

K. WEMAN.
FOUR PARTY TELEPHONE LINE.
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987,399.

Patented Oct. 19, 1909.

Fig. 1.

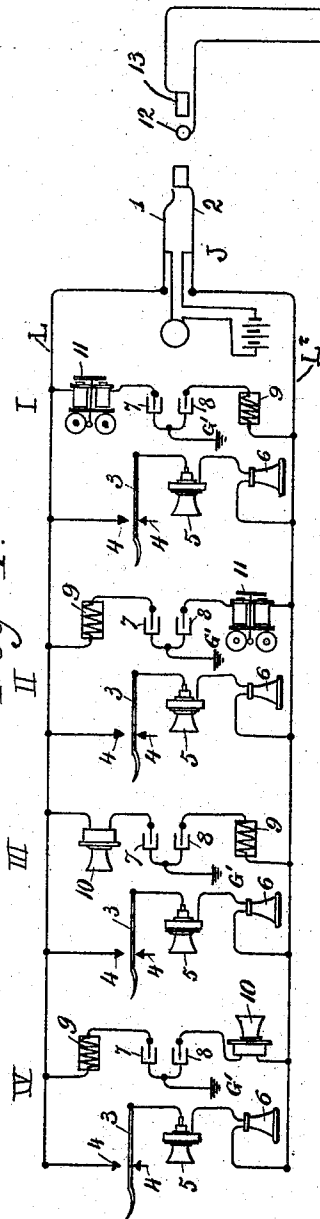


Fig. 2.

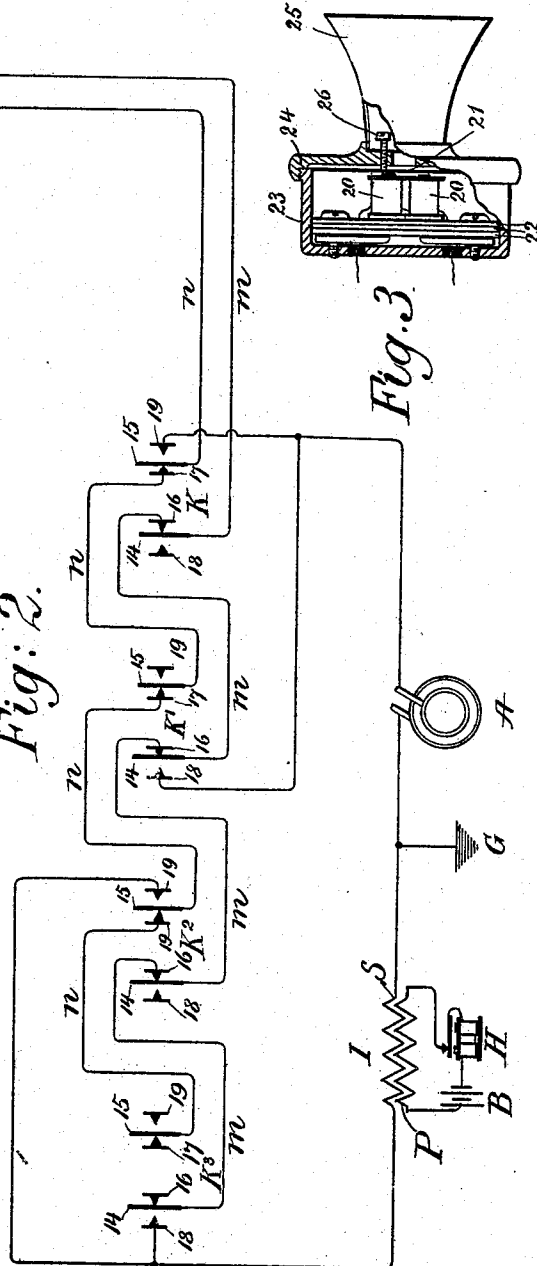
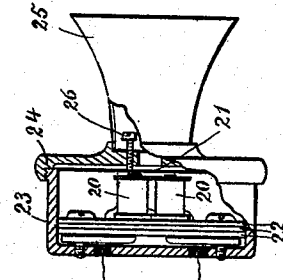


Fig. 3.



WITNESSES:

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FOUR-PARTY TELEPHONE-LINE.

