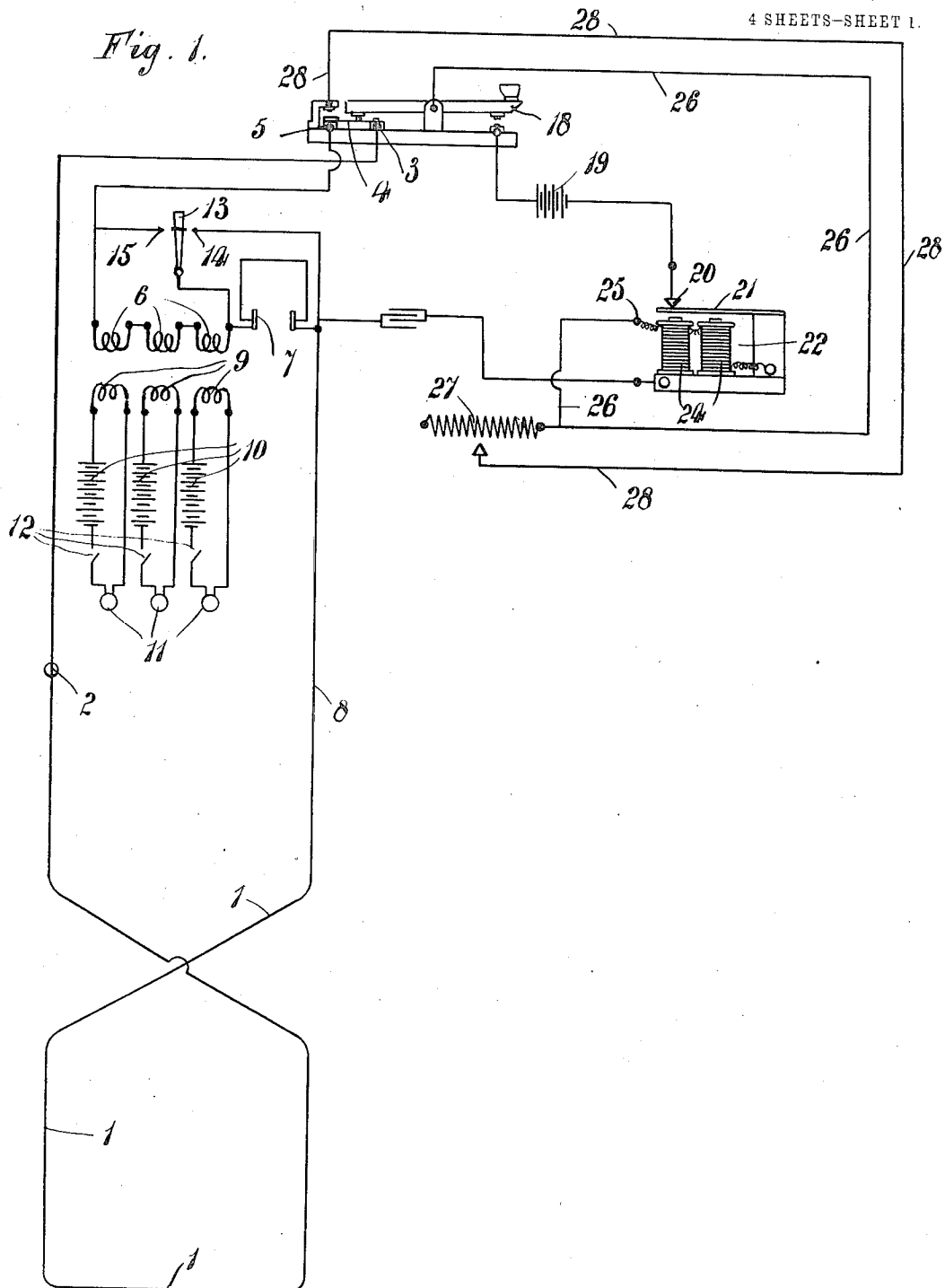


H. VON KRAMER.
INDUCTIVE TELEPHONE AND TELEGRAPHIC INSTALLATION.
APPLICATION FILED AUG. 17, 1911.

1,045,413.

