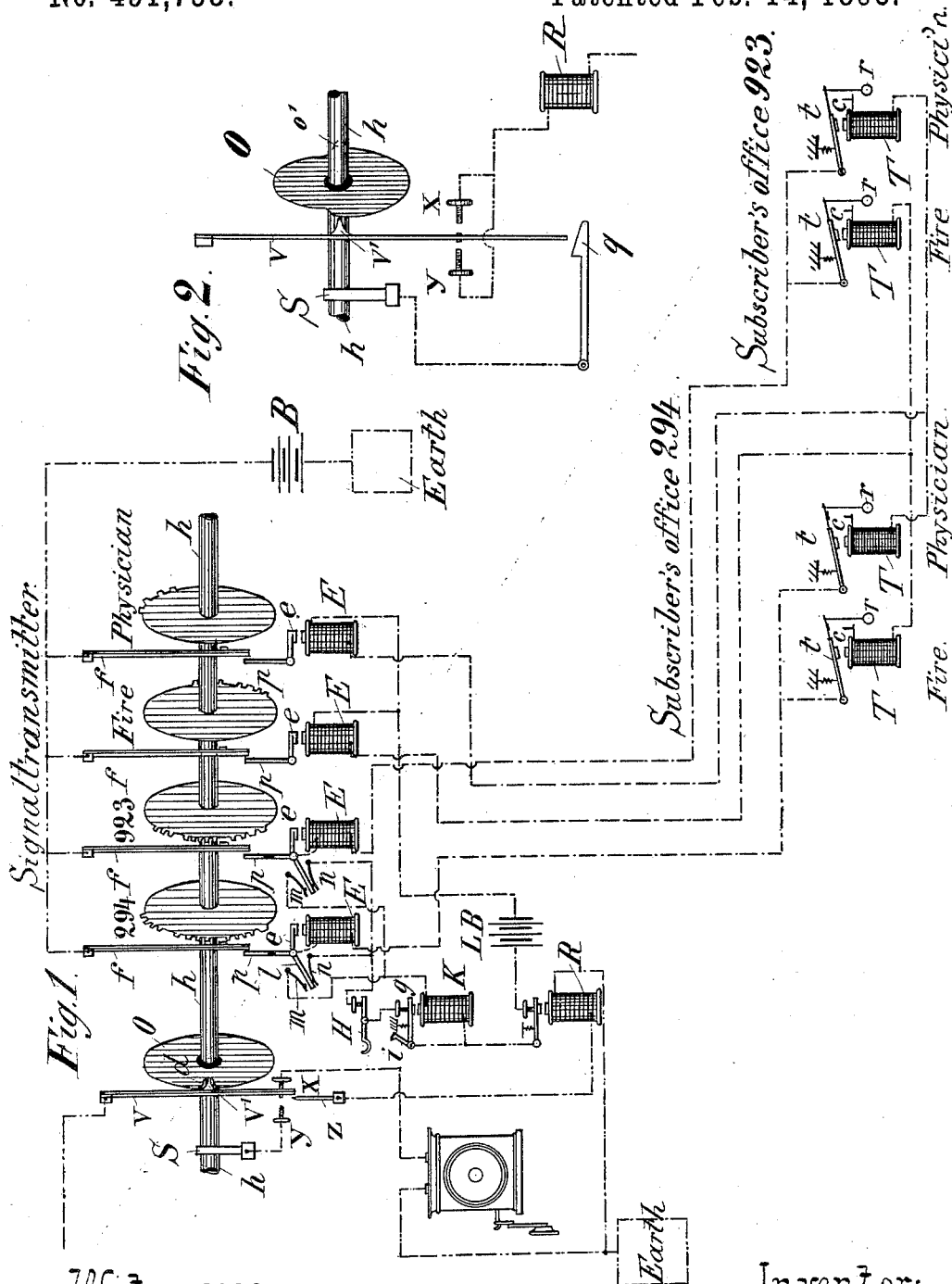


(No Model.)

