No. 673,794. Patented May 7, 1901.

C. L. FORTIER.

ELECTRIC SIGNAL AND TELEPHONE SYSTEM.

(Application filed June 12, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 2.




Fig. 1.

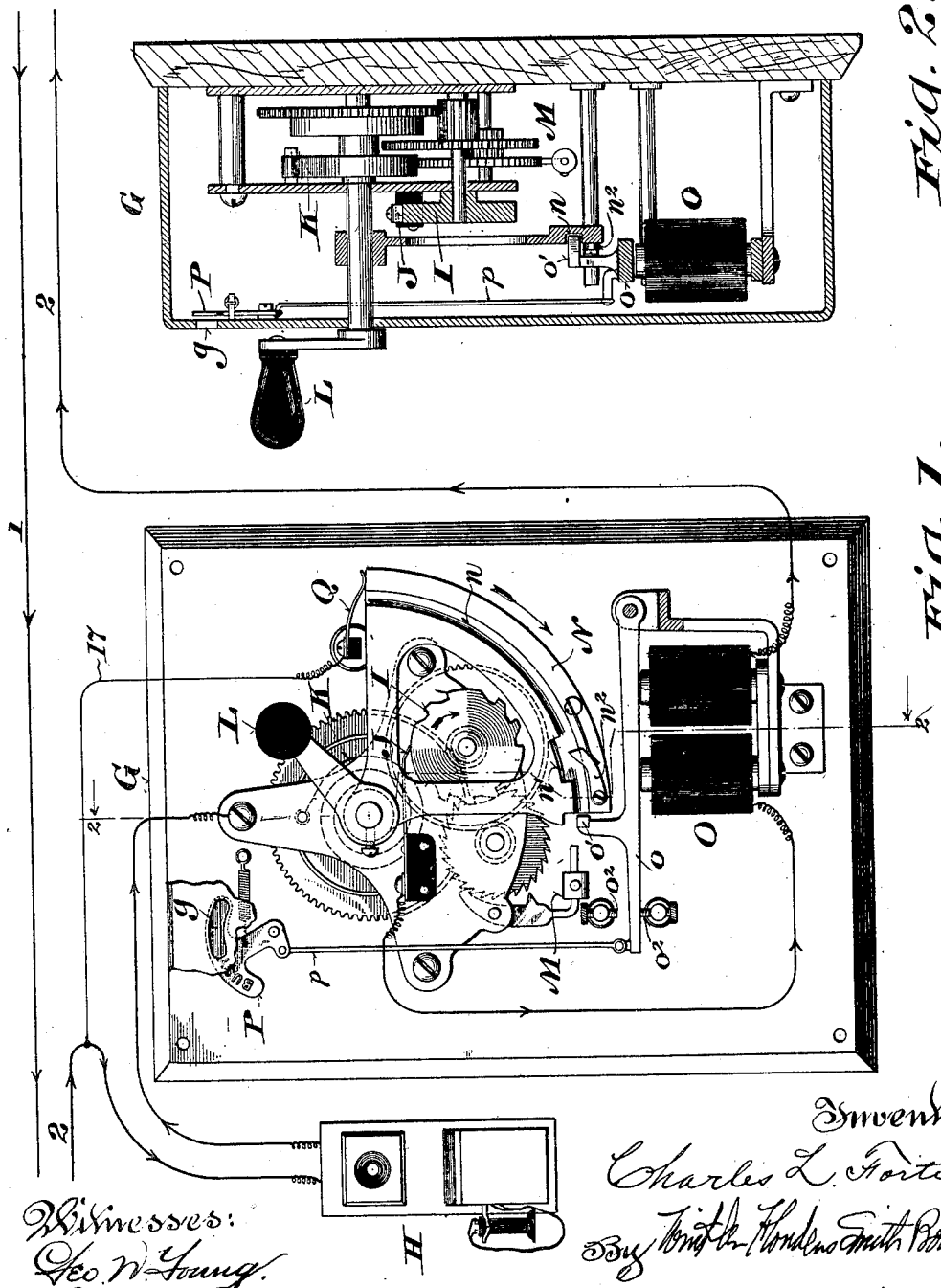


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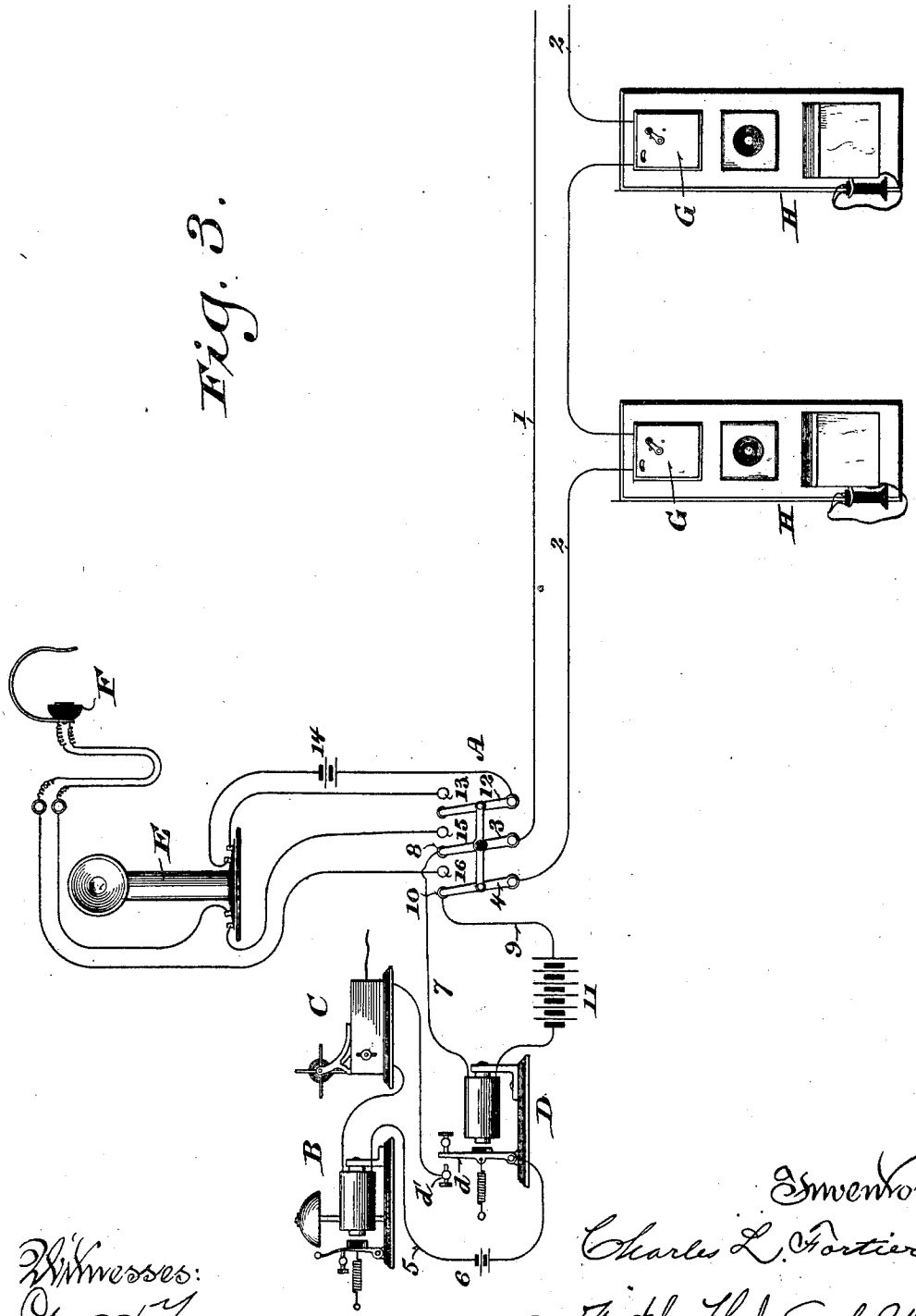
Fig. 3.