Patented Nov. 26, 1912.

4 SHEETS-SHEET 1.



WITNESSES:

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Frank H. Logan.

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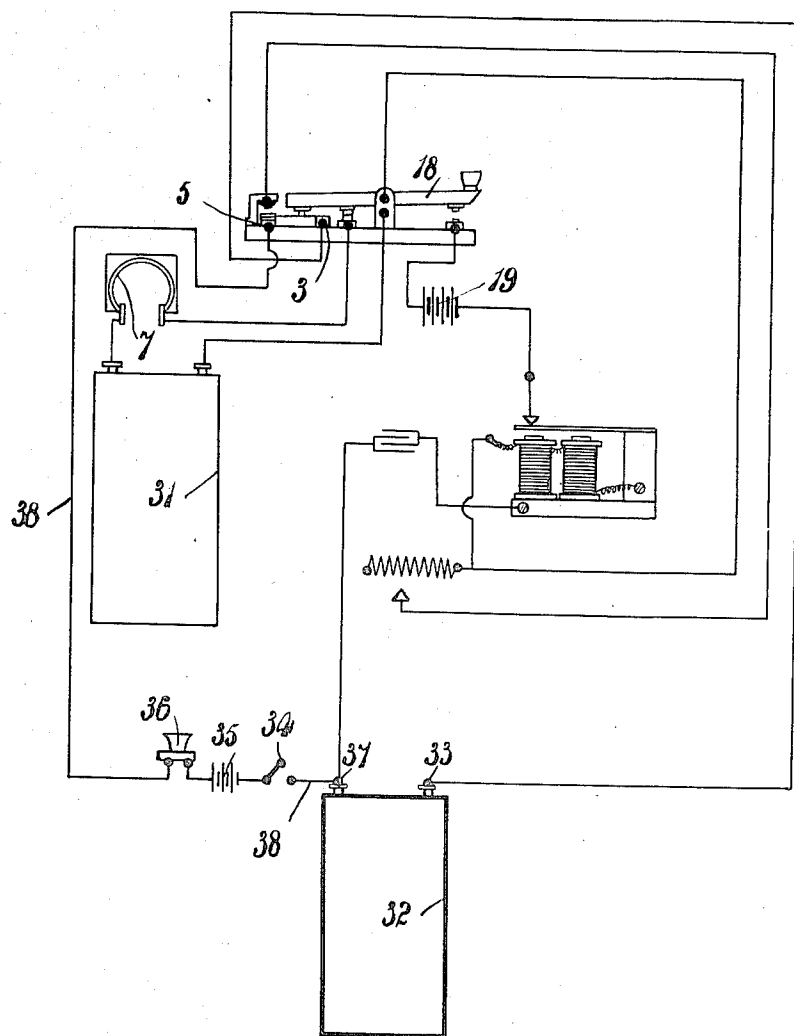
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4 SHEETS SHEET 2.

Fig. 2.