L. VON ORTH.
ELECTRIC SIGNALING APPARATUS.

No. 491,758.

Patented Feb. 14, 1893.



Witnesses:
Klas H. Truett
H. Faber du Faur

Inventor:
Ludwig von Orth
By A. Faber du Faur
Attorney.

UNITED STATES PATENT OFFICE.

LUDWIG VON ORTH, OF BERLIN, GERMANY.

ELECTRIC SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 491,758, dated February 14, 1893.

Application filed April 14, 1892. Serial No. 429,212. (No model.) Patented in France October 21, 1891, No. 216,816; in Belgium October 21, 1891, No. 96,885; in Norway October 21, 1891, No. 2,472, and in Italy December 31, 1891, XXV, 30,625, LX, 109.

To all whom it may concern:

Be it known that I, LUDWIG VON ORTH, a subject of the King of Württemberg, residing at Berlin, Prussia, Germany, have invented
5 new and useful Improvements in Electric Signaling Apparatus for Use with a Network of Electrical Lines or Conductors, (for which I have obtained Letters Patent in Italy, Reg. Gen., Vol. 25, No. 30,625, Reg. Att., Vol. 60, Nc. 109, dated December 31, 1891; in France,
10 No. 216,816, dated October 21, 1891; in Belgium, No. 96,885, dated October 21, 1891, and in Norway, No. 2,472, dated October 21, 1891,) of which the following is a specification.
15 My invention relates to a novel construction and arrangement of apparatus whereby one or more predetermined signals can be sent from any point of a net work of electrical lines to a station electrically connected with
20 this net work. A telephonic net for instance may thus be used for transmitting fire and other signals in an automatic manner to a telephonic intermediate station and from thence to another station. Any desired number
25 of subscribers' telephonic apparatus within a given district may be so connected as to enable signals to be sent through a single telephonic circuit common to the district. The construction and arrangement of the apparatus
30 is such that the telephonic traffic will not be impeded, as signals cannot be sent off as long as the telephonic circuit is engaged for conversation. On the other hand, from the moment when a signal has been sent off
35 until the same has been received, the telephonic circuit cannot be used for conversation. It is moreover impossible to send off signals simultaneously from different subscribers' offices connected to the same circuit,
40 so that any error which might otherwise occur at the station by confounding the signals, is completely avoided. Furthermore the person desiring to send off a signal can ascertain whether the signal has been transmitted or
45 whether the circuit is in use; in the former case the receipt of the signal is acknowledged from the station and in the latter case the signal key does not remain depressed.

In order to attain the above mentioned objects, an apparatus herein called a signal
50 transmitter is provided for a given district,

and all the subscribers' offices in the same district are connected therewith and provided with disengaging devices, hereinafter called keys for electrically controlling it.

In the accompanying drawings Figure 1 diagrammatically illustrates the apparatus and connections employed, and Fig. 2 illustrates a modified form and connections for the signal transmitter.

In the diagrams I have shown two subscribers' offices, say for example Nos. 294 and 923, electrically connected with the signal transmitter, each office being provided with two keys for giving two different signals, for instance "Fire" and "Physician." Any desired larger number of subscriber's offices may be electrically connected with the signal transmitter, in a similar manner and any desired number of signals may be sent off as
70 will be hereinafter more fully described.

The signal transmitter carries upon a shaft *h* driven by a train of ordinary wheel-work, a number of conducting disks, the peripheries of which are provided with projecting teeth
75 corresponding to Morse letters; there is arranged for each office connected with the signal transmitter a disk marked with the number of the office, and for each signal to be sent a separate disk is provided. In the apparatus shown there are therefore four disks
80 the Morse letters of which signify "294," "923," "Fire" and "Physician." Corresponding to each disk there is a spring contact arm *f* and an electromagnet *E*. When one of the
85 latter attracts its armature *e*, an insulated arm *p* secured to the armature presses the corresponding spring contact arm *f* into contact with the corresponding disk so that when this disk is revolved by the shaft *h* and wheel-work, currents of relatively different lengths
90 or duration and corresponding to the Morse code, will be sent from the battery *B* to the spring contact *S*. The arrangement of the inscription upon the disks is such that the
95 signs corresponding to the signals "Fire," "Physician" &c. are displaced the one in relation to the other and in relation to the signals corresponding to the numbers so that the called signals and the number of the sub-
100 scriber's office will be sent off consecutively.