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# UNITED STATES PATENT OFFICE.

CHARLES L. FORTIER, OF MILWAUKEE, WISCONSIN, ASSIGNOR OF ONE-HALF TO ALFRED WELLER, OF SAME PLACE.

## ELECTRIC SIGNAL AND TELEPHONE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 673,794, dated May 7, 1901.

Application filed June 12, 1899. Serial No. 720,187. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES L. FORTIER, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Electric Signal and Telephone Systems, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

The main object of my invention is to so combine a district telegraph and signal system with a telephone system that with a single electric circuit any one of a number of subscribers may call up a central station by means of signal-transmitting mechanism designating at the central station the number of the subscriber and hold a conversation by telephone with an operator at the central station, the apparatus being so constructed and arranged that when the circuit is, in response to a call or signal, placed in condition for holding a telephonic communication between the central station and the sender of the signal or call the signal-transmitting instruments and telephones of all other subscribers on the line will be rendered inoperative.

It consists in certain novel features in the construction and arrangement of component parts of the apparatus, as hereinafter particularly described, and pointed out in the claims.

In the accompanying drawings like characters designate the same parts in the several figures.

Figure 1 is a front elevation of a call-box constituting a part of the system embodying my invention, the greater portion of the cover or case being broken away to disclose the internal mechanism of the box. Fig. 2 is a vertical section thereof on the line 2 2, Fig. 1; and Fig. 3 is a diagram illustrating the circuit connections of the system and the apparatus at the central station.

Referring to Fig. 3, 1 and 2 designate wires of the main line or circuit, which are connected, respectively, at the central station with arms 3 and 4 of a switch A. 5 is a local circuit at the central station, including a suitable battery or generator 6, an audible signal B, and register C for indicating or recording the number of a subscriber's box from which a signal or call is transmitted. D is a relay-magnet, the spring-retracted armature *d* and the contact-stop *d'* of which are included in and control the local circuit 5. The coil or winding of the magnet D is connected at one end by a wire 7 with a contact 8 of the switch A and by a wire 9 with a contact 10 of said switch. One of these wires includes the main battery 11 or other source of electricity supplying current to the main line for the transmission of calls or signals from the several subscribers or call-boxes to the central station. The wires 7 and 9, including the winding of magnet D and the battery 11, constitute normally a part of the main circuit. E designates the transmitter, and F the receiver, of a telephone with which the central station is equipped. For convenience the receiver has provision for holding it to the ear of the operator, whose hands are thus left free. The primary of the telephone induction-coil contained in the stand or base of the transmitter E is connected with an arm 12 and contact 13 of the switch A and includes a local battery or generator 14. The secondary, which includes the receiver F, is connected with contacts 15 and 16 of the switch A. Normally said switch is turned to the left and its arms 3 and 4 engage with the contacts 8 and 10, thus closing the main circuit through the main battery or generator 11 and relay-magnet D and cutting out the central telephone. The magnet D being thus energized holds its armature-lever *d* against its front stop, thus normally breaking the local circuit 5. G G designate call-boxes or signal-transmitters arranged in series in the main circuit 1 2, and H H are telephones associated with the several call-boxes.

Referring to Figs. 1 and 2, showing, on an enlarged scale, the internal construction and arrangement of one of the call-boxes, each of which comprises the usual break-wheel I, cooperating contact J, actuating-spring K, winding-crank L, and speed-retarding escapement or train M, N is a segment-wheel fixed on the shaft of crank L. It is formed in one side with a curved groove *n*, concentric with the crank-shaft and having on its inner side a notch or offset *n'*. $n^2$ is a pawl or dog pivoted to said segment on the outer side of said groove and yieldingly held by a