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Specification of Letters Patent.

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Application filed January 23, 1906. Serial No. 297,463.

To all whom it may concern:

Be it known that I, KLAS WEMAN, citizen of the United States, residing at Buffalo, New York, have invented certain new and useful Improvements in Four-Party Telephone-Lines, of which the following is a specification.

The present invention relates to four party telephone lines, and includes novel circuit arrangements hereinafter described and particularly pointed out in the appended claims.

One object of the invention is to construct a four party telephone system, which may be used either for common battery or magneto lines, and in which but two kinds of current are employed.

A further object of the invention is to generate currents, varying so greatly in undulations, that only a given signaling device will respond to the current designed to operate it, and all other signaling instruments will remain unresponsive, under the influence of that current.

Heretofore, it has been the usual practice to use currents of four frequencies, one for each party on the line, allowing a certain limited margin for variations in undulation of the current, but with this arrangement, a comparatively slight increase or decrease of undulations makes the signals unreliable. By the application of my invention the objects above stated are attained and the disadvantageous feature just referred to is obviated.

One form of the invention is illustrated in the accompanying drawing, wherein—

Figure 1 is a diagrammatic view of four stations of a party line system; Fig. 2 is a similar view of the circuit arrangement at a central station; and Fig. 3, is a view, partly in section, of a special form of signaling device installed at certain of the stations.

Referring to the drawing, the several subscribers' stations, in Fig. 1, are designated I, II, III, IV; each station being provided with the usual switch hook 3, contact anvils 4, transmitter 5 and receiver 6. I also provide at each station condensers 7 and 8 of suitable capacity, one pole of one of each of the condensers being connected to one side of a retardation coil 9, at each station, and one pole of each of the other condensers being connected to suitable signaling devices. At stations I and II the signaling devices are ordinary ringers 11, while at

stations III and IV the form of signaling device 10 employed is that illustrated in Fig. 3 of the drawing. The other poles of the condensers are joined and run to ground at G'. The conductors for the subscribers' stations are designated L' and L². J being a jack having the usual jack springs 1 and 2. It may be here stated that the retardation coils 9, signaling devices 10 and ringers 11, all have the same resistance and inductance.

Having reference to Fig. 2 of the drawing wherein the circuit arrangement at the central station is illustrated, K, K', K² and K³ designate four keys, each provided with main springs 14 and 15 designed, normally, to be in contact with inner contacts 16 and 17 respectively, the outer contacts being indicated at 18 and 19. The calling plug for insertion into the jack J comprises the tip 12 and sleeve 13 connected up respectively, with leads *n* and *m*, which run through all the keys at the central station.

Suitably arranged in the circuit at the central station is an induction coil I, having the primary winding P and secondary winding S, and also including a battery B and high frequency current interrupter H. The ground is designated G, and A represents an ordinary alternating current generator, emitting current of a frequency adapted to operate ordinary ringers. One pole of the generator A is connected to the contacts 18 and 19 of keys K' and K respectively, and one pole of the secondary winding S is connected to the contacts 18 and 19 of the keys K³ and K² respectively. The opposite poles of the secondary S and generator A, respectively are grounded at G.

In Fig. 3, I have illustrated a special form of signaling device, which I have found gives satisfactory results in practice. The signaling device resembles a telephone receiver, and has two electromagnetic coils 20, suitably secured to ring magnets 22. The diaphragm is indicated at 21, and is mounted in case 23, over which the cap 24, carrying the mouth piece 25, is threaded. Projecting through the cap 24 is a screw 26, the point of which contacts with the diaphragm, and when the latter vibrates, it strikes the screw point 26 and gives a loud and distinct signal.

The operation of the invention may be exemplified by assuming that the central operator desires to call station I. The plug is

inserted into jack J, tip 12 making contact with spring 1 and sleeve 13 contacting with spring 2. The key K is then pressed down causing springs 14 and 15 to break contact with contacts 16 and 17 and to contact with 18 and 19 respectively. A circuit is then completed from the ground at G through generator A, contact 19, spring 15, lead *n*, tip 12, spring 1, branch L', ringer 11, condenser 7 and to ground at G'. The current passing through ringer 11 has caused the latter to give a signal. There are three other possible paths for the current just traced, viz:—through retardation coils 9, condensers 7 and to ground at G' in stations II and IV, and through the signaling device 10 at station III. It is obvious that this current can give no signal through the retardation coils at stations II and IV, and as this current is one of very low frequency it produces no signal at signal device 10 of station III which requires a current of high frequency for its audible operation. By pressing key K' analogous conditions will be established on line branch L², and only ringer 11 at station II will respond.