The armatures *e* of the electro-magnets *E*

corresponding to the numbered disks are also connected to a second arm l which in its position of rest is in contact with a spring contact n but which when the armature e is attracted 5 bears against a spring contact m and breaks contact with the contact n . The shaft h also carries an insulated disk O formed with a recess d . In the rest position of this disk a boss v' , secured to a spring contact arm v enters this recess. The circuit to the telephone station is then connected by the contact arm v and the screw x to the telephone apparatus. When the shaft h revolves, the contact arm v is pressed against the screw y and 10 by this means the circuit to the telephone station is electrically connected with the contact S . At each revolution the contact arm v returns once to x and in so doing touches a spring z so that for a moment the circuit is electrically connected with a relay R . The keys T consist each of an electromagnet, the armature t of which is secured to a pivoted arm that can be moved downward by the person desiring to send a signal by means of a 25 ring r fastened to a cord so that a contact c will be closed.

Assuming the signal "Fire" has to be sent off from the subscriber's office 294: the caller for this purpose pulls down the ring r of the 30 corresponding key T thereby closing a circuit that passes from the local battery LB through the electro-magnet E corresponding to the disk "Fire" of the signal transmitter, then through the electro-magnet of the key pressed 35 down and the contact c of the same, then through the electro-magnet E of the disk No. 294, the corresponding lever l and contact n , thence through a contact piece arranged on the telephone hook H , through a contact g controlled by an electro-magnet K , and through 40 the rest contact of the relay R back to the local battery. When a conversation is taking place over the line, this circuit will be broken at H , and the electro-magnet E cannot therefore be excited at this time and the ring r will rise again under the action of a spring or weight thereby indicating that the telephone line is in use. When however the telephone is suspended on the hook at H , the circuit 50 mentioned is closed and the armature t of the key T will remain attracted. The electro-magnets E of the disk's "Fire" and "294" will attract their armature e and press the corresponding contact arms f against the disks. 55 The armature e of the electro-magnet corresponding to disk 294 at the same time moves the arm l away from the spring n and into contact with the contact m whereby the electro-magnet K is placed in the local circuit and excited. This electro-magnet then attracts its armature thus breaking the contact at g and by means of a pawl i releases the wheelwork for driving the shaft h of the signal transmitter. A signal cannot now be sent 65 from another subscriber's office because the circuit from the keys at the other subscriber's office No. 923 through the electro-magnet

E of the disk No. 923 and the corresponding contact n is broken at g . In addition to the signal "Fire" the same subscriber's office No. 70 294 can also send off the signal "Physician." While the apparatus is operating to send a signal it cannot be put out of action by lifting off the telephone, *i.e.* by breaking the circuit at H . As the shaft H revolves, the contact 75 arm v bears against the screw y and currents then pass from the battery B through the springs f , the disks "Fire" and "294;" the shaft h , the contact S , the contact arm v and the circuit to the intermediate telephone station, where the indicator shutter will fall and thus call attention. As soon as the attendant at this station has put in circuit his apparatus, he will hear the characteristic ticking of the telephone diaphragm corresponding to the Morse letters thereby indicating 85 that a signal is being sent off and he can therefore in the known way put the desired station in circuit, where the alarm signal arranged on the telephone case will sound. 90 The attendant at this station by taking off the telephone will hear the ticking of the telephone diaphragm and by leading the circuit through a Morse apparatus can receive the signal. He then sends into the line from 95 the central station a current which, as soon as the contact arm v comes into contact with the spring contact z which takes place once for each revolution of the disk O or the shaft h , flows through the relay R which then 100 breaks the local circuit at G . All the electro-magnets E of the signal transmitter and also that of the key T then cease to be energized, the wheelwork is arrested and the armature t of the key T that was operated swings upward thus indicating that the signal has been 105 received.