spring over the groove opposite the notch or offset therein. O is an electromagnet, and *o* a pivoted armature-lever having a projection *o'*, adapted, when said lever is attracted by said magnet, to enter the groove *n* in the segment-wheel N. The outer curved wall of the groove *n* is unnecessary and may be dispensed with, provision being made for pivoting the dog $n^2$ in the position in which it is shown. The free end of said armature-lever is adapted to play between opposing stops $o^2$ and is connected by a rod *p* with a spring-retracted pivoted plate or arm P, bearing the word "Busy," or some other word or mark of like import, which when the armature-lever is released is displayed through an opening *g* in the cover or case of the call-box. The coil or winding of magnet O is connected at one end with the contact-spring J and at the other with a part of the wire 2 of the main line. The break-wheel I and segment-wheel N are electrically connected through the metallic frame of the call-box and the secondary induction-coil of the associated telephone H with another part of the wire 2 of the main circuit. Q is a contact-spring electrically connected by a wire or conductor 17 with that part of the main circuit with which the telephone H is connected. It is arranged to be engaged by the segment-wheel N when the latter is at rest in normal position and to short-circuit the associated telephone.

My improved apparatus as hereinbefore described operates as follows: The main circuit 1, 2, 7, and 9 being normally closed by the switch A, as shown in Fig. 3, and supplied with current by the battery or generator 11, the magnets O of all the call-boxes, being included in the main circuit and energized, attract and hold the armature-levers *o* against the front stops $o^2$, with the projections *o'* opposite the grooves *n* in the segment-wheels N, as shown in Fig. 1. In this condition of the apparatus the telephones H H are all short-circuited through the spring-contacts Q, and the telephone at the central station is cut out of the main circuit by the switch A. Consequently no communication by telephone can be held between any subscriber and the central station or between different subscribers. When it is desired to communicate with the central station, the crank L of the call-box is turned to the right, straining the spring K and turning the segment-wheel N in the direction indicated by the arrow. The projection *o'* on the armature-lever being held by the magnet O in line with the groove *n* is passed by the notch *n'* and the dog $n^2$ without interfering with such movement of the segment-wheel N. The separation of said segment-wheel from the contact-spring Q opens the short circuit 17, which normally cuts out the telephone H. When the crank L is released, the spring K turns the break-wheel I to the right, as indicated by the arrow thereon, and also turns the segment-wheel N back to the left toward its initial position. As the notches in the break-wheel pass the spring-contact J the main circuit is broken a number of times, indicating on the register or other receiving instrument at the central station the box from which the call or signal is sent, every opening of the main circuit 1, 2, 7, and 9 closing the local circuit 5 by means of the relay D. Upon the receipt of a call or signal the operator at the central station turns the switch A to the right, cutting the battery 11 and relay-magnet D out of and the central telephone into the main circuit and also closing the local circuit, including the primary of the telephone-induction coil. When the battery 11 is thus cut out of the main circuit, the magnets O being deënergized release the armature-levers *o*, which are withdrawn by their retracting-springs against their back stops $o^2$ in position to lock the segment-wheels, and thus prevent the operation of all other call-boxes except that which is sending in a signal and also prevent the opening of the short circuits 17 through the spring-contacts Q, by which the associated telephones H are rendered inoperative. In the return movement of the segment-wheel N the dog $n^2$ is caught by the projection *o'*, thereby stopping said wheel before it reaches the contact-spring Q and preventing the closing of the short circuit 17. When the main line is deprived of current by shifting the switch A and cutting out the battery 11, as above explained, the projection *o'* on the armature-lever *o*, which is released by its magnet O, is drawn by the retracting-spring out of engagement with the dog $n^2$ into the notch *n'*, with the shoulder at one end of which it thereupon engages, thereby preventing the segment-wheel N from engaging with the contact-spring Q and closing the short circuit 17. The segment-wheel N remains in this position while communication is carried on with the central station by telephone, the breaking of the short circuits of all the other telephones on the line being prevented, as hereinbefore explained, until the operator at the central station shifts the switch A back to the left, cutting out the telephone at that point and connecting the main line with the main battery 11 and relay D. The magnet O of the call-box from which the signal was sent in being energized attracts the armature-lever *o*, carrying the projection *o'* out of engagement with the notch *n'* and releasing the segment-wheel N, which thereupon completes its return movement and by engagement with the contact-spring Q closes the short circuit 17. The magnets O of all the call-boxes being energized and the armature-levers *o* held thereby against their front stops $o^2$, a call or signal may be transmitted to the central station, in the manner above explained, from any box on the line.