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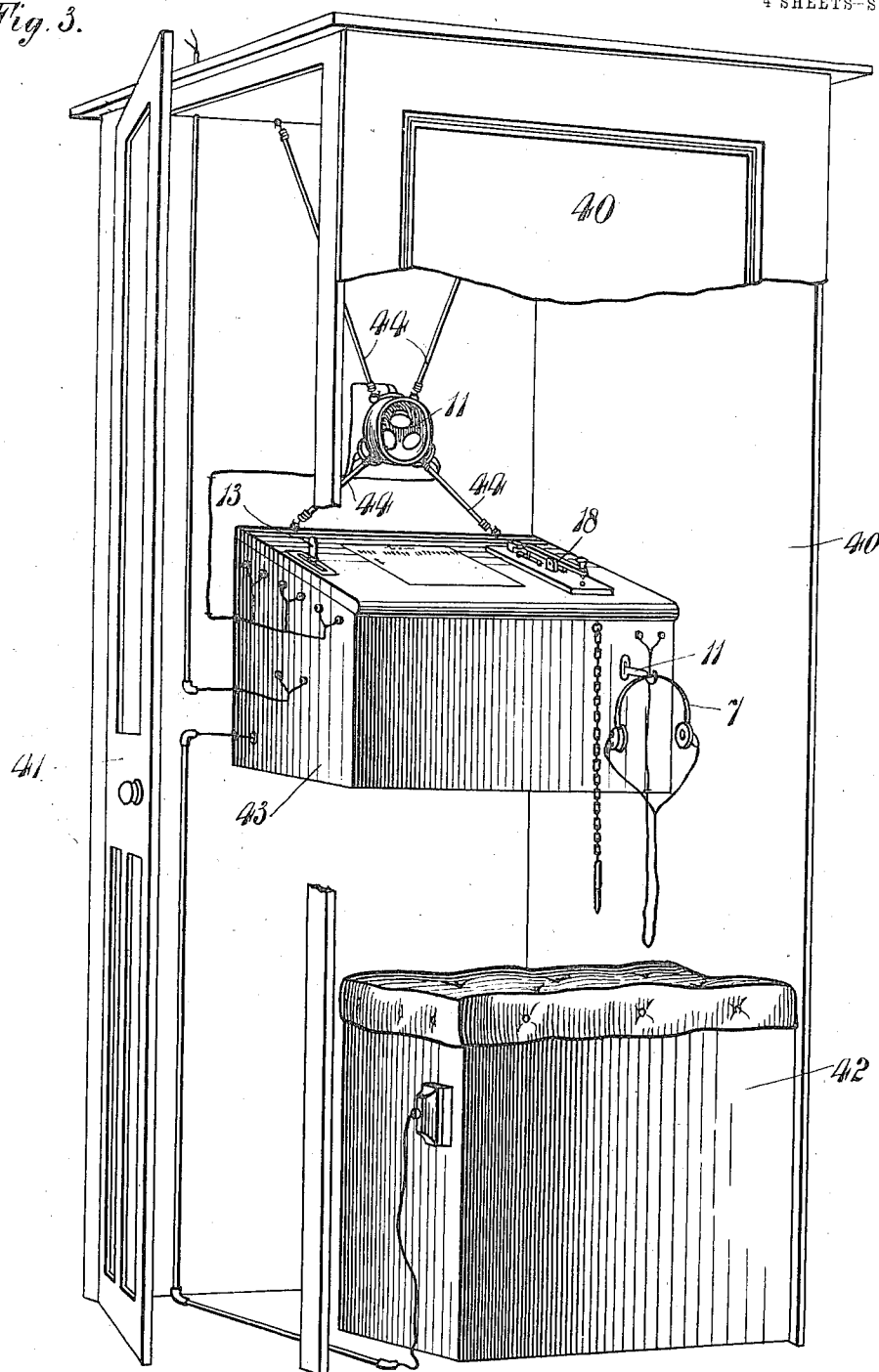
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4 SHEETS-SHEET 3.

Fig. 3.