In the case of a fire signal, the attendant at the central station can send the signal directly, by reversing, to the fire brigade office. 110 In this case the counter-current to effect the stoppage of the wheelwork and serving to acknowledge the receipt of the signal may be sent off directly from the fire brigade office instead of from the central office. 115

When for the signal transmitter a telephonic net is not used and a special conducting wire net is employed, it is not necessary to arrange from the central station a special circuit for each signal transmitter, but any 120 optional number of signal transmitters may be connected with branches of the same circuit. For this purpose it is only necessary to alter the construction of the device for reversing the line circuit while the local circuit remains as above described. In this case the line circuit is insulated on all the terminal points while the signal transmitter is at rest. When the latter is in activity, the relay is first put into circuit and in consequence 125 thereof the local circuit is immediately interrupted again, if at the same time another transmitter inserted into the circuit is in activity so that any error which may occur at

the central station by confounding the signals is completely avoided. In order that in this case the signal transmitter which last has been put in activity, be surely put out of circuit, indifferently in which state of revolution the signal transmitter put first out of circuit may be at this instant, the construction is arranged in such a manner, that, after a signal transmitter has been put out of circuit, the circuit is first, for a certain space of time, say during half a revolution of the shaft H electrically connected with the relay and then only with the shaft H and is then connected up to the breaking only once at each revolution for a very short time with the relay.

Fig. 2 shows the modification by which the above described purpose is attained.

The insulated disk O is of such a shape, that at the rest position of the signal transmitter the contact arm V is between the contacts X and Y, the circuit is therefore insulated. When the disk O revolves, the contact arm V is placed first against the contact X during half a revolution, then it is pressed by a nose *o'* of the disk O for an instant against the contact Y. Both the contacts X and Y are connected with the relay R. When a current is sent into the circuit by another signal transmitter, while the contact arm V is lying on X or Y, the local current is immediately broken again and the contact arm V returns from the contact Y into its central position. The wheelwork stops after having effected one revolution. But when the circuit is not engaged and the local current remains closed, the armature of the electro-magnet K carrying the stop hook I is excited. This armature is provided with a nose *q* which, as long as the armature is excited, is raised to such an extent that the contact arm V at its return from contact Y is placed against the nose. The current can now flow from the shaft to the contact arm V and to the circuit, which is arranged in such a manner that this circuit is not electrically connected with the local circuit passing at G, through the same armature. The contact arm V is lying during the greater part of the revolution on the nose Q and is placed only for a short time at each revolution by the nose of the disk D on the contact Y, *i. e.* the relay.

I claim—

1. In a telephone system or other network of wires, an interpolated signaling apparatus consisting of signal keys located at the subscribers' offices for the several signals, a signal transmitter inserted into the existing network, and composed of a shaft carrying disks corresponding to the numbers of the subscribers' offices, and one or more disks corresponding to the signals to be transmitted, a motor for operating the transmitter normally held out of action, a local battery, the circuit of which is closed by the keys at the subscribers' offices, a contact arm for each disk, electro-magnets E for bringing the contact arms

into contact with the transmitter disks when vitalized;—whereby the circuit from the main battery B is closed and the signals transmitted to the station, and a release for the motor operated by the closing of the circuit of the local battery, substantially as described.

2. In a telephone system or other network of wires, an interpolated signaling apparatus consisting of signal keys at the subscribers' offices, electro-magnets having their armatures attached to the keys, a signal transmitter containing rotary signal disks and contact arms *f* for the same, a motor normally held out of action by a detent, an electro-magnet K acting on said detent for releasing the motor when vitalized, a switch *Ov* playing between contacts *x y*, and adapted to engage momentarily with a contact *z*, and a relay R vitalized by the closing of the circuit at *z* to break the circuit of the local battery L B through the key T and the electro-magnet K; whereby the key at the subscriber's office is released to indicate that the signal has been received, and the motion of the motor is arrested, substantially as described.