For the transmission of a call or signal when the apparatus is in the condition shown in Figs. 1 and 3 current passes from one pole of the battery 11, through wire 9, contact 10,

switch-arm 4, wire 2, including the usual shunt of a telephone H, to the box from which the signal or call is being sent in, thence through the metallic frame, break-wheel I, contact-spring J, and magnet O of that box back to the line-wire 2, wire 1, switch-arm 3, contact 8, wire 7, and relay-magnet D to the other pole of the main battery, the circuit in all other boxes on the line being through the short circuits 17, contact-springs Q, segment-wheels N, break-wheels I, contact-springs J, and magnets O.

For holding a conversation by telephone with the central station the circuit may be traced as follows: Beginning with one terminal of the secondary coil of the telephone-transmitter E at the central station, passing thence through contact 15 and arm 3 of the switch A, a part of the main line 1 and 2, through the magnets O, contact-springs J, break-wheels I, segment-wheels N, contact-springs Q, and short circuits 17 of the several call-boxes, which are locked by the armature-levers *o*, to the call-box from which a signal has been sent and in which the short circuit of the telephone is open at Q, thence through the magnet O, contact-spring J, and break-wheel I of that box to the other part 2 of the main line through the secondary induction-coil of the associated telephone H, arm 4 and contact 16 of the switch A, and thence through the telephone-receiver F at the central station back to the other terminal of the secondary induction-coil of the transmitter E. When the magnets O are deënergized and the armature-levers *o* are thereby released, the arms or plates P are moved into position by the retracting-springs to display through the openings *g* of the covers or cases of all the call-boxes the word "Busy" or other word or mark of like import indicating that the line is in use. Under normal conditions when the magnets O are energized and hold the armature-levers *o* against their front stops $o^2$ the plates P are held, as shown in Fig. 1, against the tension of the retracting-springs in position to conceal the word "Busy."

From the foregoing explanation it will be apparent that while a conversation is being carried on between any telephone H and the telephone at the central station nobody can cut in at other points on the line and listen to such conversation, as when the main battery or generator is cut off from the main line for the use of a telephone all other telephones in the line are held short-circuited and the associated call-boxes locked and inoperative.

I do not wish to be understood as limiting myself to particular details shown and described, as they may be variously modified within the spirit and intended scope of my invention. Any well-known or suitable forms of electric generators, telephones, relays, and signal transmitting and receiving instruments may be employed in the construction of the combined signal and telephone system constituting my invention.

I claim—

1. The combination with an electric circuit, of a source of electricity, signal-receiving apparatus, and a telephone at a central station, a switch for connecting said circuit either with the source of electricity or with the telephone at the central station, signal-transmitting devices, each adapted to indicate at the central station the source of the signal and telephones arranged in series in said circuit, and means adapted, when the circuit is deprived of current, to lock all the signal-transmitting devices and to prevent the operation of the associated telephones except that from which a signal is sent in, substantially as and for the purposes set forth.

2. The combination with an electric circuit, of a source of electricity, a central telephone, a switch for connecting said circuit with either said source of electricity or said telephone, a signal-receiving instrument, a number of signal-transmitting instruments, each adapted to indicate at the central station the source of the signal and associated telephones arranged in series in said circuit, and means adapted, when the circuit is deprived of current, to render all the telephones of the system inoperative except the central telephone and that associated with the signal-transmitting instrument by which a call is sent in, substantially as and for the purposes set forth.

3. The combination with an electric circuit, of a source of electricity, a telephone, a switch for connecting said circuit with either the source of electricity or the telephone, a number of signal-transmitting instruments arranged in series in said circuit and each adapted to indicate at the central station the source of the signal, telephones associated with, and normally rendered inoperative by, said signal-transmitting instruments, and means adapted, when a call is sent in by any signal-transmitting instrument and said circuit is disconnected from said source of electricity, to automatically lock all the other signal-transmitting instruments and prevent the use of the associated telephones, substantially as and for the purposes set forth.