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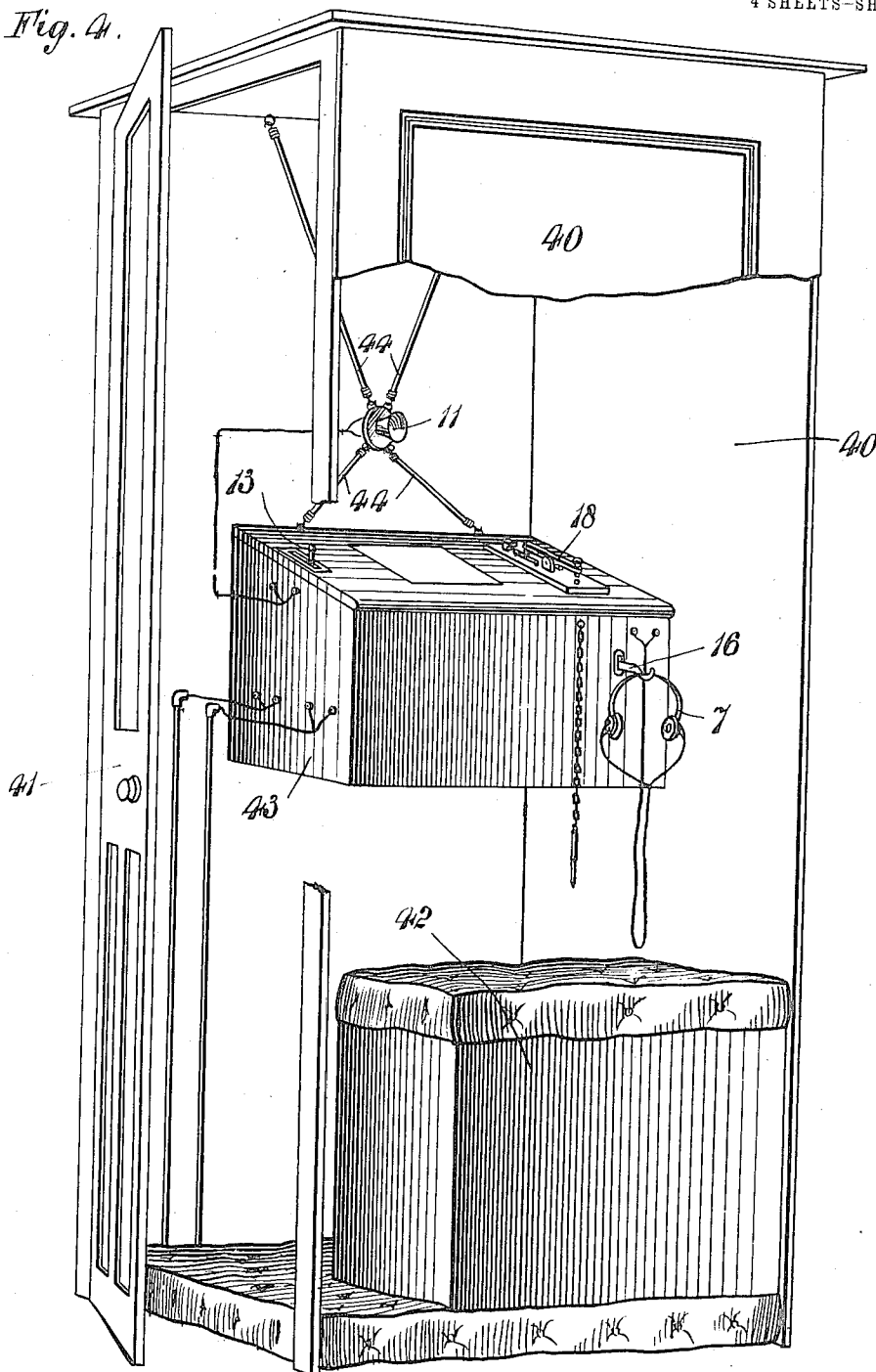
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4 SHEETS-SHEET 4.

Fig. 4.



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UNITED STATES PATENT OFFICE.

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INDUCTIVE TELEPHONE AND TELEGRAPHIC INSTALLATION.

1,045,413.

Specification of Letters Patent.

Patented Nov. 26, 1912.

Application filed August 17, 1911. Serial No. 644,515.

To all whom it may concern:

Be it known that I, HANS VON KRAMER, subject of the Emperor of Germany, residing at 21 Wood End road, Erdington, Birmingham, in the county of Warwick, England, have invented a new and useful Inductive Telephone and Telegraphic Installation; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention comprises improvements in inductive wireless telephone and telegraphic installations of the type described in my prior specification Serial No. 590,726; and has for its object to provide an apparatus capable of use both for telephony and telegraphy.

My telegraphic and telephonic installation is particularly useful for sending telegraphic and telephonic signals and to receive instantaneous replies between a railway train and a line station, or to a line station from a railway train, either when the train is in motion or stationary; or from one moving or stationary train to another train; or for other similar purposes such as on cars, boats, airships, lifts, or the like hand or power propelled vehicles, while they are in motion or temporarily at standstill, either between or among themselves or between them and railway stations, roads, harbors, river banks, quays, buildings or other stationary places, or between any of the above named vehicles and any stationary or portable telegraphic or telephonic station or stations.