3. In an apparatus of the character specified, the combination of the transmitter, its electro magnets E, switches playing between contacts *m m*, normally in contact with contacts *n*, signal keys at the subscribers' offices, and an electro-magnet K having its coil in the circuit of the local battery and its armature *g* in electrical connection with the contacts *m*, whereby the closing of the circuit at one of the subscribers' offices causes the electro-magnets E to be vitalized to close the circuit through the electro-magnet K, breaking the circuit over its armature *g* and thereby preventing a second subscriber's office from sending a signal, substantially as described.

4. In a telephone system or other network of wires, an interpolated signaling apparatus embodying signal keys K located at the subscribers' offices, a signal transmitter including in its construction circuit closers and actuating electro-magnets E for the same, combined with means for preventing telephonic conversation from being interrupted by the sending of a signal, consisting of suspension hooks H for the receivers placed in the circuit of the local battery and arranged to normally close the circuit through the signal keys and the electro-magnets E of the signal transmitter by the weight of the suspended receiver, and to automatically break said circuit when the receiver is removed, substantially as described.

5. In a telephone system or other network of wires, an interpolated signaling apparatus embodying signal keys K at the subscribers' offices, a signal transmitter having an intermittent rotary shaft *h* combined with means for preventing a signal from being interrupted by a telephonic conversation consisting of the disk O secured to the shaft *h*, a switch *v y x* actuated by the disk O on the rotation of shaft *h*, to break the telephonic circuit at *x*

and establish the connection of the transmitter with the main line at *v y*, substantially as described.

6. The signal transmitter herein described, consisting of a shaft carrying disks corresponding to the number of the subscribers' offices and to the signals to be sent, a contact arm for each disk, an electro magnet for each arm, an insulated disk *O* provided with a recess and a contact arm, a main contact *S*, and a motor, substantially as described.

7. In a telephone system or other net-work of wires, the combination of signal keys at the subscribers' offices, a signal transmitter at the district station provided with a series of disks corresponding to the numbers of the subscribers' offices and with one or more disks corresponding to the signals to be transmitted, a motor for the transmitter normally held out of action, a contact arm *f* for each disk, electro-magnets *E* having their armatures in operative connection with the contact arms, an electro-magnet *K*, a contact operated by the suspension device for the receiver of the telephone, switches operated by the closing of the circuit through the electro-magnets *E* to close the circuit through the electro-magnet *K*, and thereby causing the release of the motor of the transmitter and the breakage of the circuit through the remaining offices; electro-magnets *T* acting on the signal keys at the subscribers' offices, a switch normally closing the circuit through the main line, but breaking the same during the operation of the transmitter, and a relay *R* for breaking the circuit through the electro-magnets and signal keys when a return signal is sent from the main line, substantially as described.

8. In a telephone system or other net-work of wires, an interpolated signaling apparatus consisting of signal keys at the subscribers' offices, a signal transmitter inserted into the existing net-work and comprising a shaft carrying disks for the numbers of the several subscribers' offices and signal disks, said disks being provided with projecting teeth corresponding to letters of the Morse alphabet, a motor for operating the transmitter, normally held out of action, a local battery, the circuit of which is closed by the keys at the subscribers' offices, a contact arm for each disk, and electro-magnets *E* for bringing the contact arms into contact with the transmitter disks when vitalized, all substantially as and for the purpose set forth.

9. In an apparatus of the character specified, the combination of signal devices at the subscribers' offices, a signal transmitter, a motor for the same normally held out of action, electrical connections for disengaging the motor on sending a signal from a subscriber's office, a disk *O* carried by the transmitter, the contact arm *v*, the contact *x*, and the relay *R*, all arranged and connected to automatically arrest the motion of the motor after receipt of the signal, by the passage of the return signal, substantially as described.

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

LUDWIG VON ORTH.

Witnesses:

EDUARD PEITZ,
GUSTAV HÜLSMANN.