing the cir-
cuit through one of said windings; substan-
tially as and for the purpose set forth.

In witness whereof I hereunto subscribe my
name this 15th day of June, A. D. 1895.

JAMES A. LIGHTHIPE.

Witnesses:

F. C. MOSEBACH,

CHAS. M. COLE.