4. The combination with an electric circuit, a source of current, a central telephone, a switch for connecting said circuit with either the source of current or the telephone, and a signal-receiving instrument, of signal-transmitting instruments arranged in series in said circuit and each adapted to indicate at the central station the source of the signal, telephones associated with, and normally short-circuited by, said signal-transmitting instruments, means for locking said signal-transmitting instruments, and magnets included in said circuit and controlling said locking means, substantially as and for the purposes set forth.

5. The combination with an electric circuit and a source of current therefor, of a signal-transmitting instrument comprising a break-

wheel and coöperating contact arranged in series in said circuit, a part movable with said break-wheel, a detent for locking said movable part and the associated break-wheel, a shunt or short circuit normally closed by said movable part, an associated telephone connected with said circuit and shunt and inoperative when the shunt is closed and a magnet arranged in said circuit and normally holding said detent in releasing position while said circuit is supplied with current, substantially as and for the purposes set forth.

6. The combination with an electric circuit, a source of current therefor, a telephone and a switch for disconnecting said circuit from the source of current, of signal-transmitting instruments and associated telephones, each signal-transmitting instrument comprising a break-wheel, a coöperating contact and a movable part normally short-circuiting the associated telephone and rendering it inoperative, a detent controlling the operation of said movable part, and a magnet normally holding said detent in position to permit the operation of said movable part when said circuit is closed and connected with its source of current, said detent being adapted when released by said magnet to lock said movable part and prevent the operation of said break-wheel and of the associated telephone, substantially as and for the purposes set forth.

7. The combination with an electric circuit, a source of current therefor, a telephone, a switch for disconnecting said circuit from the source of current, and a signal-receiving instrument, of a signal-transmitting instrument comprising a break-wheel and a coöperating contact arranged in series in said circuit, an associated telephone, a circuit-controller operated by said signal-transmitting instrument to operatively connect said telephone with said circuit when the break-wheel is put in operation, a detent for locking said signal-transmitting instrument when other telephones on the line are in use, and a magnet arranged in said circuit and adapted, when energized, to hold said detent in releasing position, substantially as and for the purposes set forth.

8. The combination with an electric circuit, a source of current therefor, a telephone, a switch for connecting said telephone with either said source of current or with said telephone, and a signal-receiving instrument, of a signal-transmitting instrument comprising a break-wheel and a coöperating contact normally connected in series with said circuit, an associated telephone, a movable part connected with the signal-transmitting mechanism and normally cutting said telephone out of circuit and preventing its operation, a detent for locking said movable part and preventing the operation of the associated break-wheel and telephone when other telephones on the line are in use, and a magnet included in said circuit and adapted, when connected thereby with said source of current, to hold said detent in a position permitting the operation of said break-wheel and telephone, said movable part having a yielding dog adapted, by engagement with said detent, to prevent cutting out said telephone after the operation of the break-wheel and while said magnet is energized, and having also a notch or shoulder adapted, by engagement with said detent when it is released by said magnet and disengaged from said dog, to prevent the cutting out of said telephone until the magnet is again energized, substantially as and for the purposes set forth.

9. The combination with a break-wheel, a coöperating contact, means for actuating said break-wheel and means for manually winding such mechanism for operation, of a segment or arm connected with said mechanism so as to be turned in one direction in winding the mechanism and in the other direction in transmitting a signal, a circuit-controller adapted to be closed by said segment or arm in its normal or initial position, a detent for locking said segment or arm in that position, and a magnet arranged, when energized, to hold said detent in releasing position, said segment or arm having a dog and a shoulder or abutment adapted, by engagement with said detent in the return movement of the segment, to prevent it from closing said circuit-controller until said magnet has been deenergized and then energized, substantially as and for the purposes set forth.

In witness whereof I hereto affix my signature in presence of two witnesses.

CHARLES L. FORTIER.

Witnesses:
CHAS. L. GOSS,
KENT H. FLANDERS.