In the said prior specification, I have shown and described a wireless inductive telephone installation embodying a non inductive ground wire and coil or frame carried by the vehicle and in inductive relation to the ground wire, the ground wire and coil being each capable of being put into circuit with either a transmitter and battery or a receiver at will; whereby telephone communications may take place to or from a moving vehicle when stationary or in motion.

According to my present invention I provide an installation adapted for use either for instantaneous telegraphy or telephony, the line wire or induction frame around the vehicle being so arranged that they may be employed either for transmitting telegraphic signs, or for transmitting speech, or for receiving telegraphic or telephonic signals,

without the operation of a single switch to change over from telegraphy to telephony.

With my system as will be seen from the various diagrams it is possible to interrupt the sender of a message instantaneously while engaged in transmitting a message and so save much time and inconvenience and perhaps serious trouble. The interruption when telephoning is caused by speaking into the mouthpiece of the transmitter while the receiver is engaged to deliver the sender's message and so carry on a conversation without the use of change over switches—just as is the case in an ordinary conversation. When it is desired to interrupt the sender of a telegraphic message it is likewise possible to interrupt the sender by simply operating the Morse key switch and so warn the sender or stop him after every word— if not properly understood or to stop him in delivering a lengthy or unimportant message instead of having to wait until the sender has finished. This may prove particularly useful in railway work.

Referring to the drawings, Figure 1 diagrammatically shows the line circuit and Fig. 2 is a similar view of a movable circuit. Fig. 3 illustrates the apparatus as contained in a call box at the line station. Fig. 4 is a similar view of the call box carried by the movable vehicle.

The stationary side of the installation or line circuit and also the movable side or train equipment may each be said to broadly comprise three circuits viz 1. a telephone transmitting circuit, 2. a telegraph transmitting circuit and 3. a receiving circuit which is the same both for telephony and telegraphy.

As shown in Fig. 1 the line wire 1, which may be several miles long and is laid parallel to the track in manner described in the prior specification, has its one terminal 2 connected to a terminal 3 on the pivoted end of the switch 4 which normally engages the contact 5 which is connected to the secondary side 6 of the telephone transmitters which are then connected to the double head-gear receiver 7 and from that to the terminal 8. This transmitting member is shown as being of triple form as it is necessary to transmit through the resistance of a long length of ground wire and then by the induction frame to the train, the primary coils 9 being in circuit with batteries 10, and mouth pieces 11, the circuits being provided

with switches 12, which are opened when the receiver is hung on the hook 16 as shown in Figs. 3 and 4.

As previously explained the line wire forms part of a complete circuit and obviously speech may be transmitted from the transmitter through the induction coils to the line wire; thence inductively to the frame on the vehicle in manner described in the aforementioned prior application.

The same circuit as above described may be employed for receiving in telephony as for transmitting but it may be undesirable to have the receiver in circuit when transmitting or to have the secondary of the inductive coils in circuit when listening; and for this purpose I may employ a key switch 13 which would be brought onto the contact 14 to short circuit the receiver when transmitting and onto the contact 15 to short circuit the transmitter when listening. This switch is particularly useful when receiving or sending a lengthy message but its use is not necessary during ordinary conversation.

The apparatus includes a Morse key 18 one contact of which is in circuit with the battery 19, and through the make and break terminal 20 with the vibrating reed 21 of the vibrator 22, the current passing when the make and break terminal is in contact with the reed through the reed and then through the magnets or magnet 24 to the point 25 and then through the wire 26 to the lever of the Morse key thus completing the battery circuit operating the vibrator when the key is depressed. The vibrating current is taken off in parallel from the vibrator coil or coils passing from the point 25 through the variable inductance 27 by the wire 28 to the spring raised switch 4 normally depressed by, but insulated from, the Morse key, the said switch closing the circuit when the taper is depressed, thereby putting the telegraphic appliance into circuit with the ground loop; the return being through the condenser to the line wire. Thus whenever the Morse key is depressed a vibratory current is passing through the line wire and which current is inductively transmitted to the receiving frame 31 carried by the vehicle and this being in circuit with a receiver, the dots and dashes are sent in the usual manner, and received in the telephone receiver as from the vibrator. The installation carried by the vehicle is similar to that of the line circuit except that the receiving frame 31 and the transmitting frame 32, as seen in Fig. 2, take the place of the ground wire loop. These two frames are employed so that the user may carry on an uninterrupted conversation without using a change over switch to transfer from listening to speaking and vice versa. The receiving frame 31 and receiver 7 are connected to the rear of the Morse key the receiving cir-