If station III be called the key K² is pressed down, sending out an induced alternating current of very high frequency, and establishing a circuit from ground at G, through secondary winding S, contact 19 and spring 15 at key K², lead *n*, tip 12, spring 1, branch L', signal device 10 at station III and to ground G', causing the diaphragm 21 to vibrate against screw 26 and give a loud, clear signal. The current just traced cannot produce a signal at retardation coils 9, stations II and IV, nor at ringer 11, (station I), which is not responsive to currents of such high frequency. By pressing key K³ analogous conditions will be established on branch L², and only the signal device at station IV will respond.

It will be noted that at each station between the branches L' and L², there are placed a signaling device 10 or 11, and the condensers 7 and 8 and a coil 9, and as these all have equal resistance and inductance, there can be no noise or disturbance from earth currents or other outside influences.

In order that the use and effect of the condensers may be apparent I would state that they are employed in order to balance the circuits and thereby prevent noise on the line. It is evident that if the line were made up of two wires and on one lead or side is placed a receiver signal and condenser to ground and on the same side a ringer and condenser to ground, while on the other side is a ringer and special signal to ground through condensers, the line would not be properly balanced in relation to ground as on one side there would not be any ground at the respective stations. The result of the conditions just mentioned would be noise on the

line. It is obvious that if one subscriber were talking, and consequently his ringer and ground cut out, there would be two grounds on one side of the line and one on the other which would also make the line noisy if the arrangement set forth were not employed. Therefore, as heretofore stated, in order to balance the line absolutely under all conditions, I place at each instrument and on each side of the line, a resistance on one side and a ringer on the other side both having approximately the same self-induction and exactly the same ohmic resistance. Under these conditions a ground will not have any effect on the line as each side is grounded through exactly the same resistance and if a subscriber is talking, it still leaves the line with the grounds exactly balanced in relation to both branches and the line will not be disturbed or noisy in any way.

Obviously my invention may be modified in numerous particulars without departing from the spirit thereof, and I do not wish to be limited to the form of invention illustrated.

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

1. In a four-party telephone line, a central station, and a series of subscribers' stations connected thereto by parallel line branches, each subscriber's station including between the line branches a signaling device, a condenser and a retardation coil of equal resistance and induction, said signaling device and retardation coil being connected to the respective line branches and both of said elements being grounded through the condenser.

2. In a four party telephone line, the combination of a central exchange, a series of substations connected by limbs to said exchange, a signal receiving instrument at each substation, two of said instruments at adjacent stations being polarized ringers and responsive to ordinary alternating currents, and the two remaining instruments being responsive to currents of high frequency, said signaling instruments being connected alternately to said limbs and each grounded, an impedance coil associated with each signaling instrument and connected to the limb opposite to that to which the instrument is connected, said impedance being grounded, and means at the central station for impressing upon the line currents of varying frequencies, to operate either instrument of the pairs of signaling instruments respectively.

3. In a multi-party telephone system, an exchange, a plurality of subscribers' stations connected by limbs to said exchange, a signaling instrument at each station and connected to one of the limbs an impedance element at each station and connected to the other limb, said instrument and impedance element being grounded through a condenser.

4. In a multi-party telephone system, an
exchange, a plurality of subscribers' stations
connected by limbs to said exchange, signal-
ing instruments at each station responsive
5 to currents of different characteristics said
instruments being connected alternately to
said limbs, an impedance coil associated with
each signaling instrument and connected to
the opposite limb thereto, said instruments
10 and impedance elements being grounded

through condensers, and means to impress
upon the limbs currents of different char-
acteristics.

In testimony whereof I have affixed my
signature in presence of two witnesses.

KLAS WEMAN.

Witnesses:

ALFRED LARSSAN,
HENRIETTA BABINGTON.