cuit being completed when the key is in its normal and inoperative position. One terminal 33 of the transmitting frame 32 is connected to the terminal 3 through the key switch 34, battery 35, and transmitter 36, the other terminal 37 of the frame being connected to the switch 34 by the wire 38; the operation and arrangement of this switch and terminals being the same as previously described with reference to the ground circuit.

In Fig. 3 I have shown a perspective view of a call box 40 as employed at a line station equipped with my apparatus, part of one side of the box being broken away. The door 41 is preferably a window over the desk 43 opposite to it being intended that the operator shall sit on the seat 42 and be then in such a position that he shall be able to conveniently use all the telephone or telegraph apparatus. The desk 43 contains the three induction coils, condenser, inductance and vibrator while on its surface is arranged the Morse key and key switch, the surface being sloped conveniently for writing down messages. At the front to the right hangs the receiver, and to the left above the desk the transmitter 11 which is supported by rubber cords 44 whereby it is insulated from vibration. The seat 42 contains the batteries.

Fig. 4 shows a similar view of the call box as on a train, the arrangement being similar to that already described except that the batteries are preferably carried in the slope desk; while the seat is preferably supported on a resilient base or pad 45.

As will be seen, by my invention I provide an apparatus or installation whereby it is possible to both telephone and telegraph to or from a moving vehicle and to interrupt the sender of a message at the other end at will, either from or to a line station or a second moving vehicle equipped with corresponding apparatus, without the operation of a single change-over-switch from telegraphy to telephony and simply by either speaking into the telephone transmitter or wiring the telegraphic key as is desired.

As shown the line wire is arranged at suitable distances whereby the circuit is rendered noninductive to outside influences such as neighboring telegraph wires running parallel to a railway line.

What I claim then is:—

1. In a combined telephone and telegraphic installation for use with movable vehicles, the combination of a line wire laid substantially parallel to the direction in which the vehicle travels, and having its out and return portions crossed at intervals to make it non-inductive to neighboring telegraph wires and similar disturbing influences; a telephone transmitting apparatus including a transmitter, an induction coil

and a source of electricity; a telegraph apparatus located at a line station including means for creating a vibrating current in the circuit; a source of electricity, and means for making and breaking the circuit, said means being arranged to put the telegraphic apparatus into circuit with the line wire when said means are operated; means for receiving the telephone or telegraph messages; a wire frame carried by the vehicle; a telephonic transmitting apparatus; a telegraphic apparatus carried by the vehicle and including means for creating a vibrating current in this telegraphic circuit, a source of electricity and means for making and breaking the circuit; said means being arranged to put the telegraphic apparatus into circuit with the frame when said means are operated; and means for putting either the telephonic apparatus or the telegraphic transmitting apparatus into circuit with the said frame; all for the purpose specified and substantially as set forth.

2. In a combined telephone and telegraphic installation for use with movable vehicles, the combination of a line wire laid substantially parallel to the direction in which the vehicle travels, and having its out and return portions crossed at intervals to make it non-inductive to neighboring telegraph wires and similar disturbing influences; a telephone transmitting apparatus including a transmitter, an induction coil and a source of electricity; a telegraph apparatus located at a like station including means for creating a vibrating current in the circuit, a source of electricity, and means for making and breaking the circuit, said means being arranged to put the telegraphic apparatus into circuit with the line wire when said means are operated; means for receiving the telephone or telegraph messages; a wire frame carried by the vehicle; a telephonic transmitting apparatus; a telegraphic apparatus carried by the vehicle and including means for creating a vibrating current in this telegraphic circuit, a source of electricity, and means for making and breaking the circuit; said means being arranged to put the telegraphic apparatus into circuit with the frame when said means are operated; means for putting either the telephonic apparatus or the telegraphic transmitting apparatus into circuit with the said frame; a second frame carried by the vehicle and also in inductive relation with the line wire, and means for collecting both the telephonic and telegraphic messages; all for the purpose specified and substantially as set forth.

3. In a combined telephone and telegraph installation for use with moving vehicles, the combination of a line wire laid parallel to the direction in which the vehicle travels and having its out and return portions

crossed at intervals to make it non inductive to neighboring telegraph wires and similar disturbing influences; a telephone transmitting apparatus including a transmitter, an induction coil, and a battery, a telegraphic apparatus located at a line station including a vibrator, a battery, and Morse key, the Morse key being arranged to put the telegraphic apparatus into circuit with the line wire when said key is depressed; an ear receiver for collecting both the telephone and telegraph messages, a wire frame carried by the vehicle; a telephonic transmitting apparatus, a telegraphic apparatus carried by the vehicle and including a vibrator, a battery, and a Morse key the Morse key being arranged to put the telegraph apparatus into circuit with the frame when said key is depressed, means for putting either the telephonic transmitting apparatus or the telegraphic transmitting apparatus in circuit with the said frame; a second frame carried by the vehicle and also in inductive relation with the line wire, and an ear receiver for collecting both the telephonic and telegraphic messages; all for the purpose specified and substantially as set forth.

4. In a combined telephone and telegraph installation for use with moving vehicles, the combination of a line wire laid parallel to the direction in which the vehicle travels and having its out and return portions crossed at intervals to make it non inductive to neighboring telegraph wires and similar disturbing influences; a telephone transmitting apparatus including a transmitter, an induction coil and a battery; a telegraph apparatus located at a line station including a vibrator, a battery, and Morse key, the Morse key being arranged to put the telegraph apparatus into circuit with the line wire when said key is depressed; an ear receiver for collecting both the telephone and telegraph messages; and means for putting the telephone transmitting apparatus, telegraph sending apparatus, or receiving apparatus in circuit with the line wire as desired; a frame carried by the vehicle and in inductive relation with the line wire; a telephone transmitting apparatus; a telegraph apparatus carried by the vehicle and including a vibrator, a battery and a Morse key, the Morse key being arranged to put the telegraph apparatus into circuit with the frame when said key is depressed, a receiving apparatus; and means for putting the telephone transmitting apparatus, telegraph sending apparatus, or receiving apparatus in circuit with the frame carried by the vehicle as desired, all for the purpose specified and substantially as set forth.

5. In a combined telephone and telegraph installation for use with moving vehicles, the combination of a line wire laid parallel to the direction in which the vehicle travels

and having its out and return portions crossed at intervals to make it non inductive to neighboring telegraph wires and similar disturbing influences; a telephonic transmitting apparatus; a telegraph apparatus located at a line station and including a vibrator; a battery; and Morse key, the Morse key being arranged to put the telegraph apparatus into circuit with the line wire when said key is depressed; a receiving apparatus; and means for putting the telephone transmitting apparatus, telegraph sending apparatus, or receiving apparatus in circuit with the line wire as desired; a wire frame carried by the vehicle, and in inductive relation with the line wire; a telephone transmitting apparatus; a telegraph apparatus carried by the vehicle and including a vibrator, a battery, and a Morse key the Morse key being arranged to put the telegraph apparatus into circuit with the frame when said key is depressed; means for putting either the telephonic transmitting apparatus or the telegraphic sending apparatus in circuit with the said frame; a second frame carried by the vehicle and also in inductive relation with the line wire, and an ear receiver for collecting both the telephonic and telegraphic messages; all for the purpose specified and substantially as set forth.

6. In a combined telephone and telegraph installation for use with moving vehicles, the combination of a line wire laid parallel to the direction in which the vehicle travels and having its out and return portions crossed at intervals to make it non inductive to neighboring telegraph wires and similar disturbing influences; a telephone transmitting apparatus including a transmitter, an induction coil and a battery; a telegraph apparatus located at a line station and including a vibrator, a battery, and Morse key, the Morse key being arranged to put the telegraph apparatus into circuit with the line wire when said key is depressed, an ear receiver for collecting both the telephone and telegraph messages, a wire frame carried by the vehicle; a telephonic transmitting apparatus; a telegraphic sending apparatus; means for putting either the telephonic transmitting apparatus or the telegraphic transmitting apparatus in circuit with the said frame; a second frame carried by the vehicle and also in inductive relation with the line wire; and an ear receiver for collecting both the telephonic and telegraphic messages; all for the purpose specified and substantially as set forth.

7. In a combined telephone and telegraph installation for use with moving vehicles, the combination of a line wire, laid parallel to the direction in which the vehicle travels and having its out and return portions crossed at intervals to make it non inductive to neighboring telegraph wires and similar

disturbing influences, a telephone transmitting apparatus including a transmitting mouth piece; an induction coil, and a battery; a transmitter; an induction coil and a battery; a telegraph apparatus located at a line station and including a vibrator; a battery; and Morse key, the Morse key being arranged to put the telegraph apparatus into circuit with the line wire when said key is depressed; an ear receiver for collecting both the telephone and telegraph messages; a telegraph apparatus carried by the vehicle and including a vibrator; a battery; and a Morse key, the Morse key being arranged to put the telegraph apparatus into circuit with the frame when said key is depressed, and an ear receiver for collecting both the telephone and telegraph messages; all for the purpose specified and substantially as set forth.

8. In a combined telephone and telegraph installation for use with moving vehicles, the combination of a line wire laid parallel to the direction in which the vehicle travels and having its out and return portions crossed at intervals to make it non inductive to neighboring telegraph wires and similar disturbing influences; a telephone transmitting apparatus including a transmitter; an induction coil; and a battery; a telegraph apparatus located at a line station and including a vibrator; a battery; and Morse key; the Morse key being arranged to put the telegraph apparatus into circuit with the line wire when said key is depressed; a receiving apparatus; a telegraphic apparatus carried by the vehicle and including a vibrator; a battery; and a Morse key, the Morse key being arranged to put the telegraph apparatus into circuit with the frame when said key is depressed, a wire frame carried by the vehicle, and in inductive relation with the line wire; a telephone transmitting apparatus; a telegraph sending apparatus; means for putting either the telephonic transmitting apparatus or the telegraphic sending apparatus in circuit with the said frame; a second frame carried by the vehicle and also in inductive relation with the line wire; and an ear receiver for collecting both the telephonic and telegraphic messages; all for the purposes specified and substantially as set forth.

9. In a combined telephone and telegraph installation for use with moving vehicles, the combination of a line wire laid parallel to the direction in which the vehicle travels and having its out and return portions crossed at intervals to make it non inductive to neighboring telegraph wires and similar disturbing influences; a telephone transmitting apparatus including a transmitter, an induction coil, and a battery; a telegraph apparatus located at a line station including a vibrator, a battery, and Morse key, the

Morse key being arranged to put the telegraph apparatus into circuit with the line wire when the said key is depressed; an ear receiver for collecting both the telephone and telegraph messages; a wire frame carried by the vehicle; a telephonic transmitting apparatus; a telegraph apparatus carried by the vehicle and including a vibrator, a battery, and a Morse key, the Morse key being arranged to put the telegraph apparatus into circuit with the frame when said key is depressed; means for putting either the telephonic transmitting apparatus or the telegraphic transmitting apparatus in

circuit with the said frame; a second frame carried by the vehicle and also in inductive relation with the line wire; and an ear receiver for collecting both the telephonic and telegraphic messages; all for the purpose specified and substantially as set forth.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

H. V KRAMER.

Witnesses:

NORMAN S. BARLOW,
STANLEY L. LIGHTFOOT.